

683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080 Tel: +82-31-321-2664 Fax: +82-31-321-1664 <u>http://www.digitalemc.com</u>

≫EMC TEST REPORT≪

APPLICANT	UNIMO Technology Co., Ltd.
MODEL NO.	UDR-204
Test Item	· DVR
Model No.	: UDR-204
Manufacturer	: UNIMO Technology Co., Ltd.
Directive	: Electromagnetic Compatibility Directive 89/336/EEC
Test Standard	: EN50130-4: 1995+A1:1998 EN55022 Class A: 1998+A1:2000 EN61000-3-2:2000 EN61000-3-3:1995+A1:2001
Test Device Serial No.:	: Identical prototype
Dates of Tests	: July 16 ~ 21, 2004
Date of Issue	: July 22, 2004
Test Result	: Passed
Tested by : S.U.HAN/Engineer	Reviewed by : C.H.AHN/Leader

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 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 for NVLAP Lab. Code : 200559-0.

DIGITAL EMC CO., LTD.

Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

http://www.digitalemc.com

E-mail: demc@unitel.co.kr

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2.2 Measurement Instruments

Refer to each item.

3. General Product information

UDR-204				
Kind of Equipment	DVR			
Model Number	UDR-204			
Serial No.	None			
Type of Sample Tested	Pre-Production			
Image System	PAL Selectable			
Video Input	4CH Composite, 4CH LOOP Through, BNC			
Video Output	1CH Composite, BNC,1CH S-Video			
Video Compression	MPEG-2			
Recording Quality	4 Levels(Normal, Enhanced, Fine,Super Fine)			
Playback Type	Quad/Mux			
Playback Search	Date/Time,Event(alam,Motion)			
Sensor Input	4(NO/NC Selectable)			
Alarm Output	1(NO/NC)			
Audio	1CH,mono			
Network	10Base-T(DHCP, PPPoE, E-mail, &FTP)			
Hard Disk	Removable + Internal			
PTZ Control	RS-485			
Power Source	Free Voltage(100VAC ~240VAC,50/60Hz,50W)			
Dimension	433(W) X 385(D) X 88(H)			
Tested Power Supply	1 Phase 230Vac, 50Hz			
Applicant	UNIMO Technology Co., Ltd. 479-12 Bangbae-3Dong, Seocho-Gu, Seoul, KOREA 137-820			
Manufacturer	UNIMO Technology Co., Ltd. 435-030, 626 Dangjeong-dong, Gunpo-si, Gyeonggi-do, Korea			
Date of Receipt of Sample	2004-07-12			

4. TEST SUMMARY

4.1 Summary of tests

The data collected shows that the UNIMO Technology Co., Ltd. (Model NO.: UDR-204) DVR complies with EN50130-4. The highest emission observed, with a minimum margin to the specifications, was at 0.194MHz for conducted emissions with a margin of 5.5dB, and at 479.97MHz for radiated emissions (Pol.: Horizontal, EUT Angle : 242.0 degree,Ant. Height : 100cm) with a margin of 4.0dB.

The data and results referenced in this document are true and accurate. The readers cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report accdg. NIS 81 / 5 1994.

Ref.	Parameter					
I. Emissi	on					
5.0	Conducted emission	EN55022 Class A: 1998+A1:2000	С			
6.0	Radiated emission	EN55022 Class A: 1998+A1:2000	С			
7.1	Harmonic Current emission	EN61000-3-2: 2000	С			
5	Voltage fluctuations and flicker	EN61000-3-3: 1995+A1: 2001	С			
II. Immunity						
7.3	Main supply voltage variations	EN61000-4-11: 1994+A1: 2001	С			
8.3	Mains supply voltage dips and short interruptions	EN61000-4-11: 1994+A1: 2001	С			
9.3	Electrostatic discharge	EN61000-4-2: 1995+A1: 1998+A2:2001	С			
10.3	Radiated, radio-frequency, electromagnetic field (80-1000MHz)	EN61000-4-3: 1996+A1: 1998+A2:2001	С			
11.3	Conducted disturbances induced by radio-frequency field (0,15-100MHz)	EN61000-4-6: 1996	С			
12.3	Electrical fast transient/burst	EN61000-4-4: 1995	С			
13.3	Surge	EN61000-4-5: 1995+A1: 2001	С			
	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 modes

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.

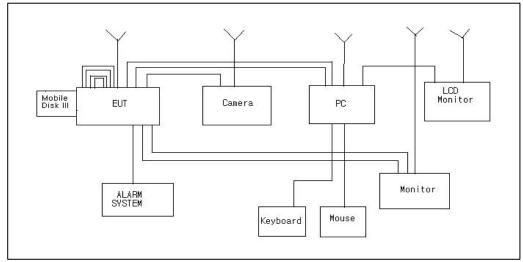
5.2 Test Operation modes

- Connected the Monitor with EUT by BNC cable, and Displayed to the image on the screen. The measurement was made of the maximized by; varying the mode of operation or resolution; moving the cable.

ТҮРЕ	MANUF.	MODEL NO.	SERIAL NO.	Cable
Monitor	Hi-Tron	CVM0954	M2040008	Power : 1.8m, non-shield BNC Cable : 1.2m, shield
PC	LG	Y8Y	311KI19443	Power: 1.8m, non-shield
LCD Monitor	Comtec	CT-150	R20110001B	Power: 1.8m, non-shield DSUB : 1.6m, shield
Keyboard	B.T.C	7800	K21199157	I/F : 1.8m, shield
Mouse	CHIC TECHNOLOGY CORP.	SMOP5000WX	4010159128	I/F : 1.8m, shield
Camera	Unimo	CCP-132F	N/A	Power: 1.8,non-shield BNC Cable :1.0,Shield
Alarm system	N/A	N/A	N/A	-
Mobile Disk III	256MB-021	N/A	TwinMos	-

5.3 Support Equipment Used

5.4 System Configuration Diagram



NOTE

- See "APPENDIX 4 photographs" for actual system test setup

6. Test Results EMISSION

6.1 Conducted emission

Result : PASS

6.1.1 Measurement Procedure

In the range of 0.15MHz to 30MHz the Mains Terminal Continuous Disturbance Voltage was measured in accordance with EN55022 1998+A1:2000 Class A. A 1m. x 1.5m. wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room. Kyoritsu Model KNW-407 and KNW-242(10kHz-30MHz) 50 /50uH Line-Impedance Stabilization Networks(LISNs) are bonded to the shielded room. The EUT is powered from the KNW-242 LISN and the support 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	Next Cal.
i tunic of moti uniciti	Model 100	Seriar 10	ivianatu cial ci	Date
Spectrum Analyzer	8591E	3649A05889	HP	2005.07
RFI/Field intensity Meter	KNW-2402	4N-170-3	Kyoritsu Electrical Works	2005.07
LISN	KNW-407	8-317-8	Kyoritsu Electrical Works	2004.08
LISN	KNW-242	8-654-15	Kyoritsu Electrical Works	2004.08

6.1.3 Conducted Test Data

1) Test Data:	July 21, 2004	Humidity:	63 %
	Temperature: 24	Barometric:	986 mbar

2) Uncertainty(95%,Confidence level, k=2) : +2.2dB / -2.21dB

2) Docult	
	٠
3) Result	

Frequency	LISN Pol.	Q,P. Result	AV Result	Q.P. Limit	AV Limit	Margin [dB]	
(MHz)	F 01.	[dB <i>µ</i> V]	[dB <i>µ</i> V]	[dB	[dB	Q.P.	AV
0.584	Ν	51.8	*	73.0	60.0	21.2	*
4.446	N	44.0	*	73.0	60.0	29.0	*
0.150	L1	60.4	45.6	79.0	66.0	18.6	20.4
0.194	L1	67.3	60.5	79.0	66.0	11.7	5.5
0.258	L1	66.2	59.0	79.0	66.0	12.8	7.0
0.323	L1	64.7	56.7	79.0	66.0	14.3	9.3
0.388	L1	61.0	53.1	79.0	66.0	18.0	12.9
0.452	L1	52.7	45.8	79.0	66.0	26.3	20.2
0.520	L1	53.8	*	73.0	60.0	19.2	*
9.210	L1	48.3	34.9	73.0	60.0	24.7	25.1
12.025	L1	50.3	*	73.0	60.0	22.7	*
13.975	L1	46.6	*	73.0	60.0	26.4	*

Table 1: Mains terminal continuous disturbance voltage Test Data

NOTES:

- 1. All modes of operation were investigated and the worst-case emissions are reported.
- 2. *: less than 30dB
- 3. L1 = Phase; N = Neutral
- 4. See "APPENDIX 1 Conducted measurement Graph"
- 5. Refer to "APPENDIX 4 Photographs" for actual system test setup.
- 6. Result = Cable loss + Insertion $\hat{l}oss$ + Reading level
- 7. Margin = Limit Result
- 8. Measurement Data's kept in DIGITAL EMC

6.2 Radiated emission

Result : PASS

6.2.1 Measurement Procedure

In the range of 30MHz to 16Hz the Electric Field strength was measured in accordance with EN55022 1998+A1:2000 Class A.

on an open test site, which allows a 10m distance measurement. The EUT was placed in the center of a wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization (high:1-4m)..

The turntable has been fully rotated. The highest radiation of the equipment has been recorded. 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

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date		
RFI/Field intensity Meter	KNM-504D	4N-161-4	Kyoritsu Electrical Work	2005.07		
Frequency Converter	KCV-604C	4-230-3	Kyoritsu Electrical Work	2005.07		
Spectrum Analyzer	8563E	3551A04634	HP	2004.09		
BICONICAL ANT.	VHA9103	VHA91031946	SCHWARZBECK	2004.11		
LOG-PERIODIC ANT.	UHALP9108A1	1098	SCHWARZBECK	2004.11		
Double Ridged Horn	3115	6419	EMCO	2005.04		
Antenna						
Amplifier (25dB)	8447D	2944A10144	Agilent	2005.06		
Position Controller	5901T	14173	TOKIN	N/A		
DRIVER	5902T2	14174	TOKIN	N/A		
Radia	Radiated Emission (ANECHOIC CHAMBER-PRE TESTING)					
Spectrum Analyzer	E4411B	US41062735	Agilent	2005.07		
Amplifier (25dB)	8447D	2944A10144	Agilent	2005.06		
BILOG ANTENNA	CBL6111C	2661	SCHAFFNER	2005.04		
CONTROLLER	5900	N/A	TOKIN	N/A		

6.2.2 List of Test and Measurement Instruments

6.2.3 Radiated Test Data

1) Test Data:	July 21, 2004	Humidity:	63 %
	Temperature: 24	Barometric:	986 mbar

2) Uncertainty (95%, Confidence level, k=2) :+3.47 /-4.27 dB

3) Result

Frequency [Mz]	ANT Pol.	Reading [dBµV]	C.F [dB(1/m)]	Results [dBµV/m]	Limits [dBµV/m]	Margin [dB]
125.99	Н	44.5	-13.22	31.3	40.0	8.7
134.98	Н	44.0	-12.53	31.5	40.0	8.5
146.40	Н	44.0	-11.66	32.4	40.0	7.6
229.04	Н	40.5	-8.45	32.0	40.0	8.0
229.04	V	42.0	-8.45	33.5	40.0	6.5
251.97	Н	46.0	-7.57	38.4	47.0	8.6
377.97	V	46.0	-9.55	36.5	47.0	10.5
377.97	Н	46.5	-9.55	36.9	47.0	10.1
479.97	Н	51.0	-8.01	43.0	47.0	4.0
479.97	V	47.0	-8.01	39.0	47.0	8.0
819.00	Н	41.0	-4.27	36.7	47.0	10.3
819.00	V	46.0	-4.27	41.7	47.0	5.3

Table 2: Electromagnetic radia-7.81tion disturbance Test Data

NOTES:

- 1. All modes of operation were investigated and the worst-case emissions are reported.
- 2. H = Horizontal; V = Vertical
- 3. Margin = Limit Result
- 4. Refer to "APPENDIX 4 Photographs" for actual system test setup.
- 5. C.F.: Correction Factors (Cable loss + Antenna factor Amp gain)
- 6. Sample calculation ; At Frequency : 479.97 MHz

Result = Reading + C.F. = $51.0 + (-8.01) = 43.0[dB\mu V/m]$

7. Measurement Data's kept in DIGITAL EMC

7. Harmonic Current emission

Result : PASS

1) Measurement Procedure

The harmonics on AC Mains in the frequency from 0 to 2KHz were measured power analyzer. The measurement was carried out under steady conditions and using A/D Auto Detect.

The measurement was performed with the Test software(EP5/HF Version 5.03)for Windows. **2) List of Test and Measurement Instruments**

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
CVCF	4420	344536	NF ELECTRONIC	N/A
POWER ANALYSIS	2503AHF-1CH	25011050001	XITRON TECHNOLOGIES	2004.09
REFERENCE IMPEDANCE	REF-IMP1S	S007	XITRON TECHNOLOGIES	2004.09

3) Test Data

(1) Test Data:	July 21, 2004	Humidity:	63 %
	Temperature: 24	Barometric:	986 mbar

(2) Measurement uncertainty (95%, Confidence level, k=2): $\pm 2.24\%$

(3) Result

Supply Voltage	231.950/50Hz
Rated Power	50 W
Measured Power consumption	47.521
Class	Class A

Note)

- According to EN61000-3-2/A14 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

8. Voltage fluctuations and flicker

Result : PASS

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:
 - 2 hours for Long Time Flicker assessment (Plt)
 - 10 minutes for Short Time Flicker assessment (Pst)
 - 1-10 minutes for Dmax, Dc and Dt assessment (depending on EUT switch-rate)
 - The unit supply an AC main, free of harmonics, fluctuations or distortion of any kind.

Defined impedance was located between the supply unit and the EUT.

The measurement was performed with the Test software(EP5/HF Version 5.03) for Windows.

2) List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
CVCF	4420	344536	NF ELECTRONIC	N/A
POWER ANALYSIS	2503AHF-1CH	25011050001	XITRON TECHNOLOGIES	2004.09
REFERENCE IMPEDANCE	REF-IMP1S	S007	XITRON TECHNOLOGIES	2004.09

3) Test Data

(1) Test Data:	July 21, 2004	Humidity:	63 %
	Temperature: 24	Barometric:	986 mbar

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

(3) RESULT

For the measurement data, see APPENDIX 3.

9. Test Results IMMUNITY

9.1 Voltage dips, short interruptions and voltage variations

Result : PASS

9.1.1 Measurement Procedure

Mains supply voltage dips, short interruptions immunity tests and it's test setup were carried out in accordance with **EN61000-4-11: 1994+A1:2001.** The dips/interruption test is only applicable to AC mains. The dips/interruptions were applied at zero crossing. The presence of a reference plane and the configuration of EUT are not critical for this test. The dips were applied with a 70% dip(down to 30% of rated voltage of EUT). EUT was given a 10Sec interval between each dip to receiver. 3 dips were applied at each phase angle step. The interruptions are a 100% dip-type (down to 0% of rated voltage of EUT). EUT was given a 10Sec interval between each interruptions were applied at each phase angle step.

9.1.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
BEST EMC	BEST EMCV2.7	200122-043SC	SCHAFFNER	2004.09
PC	MF05	A6982GT500558	SAMSUNG	N/A

9.1.3 Test Result

1) Test Data:	July 20, 2004	Humidity:	63 %
	Temperature: 27	Barometric:	986 1

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"

mbar

3) Result

Test Level %Ut	Voltage dip and short interruptions %Ut	Duration of Reduction (periods)	Remarks
40	60	0.5 1 5 10	No deterioration of the picture No deterioration of the picture Any deterioration of the picture Any deterioration of the picture
0	100	0.5 1 5	No deterioration of the picture Any deterioration of the picture Any deterioration of the picture

Table 3 : Voltage dips

Supply voltage	Duration of Reduction (periods)	Result
Umax 2)	250	No deterioration of the picture
Umin 3)	250	No deterioration of the picture

Table 4 : Voltage variations

NOTE:

- 1) Unom = Nominal mains voltage (230V)
- 2) Umax = Unom + 10%
- 3) Umin = Unom -15%

Changes to occur at 0 degree crossover point of the voltage waveform..

9.2 Electrostatic discharge

Result : PASS

9.2.1 Measurement Procedure

The immunity against electrostatic discharge was tested in accordance with EN50130-4: 1995+A1:1998. 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 a 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 470k Ω (2EA) resistor. The test was made by applying contact and air discharges to the EUT itself, 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 ±6kV were applied to various points of the EUT at conductive surfaces, and to the VCP. Air discharges of ±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)		
	± 2.0 kV, ± 4.0 kV, ± 8.0 kV (Air Discharge)		
Number of discharges	: >10 per test point		

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
BEST EMC	BEST EMCV2.7	200122-043SC	SCHAFFNER	2004.09
ESD GUN	BEST-ESD	1072	SCHAFFNER	2004.09
PC	MF05	A6982GT500558	SAMSUNG	N/A

9.2.3 ESD TEST POINT AND RESULT

1) Test Data:	July 19, 2004	Humidity:	63 %
	Temperature: 28	Barometric:	986 mbar

2) Uncertainty (95%, Confidence) : ± 5%

3) Point and Result

No.	Position	Kind of Discharge	Result	Remarks
	Front	Air	PASS	No deterioration of the picture
	Cable	Air	PASS	No deterioration of the picture
	Button	Air	PASS	No deterioration of the picture
	LED	Air	PASS	No deterioration of the picture
	Screw	Contact	PASS	No deterioration of the picture
6	Case	Contact	PASS	No deterioration of the picture
7	Port	Contact	PASS	No deterioration of the picture
8	HCP / VCP	Contact	PASS	No deterioration of the picture

Table 5 : ESD, Positive / Negative Polarity

9.3 Radiated, radio-frequency, electromagnetic field

Result : PASS

9.3.1 Measurement Procedure

The immunity against radio-frequency electromagnetic fields in the frequency range between 80 and 1000MHz was tested in accordance to EN50130-4: 1995+A1:1998.

The test set-up was make according to **EN61000-4-3: 1996+A1:1998+A2:2001** in semi-anechoic chamber. The EUT has bees 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 antenna 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 -1 GHz
Amplitude Modulation	:	AM, 80%,1kHz sine-wave
Pulse Modulation	:	1Hz (0.5s ON : 0.5s OFF)
Step size	:	1% of fundamental
Sweep capability	:	1.5x10-3decade/s

9.3.2 List of Test	and Measurement	Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
Control computer	Pentium 750MHz	956592FT202860	SAMSUNG	-
Software	TEMTO-RS	Ver.4.3en	TSJ	-
Electric Field Sensor (~5GHz,~800V/m)	HI-6005	107823	Holaday	2005.06
Signal Generator(3.3GHz)	SML03	100647	Rohde & Schwarz	2005.03
Power Meter	NRVD	100403	Rohde & Schwarz	2005.03
RF Switch Matrix (~12GHz,500W)	RFM-S3A2CIL	2075	TSJ	2005.04
Antenna(75M~1.5GHz ,1kW)	VULP9118E	754	Schwarzbeck	2005.05
Horn Antenna (0.7G~6GHz)	BBHA9120A	322	Schwarzbeck	2005.05
RF Power Amplifier (~1GHz,250W)	CMC250	F044-0602	IFI	2005.04
RF Power Amplifier (1-3GHz,25W)	5055R	1007	Ophir RF	2005.04

9.3.3 Test Result

1) Test Data:	July 20, 2004	Humidity:	63 %
	Temperature: 27	Barometric:	986 mbar

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

3) Result

Port	Result		Remarks
	1V/m	PASS	No deterioration of the picture
Enclosure	3V/m	PASS	No deterioration of the picture
	10V/m	PASS	Any deterioration of the picture
			(The picture temporarily come to
			Flicker, and then self-recovery)

Table 6: Radiated radio-frequency electromagnetic field

9.4 Conducted disturbances, induced by radio-frequency fields

Result : PASS

9.4.1 Measurement Procedure

The immunity against conducted radio frequency disturbance in the frequency range between 0.15 and 100MHz was tested in accordance to EN50130-4: 1995+A1:1998. Test set-up was make according to EN61000-4-6: 1996. 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(CND)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.

The distance between this cable and the reference ground plane was kept between 3 and 5cm as long as possible. The EUT has no dedicated ground terminal.

The coupling specified frequency range has and the CDN have been recorded before the test. The specified frequency range has been manual with a sweep rate smaller than 1.5x10-3decade/sec.

Severity level	:	3
Applied voltage	:	120dBuV, 130dBuV, 140dBuV
Frequency range	:	150kHz~100MHz
Amplitude Modulation	:	AM, 80%,1kHz sine-wave
Pulse Modulation	:	1Hz (0.5s ON : 0.5s OFF)
Step size	:	1% of fundamental
Sweep capability	:	1.5x10-3decade/s

9.4.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	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	2005.03
Power Meter	NRVD	100403	Rohde & Schwarz	2005.03
RF Switch Matrix (~12GHz,500W)	RFM-S3A2CIL	2075	TSJ	2005.03
RF Power Amplifier (~230MHz,75W)	FLL75	0072	Frankonia	2005.04
EM Clamp	TSIC-23	401	TSJ	2005.04
CDN	М-Туре Т-Туре	-	TSJ	2005.03
Decoupling Clamp	TSIC-23-DCN	150	TSJ	2005.04

9.4.3 Test Result

1) Test Data:	July 16, 2	004	Humidity:
	-		D

Temperature: 27

Barometric: 986 mbar

63 %

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

3) Result

Port	Result	Remarks
	120dBuV PASS	No deterioration of the picture
AC power	130dBuV PASS	No deterioration of the picture
	140dBuV PASS	No deterioration of the picture

Table 7 : Immunity-input AC power ports

Port	Result	Remarks
	120dBuV PASS	No deterioration of the picture
BNC Cable	130dBuV PASS	No deterioration of the picture
	140dBuV PASS	No deterioration of the picture
	120dBuV PASS	No deterioration of the picture
LAN	130dBuV PASS	No deterioration of the picture
	140dBuV PASS	No deterioration of the picture
	120dBuV PASS	No deterioration of the picture
ALARM	130dBuV PASS	No deterioration of the picture
	140dBuV PASS	No deterioration of the picture

Table 8 : Immunity / Signal line ports

9.5 Electrical fast transient / burst

Result : PASS

9.5.1 Measurement Procedure

The immunity against fast transients was tested in accordance to EN50130-4: 1995+A1:1998. on all lines which length may exceed 3m according to the manufacturers specification. Test set-up with capacitive clamp and fast transient noise generator was according to EN61000-4-4: 1995.

The EUT has been placed on a wooden table 0.8m 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 50 resistor.

The distance between the EUT and all other conductive structures. Except the ground plane beneath the EUT was more than 0.5m. The distance between clamp and EUT was about 30cm.

Severity level	:	2 (AC Power port)
Severity level	:	3 (Signal port)
Test voltage	:	0.25, 0.5, 1,2 (kV)
Polarity	:	Negative/ positive
Repetition frequency	:	5kHz

9.5.2 List of Test and Measurement Instruments

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
BEST EMC	BEST EMCV2.7	200122-043SC	SCHAFFNER	2004.09
PC	MF05	A6982GT500558	SAMSUNG	N/A
Coupling Clamp	CDN8014	17332	SCHAFFNER	2005.07

9.5.3 Test Result

1) Test Data:	July 19, 2004	Humidity:	63 %
	Temperature: 28	Barometric:	986 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"

Line	Result	Remarks
Ll	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
L2	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
PE	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
L1-L2	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
L1-PE	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
L2-PE	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture
L1-L2-PE	0.5KV PASS 1KV PASS 2KV PASS	No deterioration of the picture

3) Result (AC Power Line)

 Table 9 : EFT, AC Power lines, Positive/Negative Polarity

Line	Result		Remarks
BNC Cable	0.25KV	PASS	No deterioration of the picture
	0.5KV	PASS	No deterioration of the picture
	1 KV	PASS	Flickering of an indicator during the test
LAN	0.25KV	PASS	No deterioration of the picture
	0.5KV	PASS	No deterioration of the picture
	1 KV	PASS	Flickering of an indicator during the test
ALARM	0.25KV	PASS	No deterioration of the picture
	0.5KV	PASS	No deterioration of the picture
	1 KV	PASS	Flickering of an indicator during the test

Table 10 : Burst, Signal Line, Positive/ Negative Polarity

9.6 Surge

Result : PASS

9.6.1 Measurement Procedure

The immunity against surge was tested in accordance with EN50130-4: 1995+A1:1998.

The Combination Wave Test Generator. The Coupling/Decoupling Network and the test set-up are in accordance with EN61000-4-5: 1995.

The test consists of the injection of slow high energy transients in the a. c. 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-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 is inserted when the generator when extra low voltage and signal lines are tested, and 10 is inserted when the line-to-ground test is conducted on the a. c. 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 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 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.

Severity level	: 2 (AC power port)
Severity level	: 2 (signal line)
Test voltage	: 0.5, 1 (kV)
Waveshape, open circuit voltage	: Risetime 1.2us/ Duration 50us
Waveshape, short circuit current	: Risetime 8us/ Duration 20us
Polarity	: negative/positive
Number of surges	: 5

9.6.2 List of 1	est and Measur	rement.	Instrume	nts

Name of Instrument	Model No	Serial No	Manufacturer	Next Cal. Date
BEST EMC	BEST EMCV2.7	200122-043SC	SCHAFFNER	2004.09
PC	MF05	A6982GT500558	SAMSUNG	N/A
SIGNAL LINE COUPLING NETWORK	CDN 117	17375	SCHAFFNER	2004.09
SIGNAL LINE COUPLING NETWORK FOR UNSHIELDED SYMMETRICALLY OPERATED LINES	CDN 118	SL 400-187	SCHAFFNER	2004.09
COUPLING ACCESSORY	INA 172	SL 403-109	SCHAFFNER	-
COUPLING ACCESSORY	INA 175	SL 403-474	SCHAFFNER	-

9.6.3 Test Result

1) Test Data:	July 16, 2004	Humidity:	63 %
	Temperature: 27	Barometric:	986 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
L1 to L2	0.5kV	PASS	No deterioration of the picture
	1kV	PASS	No deterioration of the picture
	0.5kV	PASS	No deterioration of the nicture
L1 to PE	1kV	PASS	No deterioration of the picture
	2kV	PASS	No deterioration of the picture
	0.5kV	PASS	No. laterianstica of the mistage
L2 to PE	1kV	PASS	No deterioration of the picture
	2kV	PASS	No deterioration of the picture

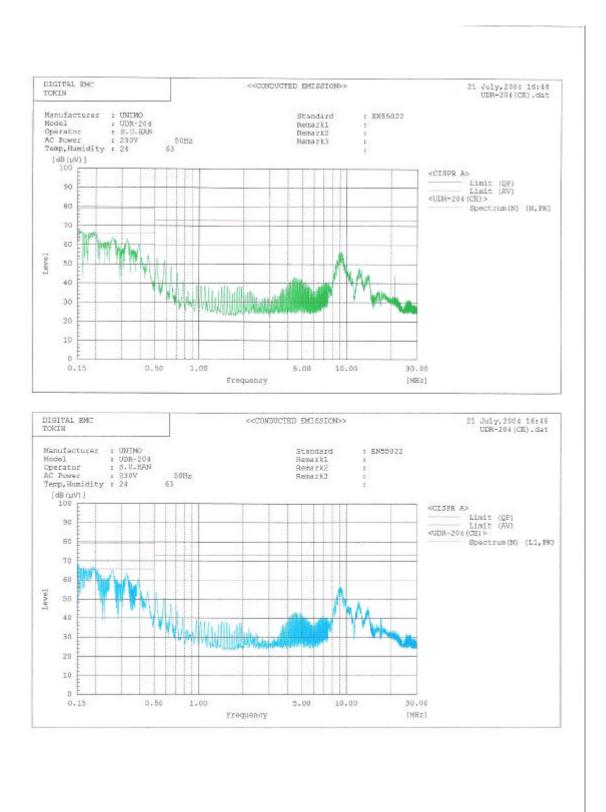
Table 11 : Surge, AC Power lines, Positive/Negative Polarity

Line	Result		Remarks
BNC Cable	0.5kV	PASS	No deterioration of the picture
	1KV	PASS	No deterioration of the picture
LAN	0.5kV	PASS	No deterioration of the picture
	1KV	PASS	No deterioration of the picture
ALARM	0.5kV	PASS	No deterioration of the picture
	1KV	PASS	No deterioration of the picture

Table 12 : Surge, Signal line port, Positive/Negative Polarity

APPENDIX 1

MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE MEASUREMENT GRAPH

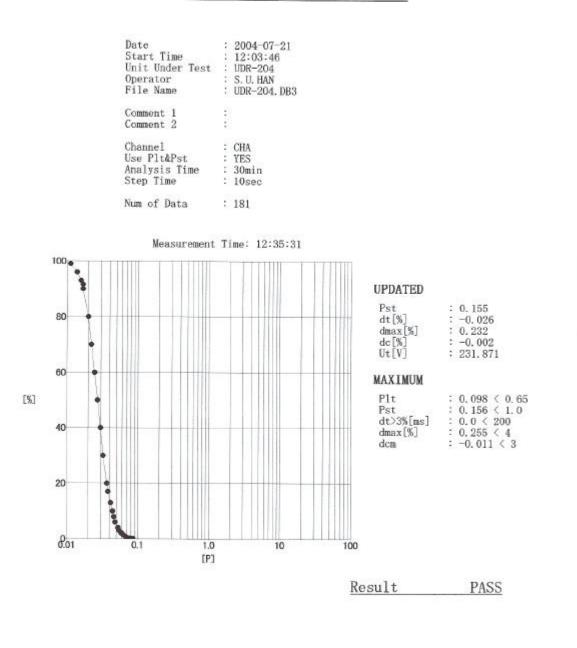


Input Quantity	Probability Distrubution		Probability Distrubution (dB) 9kHz~30MHz	Standard
Cable loss(RG214)	Standard Deviation(SD)		± 0.08	10 th measurement
Receiver corrections; -Voltage accuracy -Attenuation accuuracy -Absolute pulse response	Rectangular (3) Rectangular (3) Rectangular (3)		± 0.27 ± 0.1 ± 1.5	Cal. Report Cal. Report Cal. Report (CISPR16-3)
LISN corrections (KNW-242) ; -Voltage division factor	Normal	(k=2)	± 0.8	Cal. Report
Mismatch; - Receiver VRC*: i = 0.2 -LISN VRC: g = 0.2(150kHz) = 0.04(30MHz) - Uncertainty: 20log(1 ± i g)	U-type (2)		+0.34 -0.35	Cal. Report Cal. Report
System Repeatability	Standard Deviation(SD)		± 0.46	10 th measurement
Combined measurement uncertainty Uc(y)	Normal		+ 1.1 - 1.1	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	Normal(k=2)		+ 2.20 - 2.21	
	Probability		ent Uncertainty(dB)	
Input Quantity	Distrubution	3m	10m	Standard
		Bi-Log 30M~1G:	Bi-Log 30M~1G:	
Antenna Factor(CBL6112B)	Normal(K=2)	± 1.5 1G~2G: ± 1.2	± 1.5 1G~2G: ± 1.2	ANT Cal. uncertainty
Cable loss(RG214/U,HFC12D)	Standard Deviation(SD)	±0.14	±0.14	5 th measurement
Receiver corrections; -Voltage accuracy -Attenuation accuracy -Absolute pulse response	3	±0.19 ±0.15 ±0.19	±0.19 ±0.15 ±0.19	Cal. Report
Antenna Directivity	Rectangular (3)	+1.0/-0	+1.0/-0	CISPR16-4
AF height deviations	Rectangular (3)	± 0	± 0	CISPR16-4
Phase center location	Rectangular (3)	± 0	± 0	CISPR16-4
Separation distance	Rectangular (3)	± 0.3	± 0.1	CISPR16-4
Uncertainty of Site	Rectangular (3)	+2.3/-3.17	+2.0/-3.1	NSA
Mismatch -Receiver VRC*: i=0.2 -ANT.VRC: g=0.33 - Uncertainty 20log(1 ± i g=0.33)	U-type 2	+0.56 -0.59	+0.56 -0.59	Manual
Pre-amp.	K=2	± 0.18	± 0.18	Cal. Report
System Repeatability	Standard Deviation(SD)	± 0.11	± 0.71	5 th repeated measurement
Combined measurement uncertainty Uc(y)	Normal(k=1)	+ 1.7342 - 2.0682	+ 1.7328 - 2.1346	
Expended measurement uncertainty (95%,Confidence level,k=2)dB	K=2	30M~1GHz +3.47 -4.14	30M~1GHz +3.47 -4.27	

APPENDIX 2 Measurement Uncertainty(CE/RE)

APPENDIX 3 VOLTAGE FLUCTUATIONS ON AC MAINS

IEC1000-3-3 ANALYSIS REPORT



IEC1000-3-3 ANALYSIS REPORT

Date Start Time Unit Under Test Operator File Name	: 2004-07-21 : 12:03:46 : UDR-204 : S. U. HAN : UDR-204. DB3	Analysis Time	: CHA : YES : 30min : 10sec
Comment 1 Comment 2	1		
Num of Dat	a : 181		
Weasuremen	t Time: 12:35:31		
Probability[%] Class[P]		
0.1	0.0858		
$0, \hat{2}$	0.0791		
0.5	0.0706		
0.7	0.0685	UPDATED	
1.0	0.0665	OI DATED	
1.5	0.0625	Pst	: 0.155
2.0	0.0587	dt[%]	: -0.026
2.2	0.0587	dmax[%]	: 0.232
3.0	0.0549	dc [%]	: -0.002
4.0	0.0531	Ut[V]	: 231.871
6.0 8.0	0.0479		
10.0	0.0462	MAXIMUM	
13.0	0.0445	014	+ 0 000 / 0 05
17.0	0.0413 0.0381	Plt Pst	: 0.098 < 0.65 : 0.156 < 1.0
20.0	0. 0366	dt>3%[ms]	: 0.0 < 200
30.0	0.0323	dmax[%]	: 0.255 < 4
40.0	0.0295	dcm	; -0.011 < 3
50.0	0.0269		01011 1 0
60.0	0.0244		
70, 0	0.0220		
80.0	0.0198		
90.0	0.0166		
91.5	0.0166		
93.0	0.0156		
96.0	0.0137		
99.0	0.0111		
		<u>Result</u>	PASS

IEC1000-3-3 ANALYSIS REPORT

Date	: 2004-07-21
Start Time	: 12:03:46
Unit Under Test	: UDR-204
Operator	: S. U. HAN
File Name	: UDR-204. DB3
Comment 1 Comment 2	ł
Channel	: CHA
Use Plt&Pst	: YES
Analysis Time	: 30min
Step Time	: 10sec

Pst, Plt Evaluation

1	
Pst(max): Plt :	$\begin{array}{c} 0.\ 156 \ < \ 1.\ 0 \\ 0.\ 098 \ < \ 0.\ 65 \end{array}$
Time	Pst
00:10	0.156
00:20	0.156
00:30	0.155
00;40	0
00:50	0
01:00	0
01:10	0
01:20	0
01:30	0
01:40	0
01:50	0
02:00	0

Voltage change Evaluation

dt>3%[ms]	:	0.0 <	200
dmax[%]	1	0.255 <	4
dc[%]	:	-0.011 <	3

Result PASS

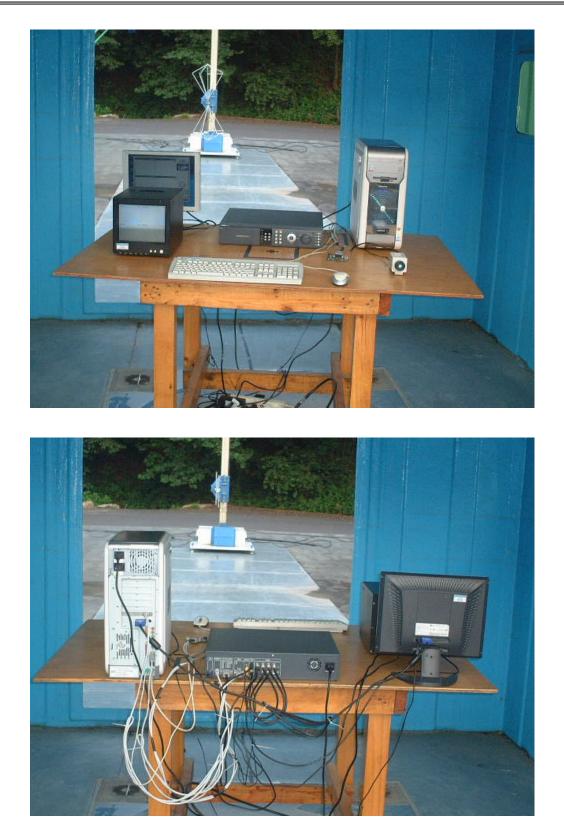
APPENDIX 4Test Setup photographs

- 1. Conducted emission
- 2. Radiated emission
- 3. Harmonics on AC Mains
- 4. Voltage dips, short interruptions and voltage variations
- 5. Electrostatic discharge
- 6. Radiated radio-frequency electromagnetic field
- 7. Conducted disturbances, induced by radio-frequency fields
- 8. Electrical fast transient / burst
- 9. Surge
- 10. EUT

Conducted emission

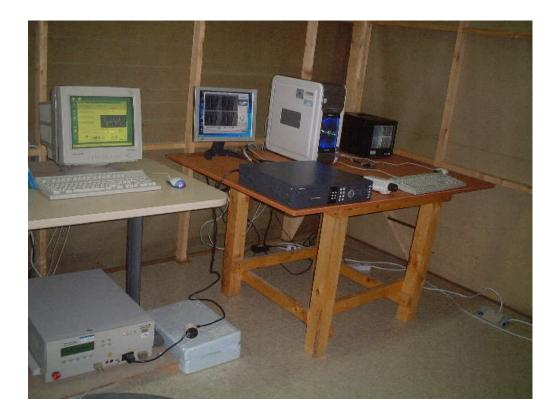


Radiated emission



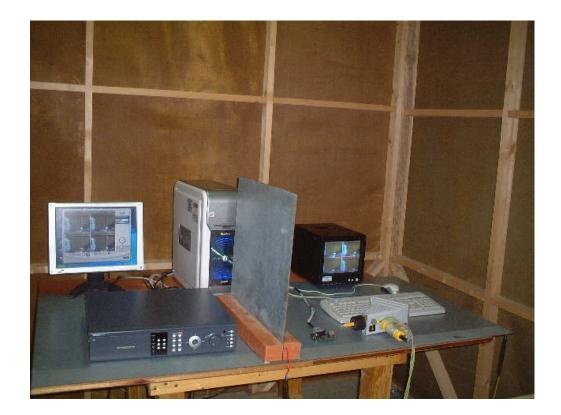


Set up for Harmonics on AC Mains



Voltage dips, short interruptions and voltage variations

Electrostatic discharge



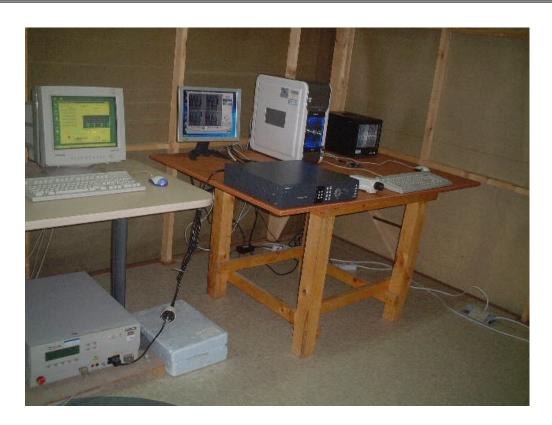


Radiated radio-frequency electromagnetic field

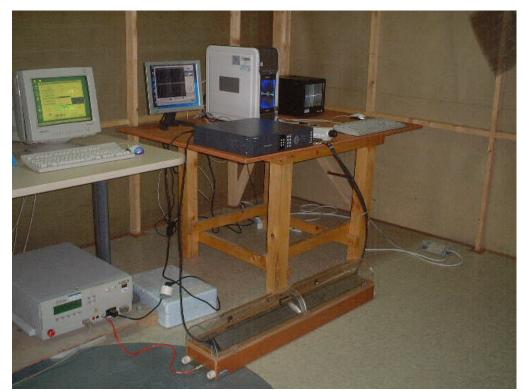


Conducted disturbances, induced by radio-frequency fields





Electrical fast transient / burst



Surge

