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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 2004/108/EC
 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

mkkim

Y.K. Shin

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory.

This report must not be used by the applicant to claim product endorsement by NVLAP or any agency of the U.S. Government.

NVLAP

NVLAP LAB CODE 200559-0

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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.

DIGITAL EMC CO., LTD.

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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-42112 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

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	: 1.5×10^{-3} decade/s
Performance criterion	: A(1V/m, 3V/m) B(10V/m)

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

7.4 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

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

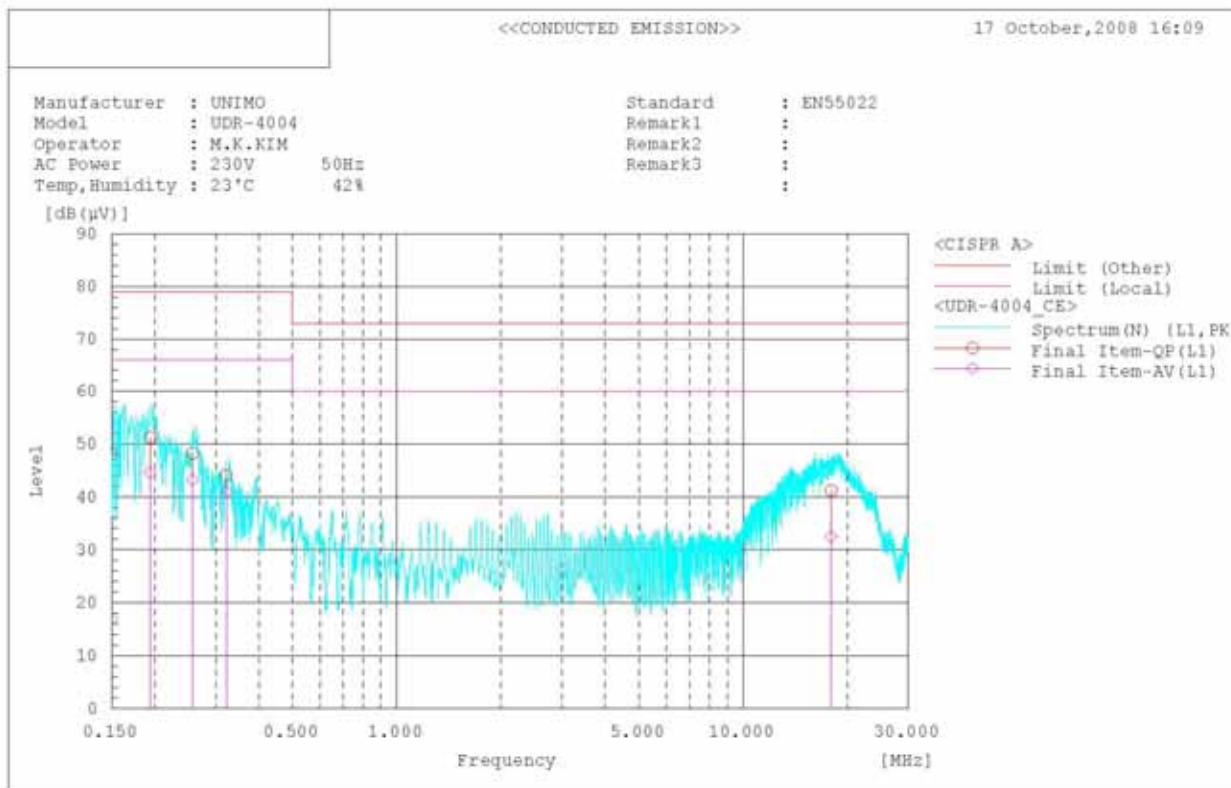
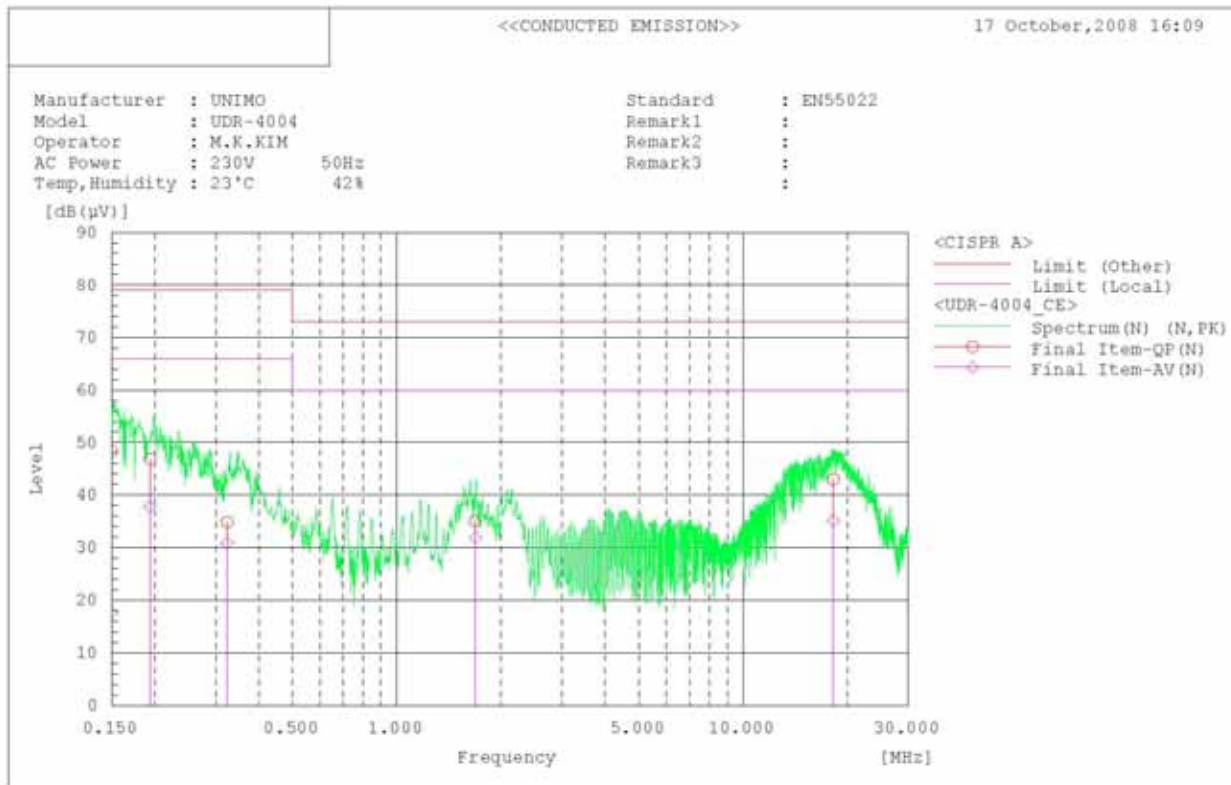
RESULT : Comply

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	: 1.5×10^{-3} decade/s
Performance criterion	: A(1V, 3V) B(10V)

APPENDIX 1 Conducted Emission Graph/Data



*****<<CONDUCTED EMISSION>>*****
 17 October, 2008 16:09

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

Final Result

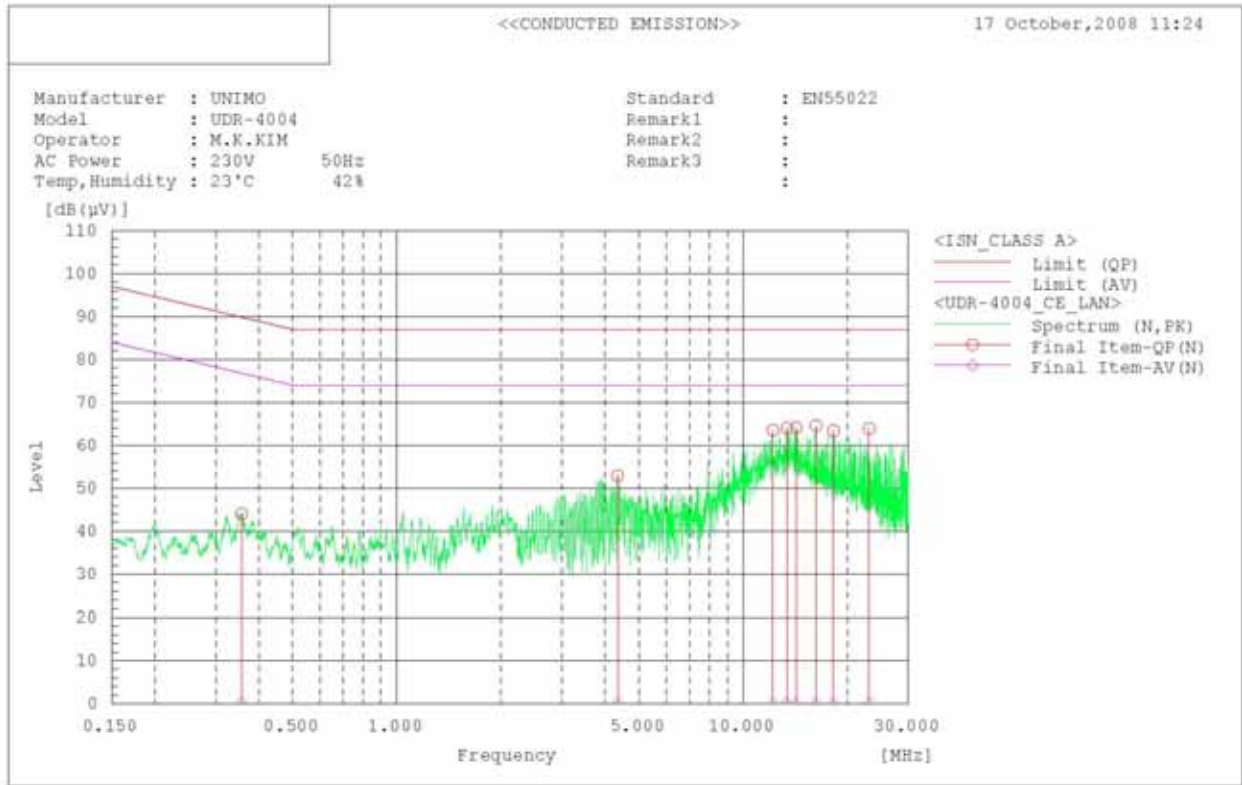
```

--- N Phase ---
No. Frequency Reading Reading c.f Result Result Limit Limit Margin Margin
      [MHz]      [dB(µV)] [dB(µV)] [dB] [dB(µV)] [dB(µV)] [dB(µV)] [dB(µV)] [dB] [dB]
      OP        AV      OP        AV      OP        AV      OP        AV      OP        AV
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 60.0 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 Reading c.f Result Result Limit Limit Margin Margin
      [MHz]      [dB(µV)] [dB(µV)] [dB] [dB(µV)] [dB(µV)] [dB(µV)] [dB(µV)] [dB] [dB]
      OP        AV      OP        AV      OP        AV      OP        AV      OP        AV
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 43.2 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 : UNITKO
 Model : UDR-4004
 Operator : M.K.KIM
 AC Power : 230V 50Hz
 Temp, Humidity : 23°C 42%

Remark1 :
 Remark2 :
 Remark3 :

Final Result

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

--- N Phase ---

APPENDIX 2 Radiated Disturbances Graph / Data



RADIATED EMISSION

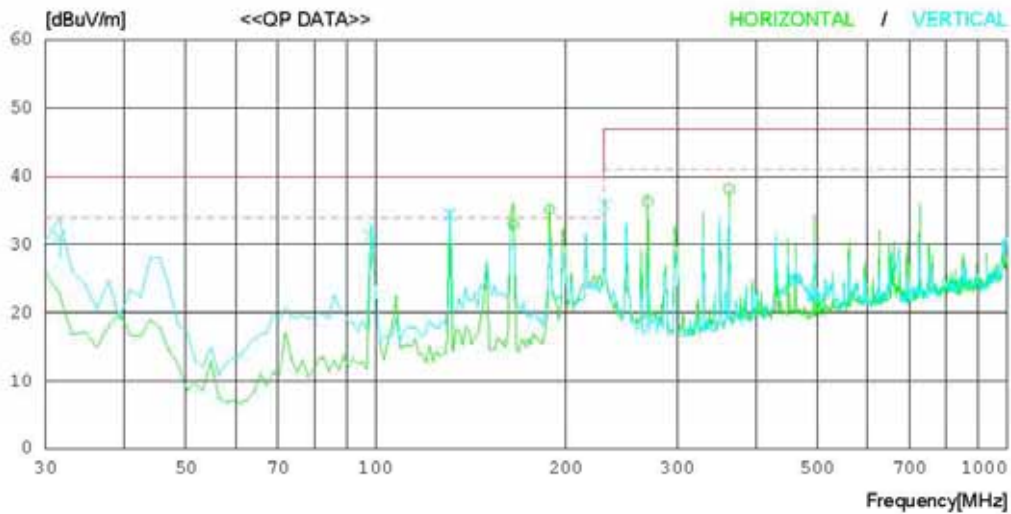
Date : 2008-10-14

Model Name : UDR-4004
 Model No. :
 Serial No. :
 Test Condition :

Reference No. :
 Power Supply : 230V 50Hz
 Temp/Humi : 19°C 46%
 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: Minimum power is greater than maximum	
N/A		
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	33.89mA	✓ ✓	34.03mA	✓	N/A
20	92.00mA	138.0mA	1.722mA	✓ ✓	1.915mA	✓	N/A	21	107.1mA	160.7mA	24.84mA	✓ ✓	24.99mA	✓	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	76.69mA	115.0mA	1.441mA	✓ ✓	1.611mA	✓	N/A	25	90.00mA	135.0mA	10.82mA	✓ ✓	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	102.3mA	5.201mA	✓ ✓	5.322mA	✓	N/A
34	54.11mA	81.17mA	1.064mA	✓ ✓	1.146mA	✓	N/A	35	64.28mA	96.42mA	4.468mA	✓ ✓	4.573mA	✓	N/A
36	51.11mA	76.66mA	0.991mA	✓ ✓	1.073mA	✓	N/A	37	60.81mA	91.21mA	3.948mA	✓ ✓	4.038mA	✓	N/A
38	48.42mA	72.63mA	0.919mA	✓ ✓	0.981mA	✓	N/A	39	57.69mA	86.53mA	3.854mA	✓ ✓	3.936mA	✓	N/A
40	46.00mA	69.00mA	0.846mA	✓ ✓	0.908mA	✓	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 11:31 am
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:	Notes:	
PASS	Pit test duration only 20 minutes Measurement method - Voltage	

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

[RE]

Input Quantity	Probability Distribution	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



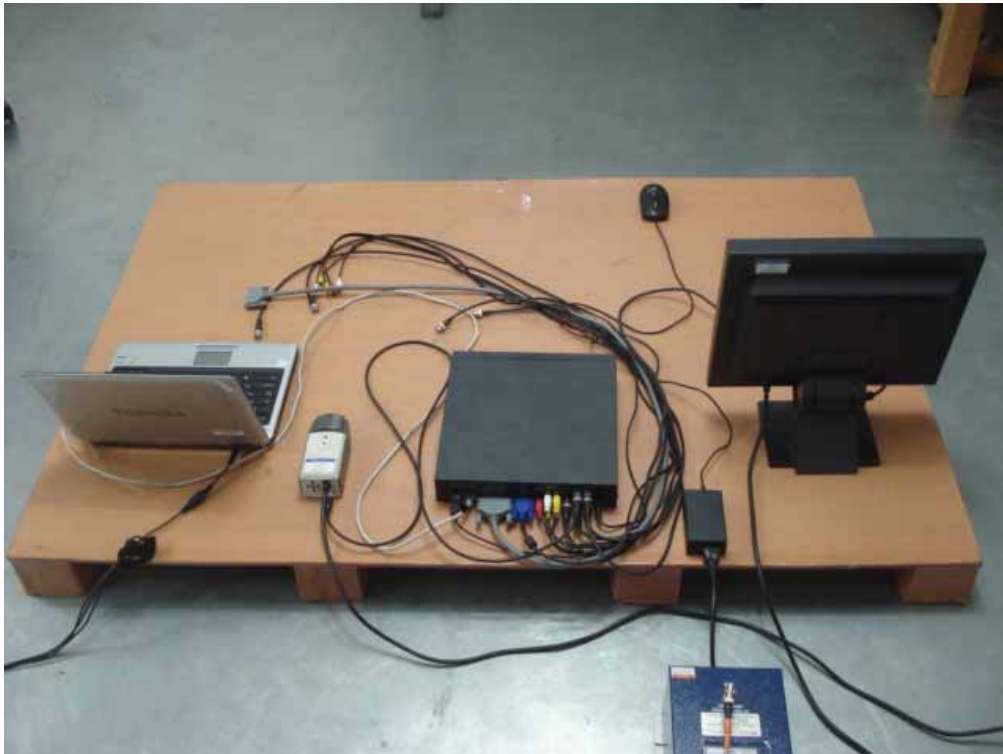
6-5 Fast transient bursts



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

