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EMC Test Report

APPLICANT	UNIMO Technology Co., Ltd.
MODEL NO.	UDR-4004

Test Item	:	Digital Hard Disk Recorder
Model No.	:	UDR-4004
Manufacturer	:	UNIMO Technology Co., Ltd.
Directive	:	Electromagnetic Compatibility Directive 89/336/EEC
Test Standard	:	EN55022:2006 Class A EN50130-4:1995+A1:1998+A2:2003 EN61000-3-2:2006 EN61000-3-3:1995+A1:2001+A2:2005
Dates of Tests	:	October 14 ~ 27, 2008
Date of Issue	:	October 30, 2008
Test Result	:	Passed

Tested by : M.K.KIM/Engineer

Reviewed by : Y.K.SHIN/Manager

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1. General Remarks

This Report describes the emission and immunity characteristics of the tested product.

If the product will be used with additional equipment other than those mentioned in this report or if the tested product will be used against the manufacture's specifications, the compliance with the relevant standards for the system has to be ensured.

2. Test Facility

2.1 Test Laboratory

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

This laboratory is accredited by NVLAP. NVLAP. Code is 200559-0.

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2.2 Measurement Instruments

Refer to each item.

3. General Information

UDR-4004	
Kind of Equipment	Digital Hard Disk Recorder
Model No.	UDR-4004
Serial No.	None
Type of Sample Tested	Pre-Production
Rating Power Supply	Model No.: DA-42I12 Manufacturer : Asian Power Devices Inc. Input : AC100-240V, 50/60Hz, 1.1A Output : DC12V, 3.5A
High Frequency	11.0592MHz, 33MHz, 50MHz, 54MHz, 66MHz
Supplied Power for Test	1 phase 230V, 50Hz
Applicant	UNIMO Technology Co., Ltd. 479-12 Bangbae-3Dong, Seocho-Gu, Seoul, 137-820 Korea
Manufacturer	UNIMO Technology Co., Ltd. 479-12 Bangbae-3Dong, Seocho-Gu, Seoul, 137-820 Korea
Date of Receipt of Sample	2008-09-09

4. Test Summary

4.1 Summary of tests

The data collected shows that the **UNIMO Technology Co., Ltd. (Model No.: UDR-4004) Digital Hard Disk Recorder** complies with **EN50130-4, EN55024, EN61000-3-2 and EN61000-3-3.**

Reference	Parameter		Status
I. Emission			
5.0	Conducted disturbance at mains terminals	EN55022:2006 Class A	C
6.0	Radiated disturbance	EN55022:2006 Class A	C
7.1	Harmonic Current emission	EN61000-3-2:2006	C
5	Voltage fluctuations and flicker	EN61000-3-3:1995+A1:2001+A2:2005	C
II. Immunity			
7.3.4	Main supply voltage variations	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-11:2004	C
8.3.4	Mains supply voltage dips	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-11:2004	C
9.3.4	Electrostatic discharge	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-2:1995+A1:1998+A2:2001	C
10.3.4	Radiated electromagnetic fields (80-2000MHz)	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-3:2002+A1:2002	C
11.3.4	Conducted disturbances induced by electromagnetic fields (0,15-100MHz)	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-6:1996+A1:2001	C
12.3.4	Fast transient bursts	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-4:2004	C
13.3.4	Slow high energy voltage surge	EN50130-4:1995+A1:1998+A2:2003 EN61000-4-5:1995+A1:2001	C
Note 1: C=Conform NC=Not Conform NT=Not Tested NA=Not Applicable			

***The data in this test report are traceable to the national or international standards.**

5. Test Set-up and operation mode

5.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use.

5.2 Test Operation mode

- Normal operate mode

5.3 Support Equipment Used

TYPE	MANUFACTURER	MODEL NO.	SERIAL NO.	CABLE
LCD Monitor	LENOVO KOREA LCC. INC	6135-AB1	N/A	Power : 1.8m, Non-Shield DSUB : 1.8m, Shield
Notebook	TOSHIBA CORP.	PSMEOK-015002	48346917W	Power : 1.8m, Non-Shield LAN : 1.6m, Non-Shield
CCD Camera	KT&C CO., LTD.	KPC-DN5000NH	HB57748	Power : 1.8m, Non-Shield BNC : 1.6m, Shield
USB Mouse	GREAT PLEASURE ELECTRONICS	GOM-3000VE	LNA30903376	USB : 1.6m, Non-shield
USB Memory	Axxen Korea	XUS30	N/A	USB : -

NOTE

- See “APPENDIX 6 Photographs” for actual system test setup

6. Test Result: Emission

RESULT : Comply

6.1 Conducted emission

6.1.1 Measurement Procedure.

In the range of 0.15MHz to 30MHz, the Conducted emission was measured and set-up in accordance with **EN55022:2006 Class A.** The Conducted emission was measured with the equipment under test (EUT) in a screened room. The EUT was placed on a non-metallic table 0.8m above the metallic grounded floor and 0.4m from the reference ground plane (RGP) wall. The distance to other metallic surfaces was at least 0.8m. Line-Impedance Stabilization Networks (LISNs) are bonded to the reference ground plane. The EUT is powered from the KNW-242 LISN and the ancillary equipment is powered from the KNW-407 LISN. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission. For further description of the configuration refer to the picture of the test set-up.

6.1.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
Spectrum Analyzer	8591E	3649A05889	H.P	2008.04	2009.04
RFI/Field intensity Meter	KNM-2402	4N-170-3	Kyoritsu Electrical Works	2008.09	2009.09
LISN	KNW-407	8-317-8	Kyoritsu Electrical Works	2008.08	2009.08
LISN	KNW-242	8-654-15	Kyoritsu Electrical Works	2008.10	2009.10
ISN T400A	T4A	24869	Teseq GmbH	2008.02	2009.02

6.1.3 Conducted emission Test Data

1) Test Data: October 17, 2008 Humidity: 42 %

Temperature: 23 ℃ Barometric: 1000 mbar

2) Measurement uncertainty (95%, Confidence level, K=2): Refer to the APPENDIX 5.

3) Result: For the measurement data, see APPENDIX 1.

4) *: If QP result meet AV limit, AV measurement might not be performed.

6.2 Radiated emission

RESULT : Comply

6.2.1 Measurement Procedure

In the frequency range of 30MHz to 1GHz, the radiated emission were measured on a 10m Semi Anechoic Chamber with a reference ground plane and at a distance of 10 m. The height of the measuring antenna was varied between 1 to 4 m and the table (height: 0.8m) was rotated a full revolution order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report. For further description of the configuration refer to the picture of the test set-up. Measurements were performed with a quasi-peak detector.

6.2.2 List of Test and Measurement Instruments

Radiated Emission (10m Chamber)					
Name of Instrument	**Model No**	**Serial No**	**Manufacturer**	**Cal. Date**	**Next Cal. Date**
EMI Test Receiver	ESU	100014	R&S	2008.01	2009.01
Bilog Antenna	CBL6112B	2737	SCHAFFNER	2008.06	2009.06
Amplifier(22dB)	8447E	2945A02865	H/P	2008.02	2009.02
Controller	5905A	N/A	TOKIN	-	-
ANT.master	N/A	N/A	TOKIN	-	-

6.2.3 Radiated emission Test Data

1) Test Data: October 14, 2008 Humidity: 46 %
Temperature: 19℃ Barometric: 1001 mbar

2) Measurement uncertainty (95%, Confidence level, K=2): Refer to the APPENDIX 5.

3) Result : For the measurement data, see APPENDIX 2.

7. Test Results: Immunity

7.1 Electrostatic discharge

RESULT : Comply

7.1.1 Measurement Procedure

The immunity against electrostatic discharge was tested in accordance with **EN50130-4:1995+ A2:2003.** The test set-up was made accordance with **EN61000-4-2:1995+A1:1998+A2:2001** in screened room. A ground reference plane was located on the floor, and connected to earth via a low impedance connection. The return cable of the ESD generator was connected to the reference plane. In case of table top equipment, EUT was placed on the reference plane on 80cm of insulating support. And a vertical coupling plane (VCP) of 0.5*0.5m was located 10cm from the EUT's sides. The VCP was connected to the reference plane via a cable with a 470㏀ (2EA) resistor. The test was made by applying contact and air discharges to the EUT and contact discharges to the VCP/HCP. When applying the discharges to the VCP the tip of the generator was located at the middle edge of the VCP. The VCP was located 10cm from each side of the EUT. Contact discharges of up to ±6kV were applied to various points of the EUT at conductive surfaces and to the HCP/VCP. Air discharges of up to ±8kV were applied to various points of the EUT at non-conductive surfaces.

Severity level	:	3 (Contact discharge)
		3 (Air Discharge)
Test voltages	:	±2.0kV, ±4.0kV, ±6.0kV (Contact Discharge)
		±2.0kV, ±4.0kV, ±8.0kV (Air Discharge)
Performance criterion	:	B

7.1.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
BEST EMC	BEST EMCV2.7	200126-006SC	SCHAFFNER	2007.11	2008.11
ESD GUN	BEST-ESD	1072	SCHAFFNER	2007.12	2008.12
PC	MF05	A6982GT500558	SAMSUNG	N/A	N/A

7.1.3 ESD Test Point and Result

1) Test Data: October 20, 2008 Humidity: 51 %
Temperature: 23 ℃ Barometric: 998 mbar

2) Uncertainty (95% confidence): ±5%

"It has been demonstrated that the ESD generator meets the specified requirements in the standard with at least 95% confidence"

3) Point and Result

No.	Position	Kind of Discharge	Result	Remarks
1	Enclosure(Front)	Air	PASS	No disturbance of function
2	USB port(Front)	Air	PASS	No disturbance of function
3	Enclosure(Metal)	Contact	PASS	No disturbance of function
4	Screws	Contact	PASS	No disturbance of function
5	Ports	Contact	PASS	No disturbance of function
6	Horizontal Coupling Plane Vertical Coupling Plane	Contact	PASS	No disturbance of function

Table 1 : ESD, Positive / Negative Polarity

7.2 Radiated electromagnetic fields (80-2000MHz)

RESULT : Comply

7.2.1 Measurement Procedure

The immunity against radiated electromagnetic fields in the frequency range between 80 and 2000MHz was tested in accordance to **EN50130-4:1995+A1:1998+A2:2003.** The test set-up was made accordance with **EN61000-4-3:2002+A1:2002** in semi-anechoic chamber. The EUT has been placed in center of a wooden turntable. The height of this table was 0.8m. The field strength was monitored by an isotropic sensor during the complete test. The isotropic sensor was located beside the equipment. The antenna has been orientated for both horizontal and vertical polarization. The distance between antennas the equipment under testing was at least 3m. The tests have been performed with the antenna facing each of the four side of the EUT.

Severity level	:	3
Field strength	:	1V/m, 3V/m, 10V/m
Frequency range	:	80MHz -2GHz
Modulation	:	AM, 80%,1kHz sine-wave PM, 1 Hz (0.5s On : 0.5s Off)
Step size	:	1% of fundamental
Sweep capability	:	$1.5x10^{-3}$decade/s
Performance criterion	:	A(1V/m, 3V/m) B(10V/m)

7.2.2List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
Control computer	Pentium 750MHz	N/A	SAMSUNG	-	-
Software	TEMTO-RS	Ver.4.3en	TSJ	-	-
Electric Field Sensor (~5GHz,~800V/m)	HI-6005	107823	Holaday	2007.12	2008.12
Signal Generator(3.3GHz)	SML03	100647	Rohde & Schwarz	2008.03	2009.03
Power Meter	NRVD	100403	Rohde & Schwarz	2008.03	2009.03
RF Switch Matrix(~12GHz,500W)	RFM-S3A2CIL	2075	TSJ	N/A	N/A
Antenna(75M~1.5GHz,1kW)	VULP9118	754	Schwarzbeck	N/A	N/A
Horn Antenna(0.8G~5GHz)	BBHA9120A	322	Schwarzbeck	N/A	N/A
RF Power Amplifier(~1GHz,250W)	AP32 MT225	0604-0743	PRANA	N/A	N/A
RF Power Amplifier(1-3GHz,25W)	5055R	1007	Ophir RF	N/A	N/A

7.2.3 Test Result

1) Test Data: October 21, 2008 Humidity: 55 %

Temperature: 24 ℃ Barometric: 997 mbar

2) Uncertainty(95% confidence, k=2.28): ±1.6dB

3) Result:

Port	Result	Remarks
Enclosure	1V/m PASS	No disturbance of function
	3V/m PASS	No disturbance of function
	10V/m PASS	No disturbance of function

Table 2 : Radiated electromagnetic fields

7.3 Fast transient bursts

RESULT : Comply

7.3.1 Measurement Procedure

The immunity against fast transient bursts was tested in accordance to **EN50130-4:1995+A1: 1998+A2:2003.** Test set-up with capacitive clamp and fast transient noise generator was according to **EN61000-4-4:2004.** The EUT has been placed on a wooden table 10cm above the reference ground plane. The reference ground plane exceeded the projected geometry of the EUT and the capacitive clamp by more than 20cm. The clamp has placed directly on the reference ground plane. The un-used signal connector of the clamp has been terminated with a 50Ω resistor. The distance between the EUT and all other conductive structures except the ground plane beneath the EUT was more than 50cm. The distance between noise generator and EUT was about 50cm.

AC Power port	
Severity level	: 3
Test voltage	: 0.5, 1, 2 (Kv)
Polarity	: Negative / Positive
Repetition frequency	: 5kHz
Performance criterion	: B

Signal port and Telecommunication port	
Severity level	: 2
Test voltage	: 0.25, 0.5, 1 (Kv)
Polarity	: Negative / Positive
Repetition frequency	: 5kHz
Performance criterion	: B

7.3.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
BEST EMC	BEST EMCV2.7	200126-006SC	SCHAFFNER	2007.11	2008.11
PC	MF05	1062	SCHAFFNER	2007.12	2008.12
Coupling Clamp	CDN8014	17332	SCHAFFNER	N/A	N/A

7.3.3 Test Result

1) Test Data: October 22, 2008 Humidity: 53 %

Temperature: 21 ℃ Barometric: 999 mbar

2) Uncertainty(95% confidence): ±10%

"It has been demonstrated that the EFT/BURST generator meets the specified requirements in the standard with at least 95% confidence"

3) Result

Line	Result	Remarks
N	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
L1	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
PE	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
N-L1	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
N-PE	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
L1-PE	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function
N-L1-PE	0.5KV PASS 1KV PASS 2KV PASS	No disturbance of function No disturbance of function No disturbance of function

Table 3: EFT, AC Supply line, Positive / Negative Polarity

Line	Result	Remarks
BNC	0.25KV PASS 0.5KV PASS 1KV PASS	No disturbance of function No disturbance of function No disturbance of function
LAN	0.25KV PASS 0.5KV PASS 1KV PASS	No disturbance of function No disturbance of function No disturbance of function

Table 4: EFT Bursts, Signal Line, Positive / Negative Polarity

7.4 Slow high energy voltage surge

RESULT : Comply

7.4.1 Measurement Procedure

The immunity against slow high energy voltage surge was tested in accordance with **EN50130-4:1995+A1:1998+A2:2003.** The Coupling/Decoupling Network and the test set-up were made in accordance with **EN61000-4-5:1995+A1:2001.** The test consists of the injection of slow high energy transients in the AC mains supply lines in both line-to-line and line-to-ground coupling mode, and into the signal and extra low voltage supply lines in line-to-ground coupling mode. The impedance of the transient generator (effectively 2) is characterized by the shape of the open-circuit voltage and the circuit current pulses. To simulate typical installation impedances, 40 are inserted when the generator when extra low voltage and signal lines are tested, and 10 are inserted when the line-to-ground test is conducted on the AC mains lines. The test pulses are coupled into the leads to be tested by means of appropriate coupling networks, which maintain the test pulses within their specification. The reference ground plane exceeded the projected geometry of the EUT and the back filler by more than 20cm. The back filler has been placed directly on a separated reference ground plane. Both ground planes were connected together. The ground terminal of the back filler has been connected directly with its reference ground plane.

AC Power port		
Severity level	:	3
Test voltage	:	0.5, 1, 2 (kV)
Waveshape, open circuit voltage	:	1.2us / 50us
Waveshape, short circuit current	:	8us / 20us
Polarity	:	Negative / positive
Phase shifting	:	0°, 90°, 180°, 270°
Number of surges	:	5 at each phase(Total 25)
Performance criterion	:	B

Signal port and Telecommunication port		
Severity level	:	2
Test voltage	:	0.5, 1 (kV)
Waveshape, open circuit voltage	:	1.2us / 50us
Waveshape, short circuit current	:	8us / 20us
Polarity	:	Negative / positive
Number of surges	:	5
Performance criterion	:	B

7.4.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal.Date
BEST EMC	BEST EMCV2.7	200126-006SC	SCHAFFNER	2007.11	2008.11
PC	MF05	A6982GT500558	SAMSUNG	N/A	N/A
SIGNAL LINE COUPLING NETWORK	CDN 117	17375	SCHAFFNER	N/A	N/A
SIGNAL LINE COUPLING NETWORK FOR UNSHIELDED SYMMETRICALLY OPERATED LINES	CDN 118	SL 400-187	SCHAFFNER	N/A	N/A
COUPLING ACCESSORY	INA 172	SL 403-109	SCHAFFNER	N/A	N/A
COUPLING ACCESSORY	INA 175	SL 403-474	SCHAFFNER	N/A	N/A

7.4.3 Test Result

1) Test Date: October 23, 2008 Humidity: 49 %

Temperature: 23 ℃ Barometric: 998 mbar

2) Uncertainty (95%, Confidence): ±10%

"It has been demonstrated that the Surge generator meets the specified requirements in the standard with at least 95% confidence"

3) Result

Line	Result		Remarks
N to L1	0.5kV	PASS	No disturbance of function
	1kV	PASS	No disturbance of function
N to PE	0.5kV	PASS	No disturbance of function
	1kV	PASS	No disturbance of function
	2kV	PASS	No disturbance of function
L1 to PE	0.5kV	PASS	No disturbance of function
	1kV	PASS	No disturbance of function
	2kV	PASS	No disturbance of function

Table 5: Surge, AC Supply line, Positive/Negative Polarity

Line	Result		Remarks
BNC	0.5kV	PASS	No disturbance of function
	1kV	PASS	No disturbance of function

Table 6: Surge, Signal line, Positive/Negative Polarity

7.5 Conducted disturbances induced by electromagnetic fields (0,15-100MHz)

RESULT : Comply

7.5.1 Measurement Procedure

The immunity against conducted disturbances induced by electromagnetic fields in the frequency range between 0.15 and 100MHz was tested in accordance to **EN50130-4:1995+A1 :1998+A2:2003.** Test set-up was made according to **EN61000-4-6:1996+A1:2001.** The EUT has been placed on a wooden table 0.1m above the reference ground plane. The reference ground plane exceeded the projected geometry of the EUT and the Coupling/Decoupling Network (CDN) by more than 20cm. The CDN has been placed directly on the reference ground plane. The ground terminal of the CDN has been connected directly with the reference ground plane. The cable between CDN and EUT has a length of 20cm.

Severity level	:	3
Applied voltage	:	1V, 3V, 10V
Frequency range	:	150kHz~100MHz
Modulation	:	AM, 80%,1kHz sine-wave PM, 1 Hz (0.5s On : 0.5s Off)
Step size	:	1% of fundamental
Sweep capability	:	$1.5x10^{-3}$decade/s
Performance criterion	:	A(1V, 3V) B(10V)

7.5.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal.Date
Control computer	Pentium 800MHz	N/A	SAMSUNG	-	-
Software	TEMTO-CS	Ver.2.5en	TSJ	-	-
Signal Generator (3.3GHz)	SML03	100647	Rohde & Schwarz	2008.03	2009.03
Power Meter	NRVD	100403	Rohde & Schwarz	2008.03	2009.03
RF Switch Matrix(~12GHz, 500W)	RFM-S3A2CIL	2075	TSJ	N/A	N/A
RF Power Amplifier(~230MHz, 75W)	FLL75	0072	Frankonia	N/A	N/A
EM Clamp	TSIC-23	401	TSJ	N/A	N/A
CDN	M-Type T-Type	-	TSJ	2008.07	2009.07
Decoupling Clamp	TSIC-23-DCN	150	TSJ	2008.08	2009.08

7.5.3 Test Result

1) Test Date: October 24, 2008 Humidity: 53 %

Temperature: 22 ℃ Barometric: 999 mbar

2) Uncertainty (95%, Confidence, k=2): ±1.39dB

3) Result

Port	Result		Remarks
AC power	1V	PASS	No disturbance of function
	3V	PASS	No disturbance of function
	10V	PASS	No disturbance of function

Table 7: Conducted disturbances induced by electromagnetic fields / AC power line

Port	Result		Remarks
BNC	1V	PASS	No disturbance of function
	3V	PASS	No disturbance of function
	10V	PASS	No disturbance of function
LAN	1V	PASS	No disturbance of function
	3V	PASS	No disturbance of function
	10V	PASS	No disturbance of function

Table 8: Conducted disturbances induced by electromagnetic fields / Signal line

7.6 Mains supply voltage dips and voltage variations

RESULT : Comply

7.6.1 Measurement Procedure

Mains supply voltage dips and voltage variations immunity tests were carried out in accordance with **EN50130-4:1995+A1:1998+A2:2003.** The test set-up was made accordance in with **EN61000-4-11:2004.**
The dips/interruption test is only applicable to AC mains. The dips/interruptions were applied at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° on each phase.

7.6.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal.Date
Dropout/Variation Plug In	PNW 2003	200611-531LU	SCHAFFNER	2008.08	2009.08
PC	Y8Y	408K18A102133	LG	N/A	N/A

7.6.3 Test Data

1) Test Date: October 27, 2008 Humidity: 56 %
Temperature: 24 ℃ Barometric: 998 mbar

2) Uncertainty (95% confidence): ± 5%
"It has been demonstrated that the Voltage dips generator meets the specified requirements in the standard with at least 95% confidence"

3) Result

Test Level %Ut	Voltage dips %Ut	Duration of Reduction (periods)	Result
0	>95	0.5 1 5	No disturbance of function No disturbance of function No disturbance of function
40	60	0.5 1 5 10	No disturbance of function No disturbance of function No disturbance of function No disturbance of function
70	30	0.5 1 5 10	No disturbance of function No disturbance of function No disturbance of function No disturbance of function

Table 9: Voltage dips

Supply voltage	Result
Umax 1) Umin 2)	No disturbance of function No disturbance of function

Table 10: Voltage variations

NOTE:
1) Umax = Unom + 10%
2) Umin = Unom – 15%
* Unom = Nominal mains voltage (100V, 240V) include the European normal mains voltage (230V)

8. Harmonic Current emission

Result : Comply

1) Measurement Procedure

The harmonics on AC Mains in the frequency from 0 to 2 kHz were measured using power analyzer. The measurement was carried out under steady conditions. The measurement was performed with the test software (voltech IEC61000-3 windows software v1.09.03RC1).

2) List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
POWER ANALYZER	PM6000	100006700031	VOLTECH INSTUMENT LTD	2008.08	2009.08
REFERENCE IMPEDANCE NETWORK	ES4152	424059	NF CORPORATION	2008.08	2009.08

3) Test Data

(1) Test Date: October 20, 2008 Humidity: 60 %

Temperature: 21 ℃ Barometric: 998 mbar

(2) Measurement uncertainty (95%, Confidence level, k=2) : ± 2.24%

(3) Result: For the measurement data, see APPENDIX 3.

Note)

1) According to EN61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits; the specified power shall be within +/-10% of the measured power.
2) Limit are not specified for
   - Equipment with a rated power of 75W or less (other than lighting equipment)
   - Professional equipment with a total rated power greater than 1kW
   - Symmetrically controlled heating elements with a rated power less than or equal to 200W
   - Independent dimmers for incandescent lamps with a rated power less than or equal to 1kW

9. Voltage fluctuations and flicker

Result : Comply

1) Measurement Procedure

EUT was connected to the Power Analyzer system. Measurements were conducted to obtain the desired flicker parameters. The measuring time depends on which parameters are to be measured:

The measurement was performed with the test software (voltech IEC61000-3 windows software v1.09.03RC1).

2) List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Cal. Date	Next Cal. Date
POWER ANALYZER	PM6000	100006700031	VOLTECH INSTUMENT LTD	2008.08	2009.08
REFERENCE IMPEDANCE NETWORK	ES4152	424059	NF CORPORATION	2008.08	2009.08

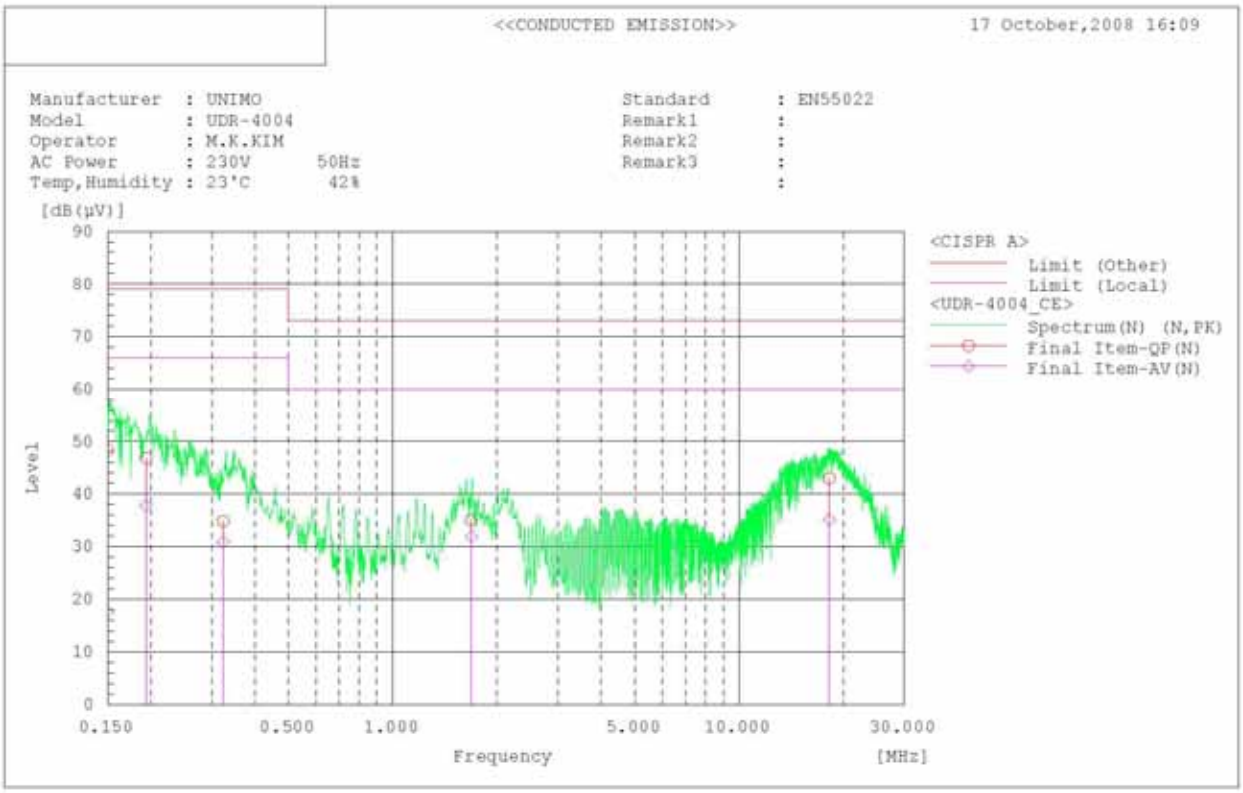
3) Test Data

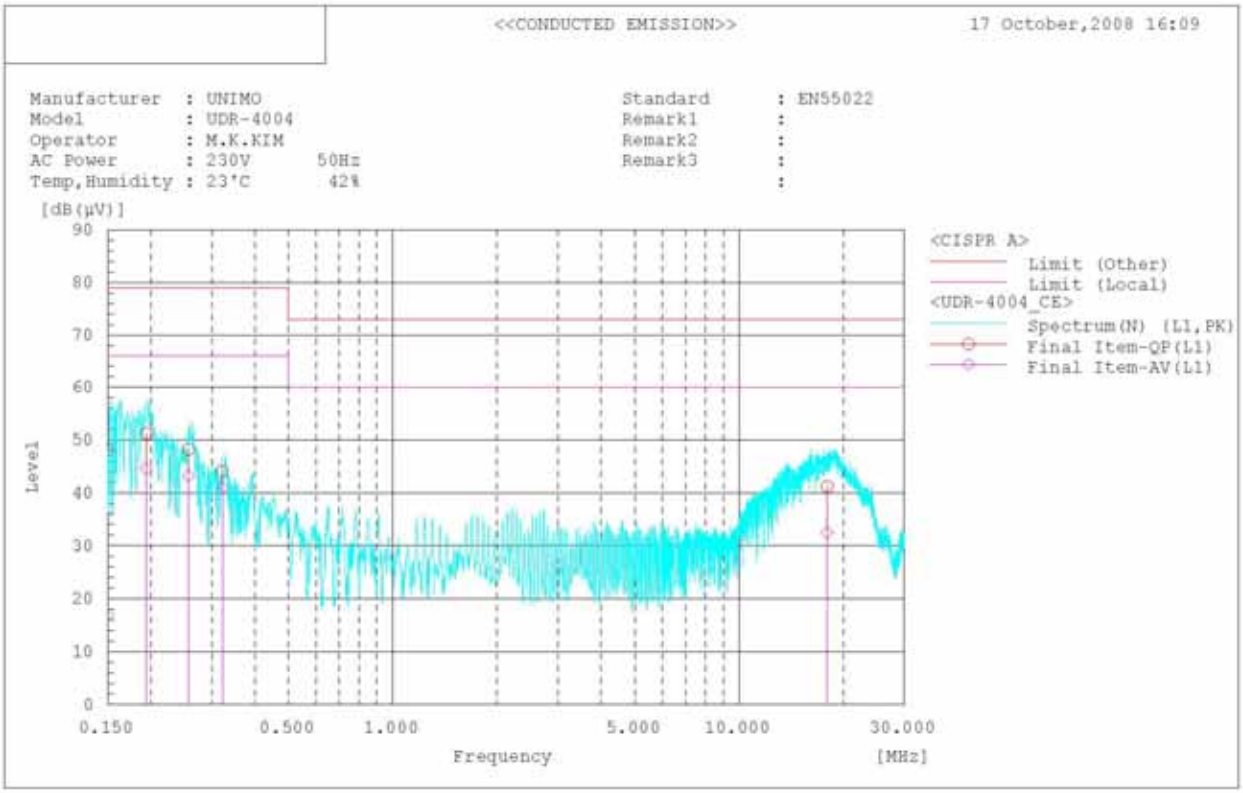
(1) Test Data: October 20, 2008 Humidity: 60 %
Temperature: 21 ℃ Barometric: 998 mbar

(2) Measurement uncertainty (95%, Confidence level, k=2): ± 9.94%

(3) Result: For the measurement data, see APPENDIX 4.

APPENDIX 1 Conducted Emission Graph/Data





<<CONDUCTED EMISSION>>

17 October,2008 16:09

Standard : EN55022
Manufacturer : UNIMO
Model : UDR-4004
Operator : M.K.KIM
AC Power : 230V 50Hz
Temp,Humidity : 23'C 42%
Remark1 :
Remark2 :
Remark3 :

Final Result

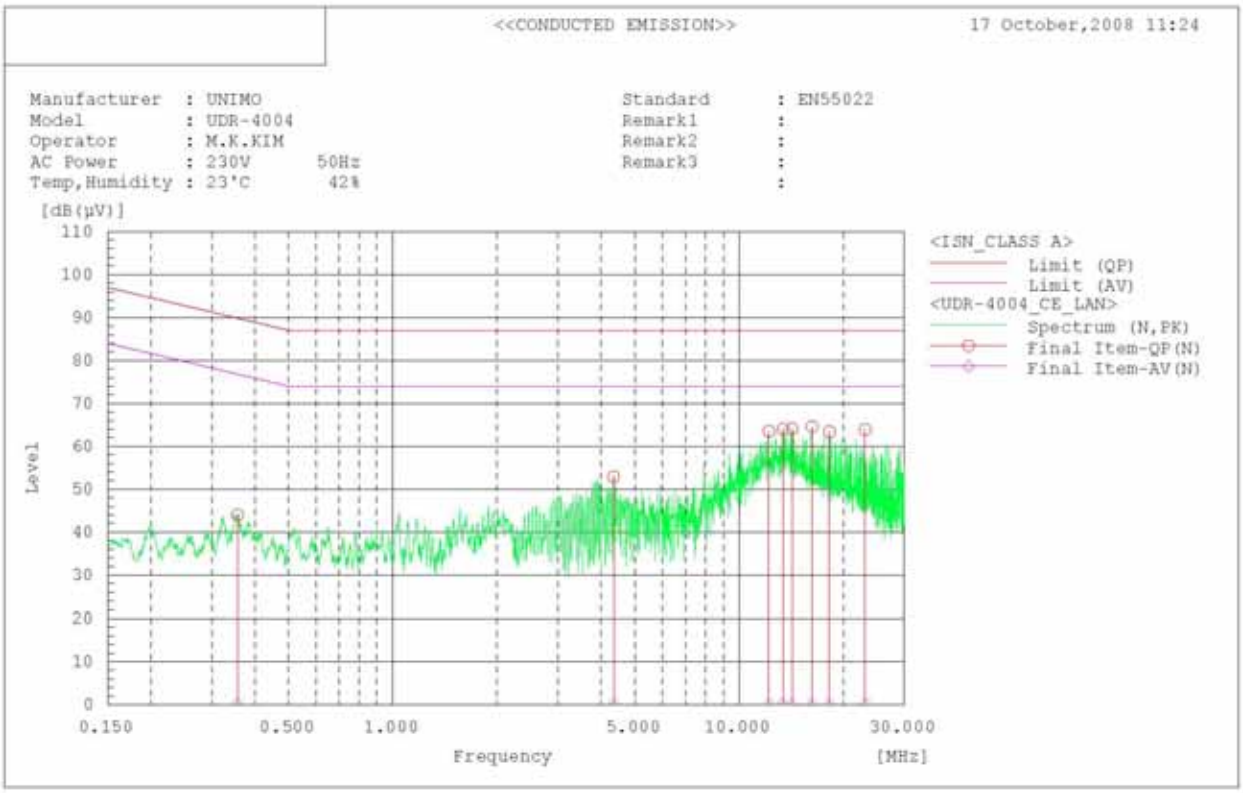
--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.150	48.2	17.5	0.2	48.4	17.7	79.0	66.0	30.6	48.3	
2	0.194	46.8	37.7	0.1	46.9	37.8	79.0	66.0	32.1	28.2	
3	0.324	34.6	30.6	0.2	34.8	30.8	79.0	66.0	44.2	35.2	
4	1.688	34.7	31.6	0.3	35.0	31.9	73.0	60.0	38.0	28.1	
5	18.242	42.1	34.2	0.9	43.0	35.1	73.0	60.0	30.0	24.9	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.150	47.7	16.6	0.4	48.1	17.0	79.0	66.0	30.9	49.0	
2	0.194	50.8	44.2	0.4	51.2	44.6	79.0	66.0	27.8	21.4	
3	0.257	47.8	42.8	0.4	48.2	43.2	79.0	66.0	30.8	22.8	
4	0.322	43.7	40.5	0.4	44.1	40.9	79.0	66.0	34.9	25.1	
5	17.982	40.2	31.5	1.0	41.2	32.5	73.0	60.0	31.8	27.5	

< Telecommunication mode(LAN)>



<<CONDUCTED EMISSION>>

17 October,2008 11:24

Standard : EN55022
Manufacturer : UNIMO
Model : UDR-4004
Operator : M.K.KIM
AC Power : 230V 50Hz
Temp,Humidity : 23'C 42%
Remark1 :
Remark2 :
Remark3 :

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	16.250	54.8	0.0	9.8	64.6	0.0	87.0	74.0	22.4	0.0	
2	12.200	53.8	0.0	9.7	63.5	0.0	87.0	74.0	23.5	0.0	
3	13.425	54.3	0.0	9.7	64.0	0.0	87.0	74.0	23.0	0.0	
4	14.238	54.4	0.0	9.7	64.1	0.0	87.0	74.0	22.9	0.0	
5	23.122	54.0	0.0	9.9	63.9	0.0	87.0	74.0	23.1	0.0	
6	18.245	53.6	0.0	9.8	63.4	0.0	87.0	74.0	23.6	0.0	
7	4.350	43.3	0.0	9.6	52.9	0.0	87.0	74.0	34.1	0.0	
8	0.356	34.1	0.0	9.9	44.0	0.0	89.8	76.8	45.8	0.0	

APPENDIX 2 Radiated Disturbances Graph / Data

Digital EMC

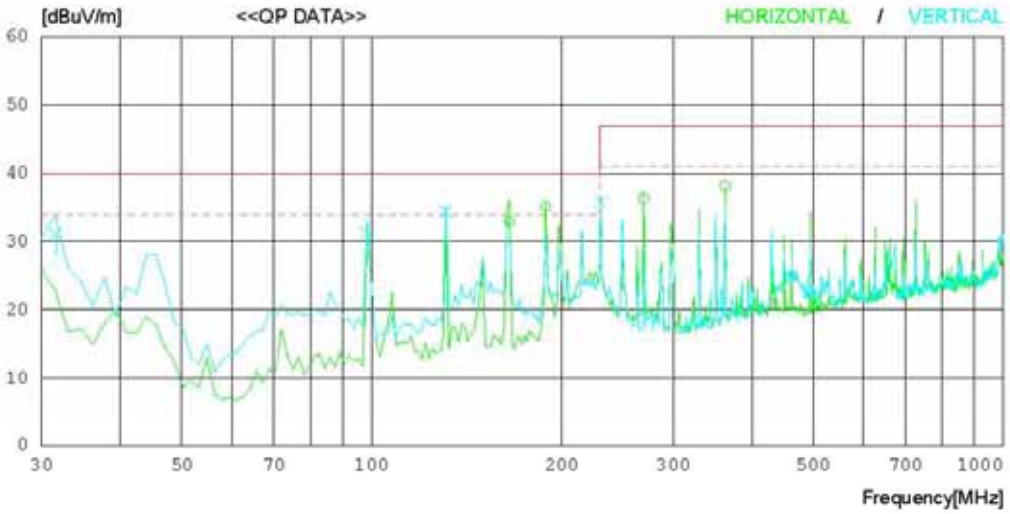
RADIATED EMISSION

Date : 2008-10-14

Model Name	: UDR-4004		Reference No.	:	
Model No.	:		Power Supply	: 230V 50Hz	
Serial No.	:		Temp/Humi	: 19'C 46%	
Test Condition	:		Operator	: M.K.KIM	

Memo :

LIMIT : CISPR Pub.22 Class A (10m)
MARGIN: 6 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	165.241	43.9	10.0	2.0	22.9	33.0	40.0	7.0	399	358
2	188.558	45.9	10.2	2.1	23.0	35.2	40.0	4.8	399	358
3	269.391	43.7	13.4	2.5	23.3	36.3	47.0	10.7	399	92
4	362.660	43.7	15.4	2.9	23.9	38.1	47.0	8.9	199	358
----- Vertical ------										
5	31.554	35.8	16.7	1.0	22.4	31.1	40.0	8.9	100	358
6	98.398	42.1	10.2	1.6	22.6	31.3	40.0	8.7	100	358
7	131.042	44.0	11.4	1.7	22.7	34.4	40.0	5.6	100	358
8	230.529	44.6	12.1	2.3	23.2	35.8	47.0	11.2	100	358

APPENDIX 3 Harmonic Current Emission

Product:	Digital Hard Disk Recorder	2008 Oct 20 11:30am
Serial no:	21'C 60%	Page 1 of 1
Description:	UDR-4004	
Test Date:	2008 Oct 20 10:18am	
Result Name:	UDR-4004	
Type of Test:	EN61000:2006 Harmonics inc. interharmonics to EN61000-4-7:2002	
Limits:	Class A	
Power Analyzer:	Voltech PM6000 v1.20.06RC3 s/n 100006700031	
AC Source:	Mains / Manual Source	

Harmonic Results Against Chosen Limits:	**Notes:**
N/A	Minimum power is greater than maximum

Test Parameter Details	**User Entered**	**Measured**
Operating Frequency:	50	49.9840
Operating Voltage:	230	230.5348
Specified Power:	0.0000	24.1954
Fundamental Current:	0.0000	0.1085
Power Factor:	0.0000	0.4147
Average Input Current:		0.2520
Maximum POHC:		0.0390
POHC Limit:		0.2514
Maximum THC:		0.2288
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	00:02:30	

Product:	Digital Hard Disk Recorder	2008 Oct 20 11:30am
Serial no:	21'C 60%	Page 1 of 1
Description:	UDR-4004	
Result Name:	UDR-4004	
Voltech IEC61000-3 Windows Software 1.09.03RC1		Test Date: 2008 Oct 20 10:18am
Type of Test:	Fluctuating Harmonics Test - Worst Case Table (2006)	
Power Analyzer:	Voltech PM6000 v1.20.06RC3 s/n 100006700031	
AC Source:	Mains / Manual Source	
Overall Result: **N/A**		

Class	Class A
Class Multiplier	1

Harm	Limit 1	Limit 2	Average Reading	<L1	<L2	Max Reading	<L2	Pass FAIL	Harm	Limit 1	Limit 2	Average Reading	<L1	<L2	Max Reading	<L2	Pass FAIL
2	1.0800A	1.6200A	3.281mA	✓	✓	3.633mA	✓	N/A	3	2.3000A	3.4500A	100.9mA	✓	✓	101.4mA	✓	N/A
4	430.0mA	645.0mA	3.240mA	✓	✓	3.595mA	✓	N/A	5	1.1400A	1.7100A	96.77mA	✓	✓	97.24mA	✓	N/A
6	300.0mA	450.0mA	3.101mA	✓	✓	3.423mA	✓	N/A	7	770.0mA	1.1550A	90.70mA	✓	✓	91.15mA	✓	N/A
8	230.0mA	345.0mA	2.956mA	✓	✓	3.255mA	✓	N/A	9	400.0mA	600.0mA	83.00mA	✓	✓	83.38mA	✓	N/A
10	184.0mA	276.0mA	2.772mA	✓	✓	3.041mA	✓	N/A	11	330.0mA	495.0mA	74.06mA	✓	✓	74.39mA	✓	N/A
12	153.3mA	230.0mA	2.581mA	✓	✓	2.806mA	✓	N/A	13	210.0mA	315.0mA	64.24mA	✓	✓	64.53mA	✓	N/A
14	131.4mA	197.1mA	2.341mA	✓	✓	2.574mA	✓	N/A	15	150.0mA	225.0mA	54.00mA	✓	✓	54.23mA	✓	N/A
16	115.0mA	172.5mA	2.114mA	✓	✓	2.319mA	✓	N/A	17	132.3mA	198.5mA	43.75mA	✓	✓	43.93mA	✓	N/A
18	102.2mA	153.3mA	1.908mA	✓	✓	2.107mA	✓	N/A	19	118.4mA	177.6mA	33.69mA	✓	✓	34.03mA	✓	N/A
20	92.00mA	138.0mA	1.722mA	✓	✓	1.915mA	✓	N/A	21	107.1mA	160.7mA	24.84mA	✓	✓	34.99mA	✓	N/A
22	83.63mA	125.4mA	1.563mA	✓	✓	1.748mA	✓	N/A	23	97.82mA	146.7mA	16.98mA	✓	✓	17.13mA	✓	N/A
24	76.66mA	115.0mA	1.441mA	✓	✓	1.611mA	✓	N/A	25	90.00mA	135.0mA	10.62mA	✓	✓	10.95mA	✓	N/A
26	70.76mA	106.1mA	1.334mA	✓	✓	1.492mA	✓	N/A	27	83.33mA	125.0mA	7.287mA	✓	✓	7.380mA	✓	N/A
28	65.71mA	98.57mA	1.254mA	✓	✓	1.398mA	✓	N/A	29	77.58mA	116.3mA	6.976mA	✓	✓	7.089mA	✓	N/A
30	61.33mA	92.00mA	1.196mA	✓	✓	1.316mA	✓	N/A	31	72.58mA	108.8mA	6.191mA	✓	✓	6.320mA	✓	N/A
32	57.50mA	86.25mA	1.131mA	✓	✓	1.223mA	✓	N/A	33	68.18mA	102.2mA	9.201mA	✓	✓	9.322mA	✓	N/A
34	54.11mA	81.17mA	1.064mA	✓	✓	1.146mA	✓	N/A	35	64.28mA	96.42mA	9.468mA	✓	✓	9.573mA	✓	N/A
36	51.11mA	76.66mA	0.991mA	✓	✓	1.073mA	✓	N/A	37	60.81mA	91.21mA	8.948mA	✓	✓	9.038mA	✓	N/A
38	48.42mA	72.63mA	0.919mA	✓	✓	0.981mA	✓	N/A	39	57.69mA	86.53mA	7.854mA	✓	✓	7.936mA	✓	N/A
40	46.00mA	69.00mA	0.848mA	✓	✓	0.909mA	✓	N/A									

<L1 : Reading is below limit 1
<L2 : Reading is below limit 2
N/A : Overall Result is N/A

APPENDIX 4 Voltage fluctuations and flicker

Product:	Digital Hard Disk Recorder	2008 Oct 20 11:31am
Serial no:	21'C 60%	Page 1 of 1
Description:	UDR-4004	
Result Name:	UDR-4004	
Voltech IEC61000-3	Windows Software 1.09.03RC1	Test Date: 2008 Oct 20 9:56am
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM6000 v1.20.06RC3 s/n 100006700031	
AC Source:	Mains / Manual Source	
Overall Result: **PASS**	Notes: Plt test duration only 20 minutes Measurement method - Voltage	

	Plt
Limit	0.650
Reading	0.096

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.096	0.003	0.424	0
Reading 2	0.097	0.005	0.472	0

APPENDIX 5 Measurement Uncertainty(CE/RE)

[CE]

Input Quantity	Probability Distrubution	Probability Distrubution (dB)
		9kHz~30MHz
Expanded measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k=2)	+ 2.30 - 2.30

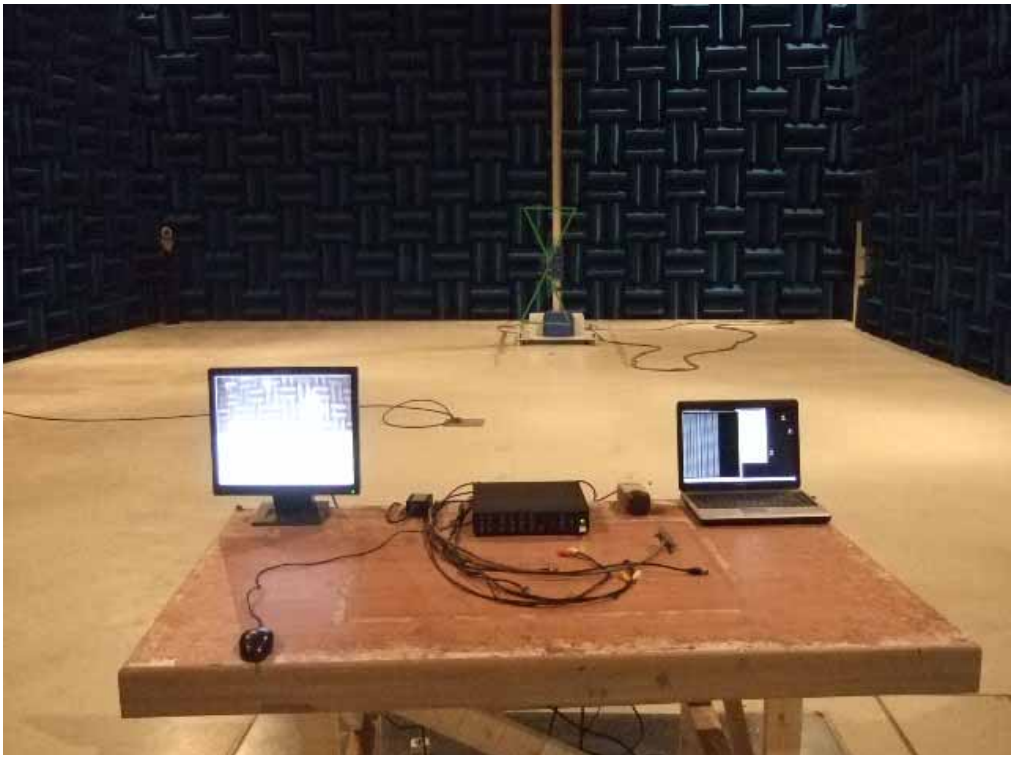
[RE]

Input Quantity	Probability Distrubution	Measurement Uncertainty(dB)	
		3m	10m
		Bi-Log	Bi-Log
Expanded measurement uncertainty (95%,Confidence level,k=2)dB	K=2	30M~1GHz ; + 5.22 - 3.90	30M~1GHz ; + 3.76 - 3.72

APPENDIX 6 Photographs

1. Radiated emission
2. Conducted emission
3. Electrostatic discharge
4. Radiated electromagnetic fields
5. Fast transient bursts
6. Slow high energy voltage surge
7. Conducted disturbances induced by electromagnetic fields
8. Mains supply voltage dips and voltage variations
9. Harmonic Current emission
10. EUT

6-1 Radiated emission



6-2 Conducted emission

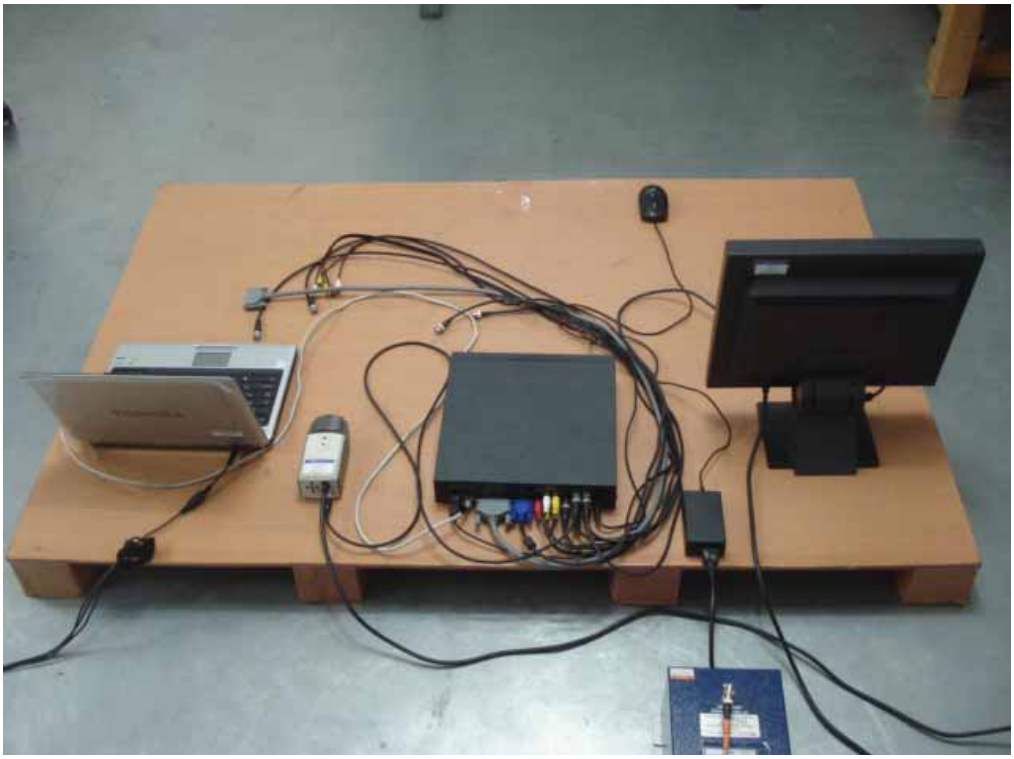
6-3 Electrostatic discharge

6-4 Radiated electromagnetic fields

6-5 Fast transient bursts

6-6 Slow high energy voltage surge

6-7 Conducted disturbances induced by electromagnetic fields



6-8 Mains supply voltage dips and voltage variations

6-9 Harmonic Current emission

6-10 EUT

1. Front View of Product

2. Rear View of Product

3. Inside View of Product