

# EMC TEST REPORT

## Samsung Electronics Co., Ltd.

416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea  
(Tel: 031 277 7752, Fax: 031 277 7753)



### 1. Applicant

- Name of organization : Samsung Electronics Co., Ltd.
- Address : 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea

2. Purpose for the report : Approval for EMC

3. Kind of product : LCD Monitor (Model name: SMT-1922)


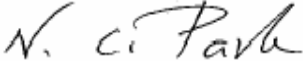
4. Date of test : 2007.03.13 ~ 2007.03.21

5. Applied standard : EN 61000-6-4:2001, EN61000-3-2: 2000,  
EN61000-3-3: 1995+A1:2001, EN50130-4: 1995 + A1:1998

6. Report No. : LBE070790

7. Test result : Complied

The equipment under test has found to be compliant with the applied standards.  
(Refer to the attached test result for more detail.)

Tested by Name : Tae Young, Jang 	Reviewed by Name : No Cheon, Park 
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This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.

2007. 04.04

**Samsung Electronics Co., Ltd.**  
**Chief of CS Management Center**

# TEST RESULT

**Test Report No.** : LBE070790

**Applicant / Address** : Samsung Electronics Co., Ltd.  
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do  
443-742 Korea

**Manufacture / Address** : Samsung Electronics Co., Ltd.  
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do  
443-742 Korea

**EUT** :

1. Product name : LCD Monitor
2. Model name : SMT-1922
3. Brand name : Samsung
4. Variant model : None

**Test Method** : EN 61000-6-4:2001, EN61000-3-2: 2000,  
EN61000-3-3: 1995+A1:2001, EN50130-4: 1995 + A1:1998

**Test Result** : **Complied**  
The equipment under test has found to be compliant  
with the applied standards

**Test Lab.** : CS Management Center, Samsung Electronics Co., Ltd.



**Tested by** : Tae Young, Jang

**Reviewed by** : No Cheon, Park

**Date of Issue** : 2007.04.04

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# 1. General information

## 1.1 Basic information related product

Applicant	Samsung Electronics Co., Ltd.
Model name	SMT-1922
Applicant address	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Contact person	Chang Seub, Eum
Kind of product	LCD MONITOR
Valiant model	None
Manufacturer	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Rated power	AC 240 V, 50 Hz
New / Alternative / Permissive change information	New

## 1.2 Detail Information related product

### 1.2.1 Specification

Item(s)	Description
Resolution	1 280 X 1 024
Contrast	1 000:1
Brightness	300 cd/m <sup>2</sup>
Response Time	5 ms

### 1.3 Operating mode and condition

The system was configured for testing in typical fashion use. Cables were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables. The mode of operation utilized for testing was selected to best simulate typical EUT use. This EUT has the following operating mode(s).

- Test Mode
- CCTV Monitring

### 1.4 Equipment modifications

No equipment modification

### 1.5 Test procedure

#### 1.5.1 Conducted emission

The EUT was placed on a platform nominal size, 1 m by 1.5 m, raised 80 cm above the conducting Ground plane. The rear of tabletop was located 40 cm to the vertical conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop.

All other surfaces of tabletop was at least 80 cm from any other grounded conducting surface.

I/O cables and AC cables that were connected to the peripherals were bundled in center.

They were folded back and forth forming a bindle 30 cm to 40 cm long and were handed at a 40 cm height to the ground plane.

Each EUT current-carrying power lead, except the ground(safety) lead, were individually connected through a LISN to the input power source.

All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connecte

d to the measuring equipment.

Frequency Band [MHz]	Equipment	Detector	Resolution Bandwidth	Video Bandwidth
0.15 to 30	EMI Receiver	Quasi-Peak	9 kHz	-
		Average	9 kHz	-

### 1.5.2 Radiated emission

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop. The I/O cables that were connected to the peripherals were bundle in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged 40 cm height to the ground plane.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane and the turntable azimuth was varied to obtain the maximum signal strength

The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.

The spectrum was scanned from 30 to 1 000 MHz using biconiLog antenna.

The explanation of measuring equipment setup when Respective function is used in any frequency band and is as following;

Frequency Band [MHz]	Equipment	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1 000	EMI Receiver	Quasi-Peak	120 kHz	-

## 1.6 Test configuration

### 1.6.1 Used EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Note
A	LCD Monitor	SMT-1922	-	SAMSUNG	EUT
B	CCTV Camera	SCC-B5352P	00KX6VSLC00017W	SAMSUNG	-
C	CCTV Camera	SCC-B5353P	00KY6VSLC00057Y	SAMSUNG	
D	Adapter	STC-24150AK	-	SAMSUNG	For CCTV Camera
E	Adapter	STC-24150AK	-	SAMSUNG	For CCTV Camera

### 1.6.2 Used cable description

Mark	Connected cable	Length [m]	Shielded [Y/N]	Note
1	Video IN 1	1.0	No	To the Camera
2	Video Out 1	-	No	Termination
3	Video IN 2	1.0	No	To the Camera
4	Video Out 2	-	No	Termination
5	Audio IN 1	-	No	Termination
6	Audio IN 2	-	No	Termination
7	Power	1.5	No	For the EUT
8	Power	1.5	No	For the Camera

## 1.7 Applied Standards

Test standard	Test method
EN61000-6-4: 2001	EN61000-4-2:1995
EN61000-3-2: 2000	EN61000-4-3:1996
EN61000-3-3: 1995+A1:2001	EN61000-4-4:1995
EN50130-4:1995+A1:1998	EN61000-4-5:1995
	EN61000-4-6:1996
	EN61000-4-11:1994

### Performance Criteria

- A. normal performance within the specification limits
- B. temporary degradation or loss of function or performance which is self-recoverable
- C. temporary degradation or loss of function or performance which require operator intervention or system reset

## 1.8 Test Facility

### 1.8.1 General information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-

2.This EMC Testing Lab. is accredited by Korea Laboratory Accreditation Scheme(KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

This Lab. is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1998.

### 1.8.2 Accreditation and listing



### 1.8.3 Measurement uncertainty

(According to CISPR 16-4 and Lab. 34)

Test item	Measurement uncertainty
Conducted emission	± 3.3 dB
Radiated emission Horizontal	± 4.0 dB
Vertical	± 4.4 dB

## 2. Summary of test results

**Result : Complied**

The equipment under test(EUT) has been found to comply with the applied standards.

Section of the Product Standard		Applied Standard	Result
<b>Electromagnetic Emission Test</b>			
3.1	Conducted Emission	EN61000-6-4:2001	Complied
3.2	Radiated Emission	EN61000-6-4:2001	Complied
3.3	Harmonics	EN61000-3-2: 2000	Complied
3.4	Flicker	EN61000-3-3: 1995+A1:2001	Complied
<b>Electromagnetic Susceptibility(Immunity) Test</b>			
3.5	ESD	EN61000-4-2:1995	Complied
3.6	Radiated Immunity	EN61000-4-3:1996	Complied
3.7	EFT	EN61000-4-4:1995	Complied
3.8	SURGE	EN61000-4-5:1995	Complied
3.9	Conducted Immunity	EN61000-4-6:1996	Complied
3.10	Voltage Dip	EN61000-4-11:1994	Complied

### 3. Description of individual tests

#### 3.1 Conducted emission

##### 3.1.1 Test information

Test engineer	Tae Young Jang
Test date	March 16, 2007
Climate condition	Ambient temperature : 23.7 °C, Relative humidity : 25 % Atmospheric pressure 102.0 kPa
Test place	Shielded room # 1

##### 3.1.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval (Month)
EMI TEST RECEIVER	ESCI	R&S	100369	2006-05-10	12
LISN(For EUT)	ENV216	R&S	100116	2006-09-01	12
LISN(For Peripheral)	ESH3-Z5	R&S	100261	2006-07-21	12
Test Software	EMC 32	R&S	Ver 5.20.0	N/A	N/A

#### EUT Test Setup

The EUT was set up as per normal use on a PVC table, 0.4 m from a vertical ground reference plane, At least 0.8 m from other conduction surfaces and 0.8 m from the LISN.

See photo.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> The measured emissions of the EUT have found to be below the specified limits.
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### Test Information

EUT Name: SMT-1922  
 Test Description: EN55022  
 Operating Conditions: CCTV Monitoring  
 Operator Name: T Y JANG  
 Comment: CH A

### Hardware Setup: Voltage with ENV 2-Line-LISN - [EMI conducted]

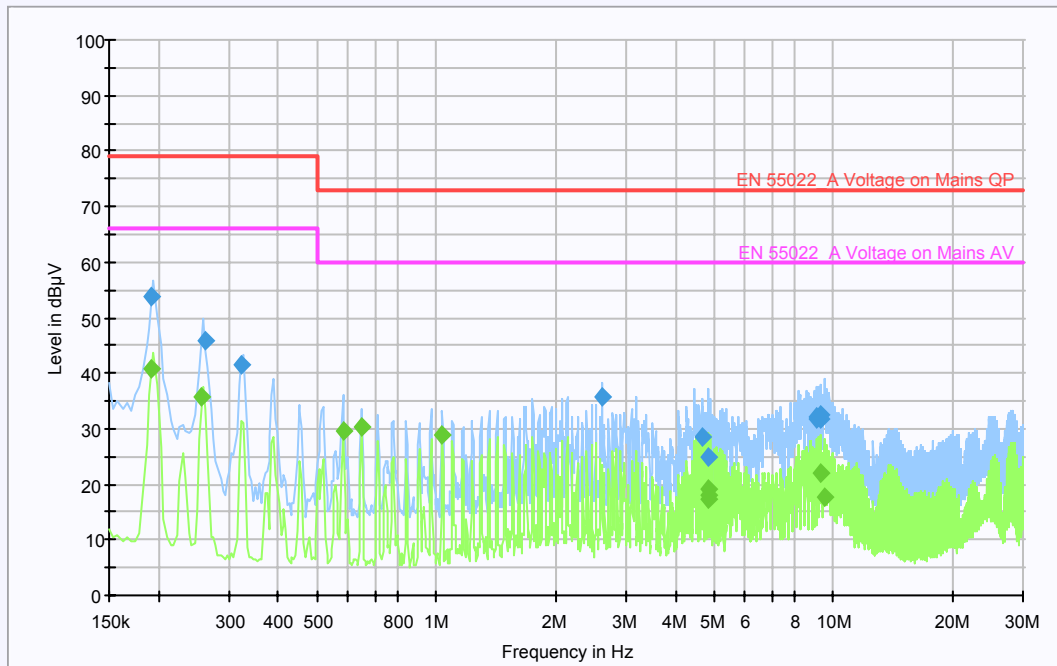
Subrange 1  
 Frequency Range: 150kHz - 30MHz  
 Receiver: ESCI 3 [ESCI 3]  
 @ GPIB0 (ADR 20), SN 100369/003, FW 3.82  
 Signal Path: Receiver-2-Line-LISN ENV216  
 FW 1.0  
 Correction Table: Receiver-2-LISN ENV216  
 LISN: ENV216  
 Correction Table (Line 0): ENV216\_100116\_N  
 Correction Table (Line 1): ENV216\_100116\_L

### Scan Setup: EN55022\_A\_ENV 2-Line-LISN fin [EMI conducted]

Hardware Setup: Voltage with ENV 2-Line-LISN  
 Level Unit: dB  $\mu$  V

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
150kHz - 30MHz	QuasiPeak; Average	9kHz	15s	ESCI 3

### EN55022\_A with ENV 2-Line-LISN



### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.192 300	53.7	L1	9.6	25.3	79.0
0.261 100	45.7	L1	9.9	33.3	79.0
0.321 700	41.6	L1	9.8	37.4	79.0
2.621 000	35.7	N	9.7	37.3	73.0
4.652 800	28.7	N	9.7	44.3	73.0
4.849 200	24.9	N	9.7	48.1	73.0
9.047 000	32.0	N	9.9	41.0	73.0
9.051 800	31.7	N	9.9	41.3	73.0
9.245 200	32.4	N	9.9	40.6	73.0
9.248 200	31.9	L1	9.9	41.1	73.0

### Final Measurement Detector 2

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.192 300	40.8	L1	9.6	25.2	66.0
0.257 100	35.8	N	9.6	30.2	66.0
0.580 900	29.7	N	9.6	30.3	60.0
0.645 700	30.4	N	9.6	29.6	60.0
1.032 200	28.8	N	9.6	31.2	60.0
4.845 400	19.2	N	9.7	40.8	60.0
4.846 200	17.9	N	9.7	42.1	60.0
4.848 600	17.4	N	9.7	42.6	60.0
9.305 800	21.8	L1	9.9	38.2	60.0
9.499 800	17.8	N	9.9	42.2	60.0

\* QP : Quasi-peak, AV: Average

\* Result = Level(QP or AV) + Corr. (LISN Insertion loss + Cable loss)

\* Margin = Limit - Level

### 3.2 Radiated emission

#### 3.2.1 Test information

Test engineer	Tae Young Jang
Test date	March 13, 2007
Climate condition	Ambient temperature : 24.8 °C , Relative humidity : 13 % Atmospheric pressure 101.7 kPa
Test place	10 m Semi-Anechoic Chamber # 2

#### 3.2.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
EMI Test Receiver	ESI-26	R&S	100289	2006-03-13	12
EMI Test Receiver	ESI-26	R&S	100291	2006-03-31	12
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Mast Controller	CO2000	inn-co	-	N/A	N/A
Amplifier	310N	SONOMA	251675	2007-03-03	12
Amplifier	310N	SONOMA	251676	2006-03-14	12
RF selector	NS4900	TOYO	-	N/A	N/A
Bi-log Antenna	CBL6112D	SCHAFFNER	22603	2006-06-26	12
Bi-log Antenna	CBL6112D	SCHAFFNER	22604	2006-06-26	12

#### EUT Test Setup

EUT set up in semi-anechoic chamber. EUT positioned at 10 m from the antenna in the center of the table.

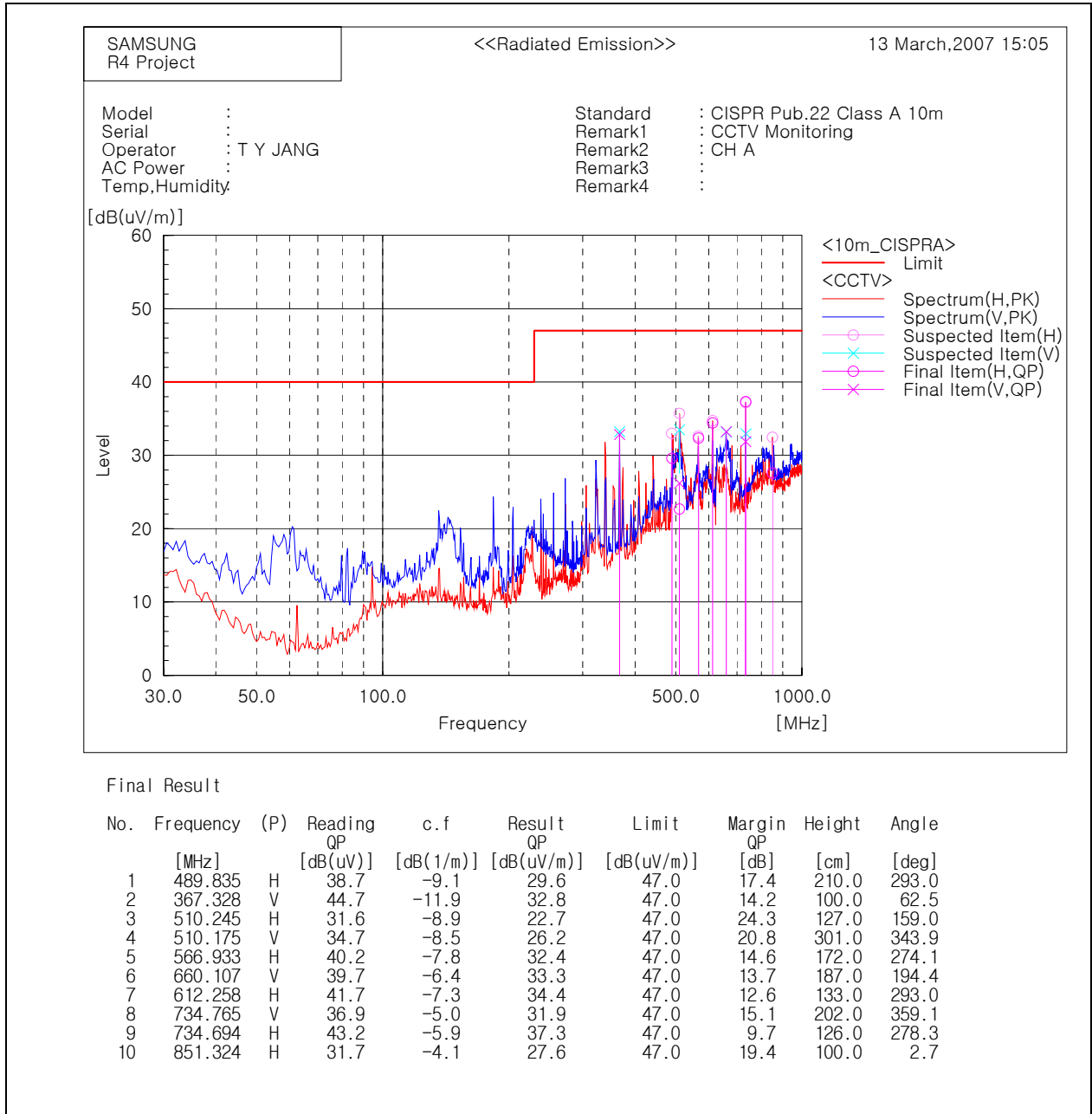
All ports terminated into characteristic loads.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> The measured emissions of the EUT have found to be below the specified limits.
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**Test Data (Other Frequency)**

■ Operating Mode : CCTV Display



- \* Receiving antenna mode : Horizontal, Vertical
- \* Test distance : 10m (RF Semi Anechoic Chamber)
- \* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)
- \* Margin = Limit – Result

### 3.3 Harmonics

#### 3.3.1 Test information

Test engineer	Tae Young Jang
Test date	March 21, 2007
Climate condition	Ambient temperature : 23.8 °C, Relative humidity : 39 % Atmospheric pressure 102.2 kPa
Test place	Shielded room # 3

#### 3.3.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Universal Power Analyzer	PM3300	Voltech	AK08/9137	2006-06-23	12
IEC Network	555	Voltech	IB10/9466	2006-06-23	12

#### EUT Test Setup

The EUT was set up in accordance with the requirements of the applied standard.  
The power consumption, steady state harmonic currents were measured in the tested operating mode(s).

#### Test Result

<b>Measurement Results</b>	<b>Complied</b>  The measured emission of the EUT has been found to be below the specified limits
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**Test Data**

Product:	MONITOR	2007 Mar 21 11:14am
Serial no:	None	Page 1 of 1
Description:	CCTV Monitoring	
Result Name:		
Voltech IEC1000-3 Windows Software 3.13.08		Test Date: 2007 Mar 21 11:12am
Type of Test:	Steady State Harmonics Test - Table (1995)	
Power Analyzer:	Voltech PM3300 v1.67 s/n 9157	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
<b>PASS</b>	Below Class D power limit	

Class	D
Class Multiplier	1
Power	35.8 W

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	1.34mA	None	N/A	3	151mA	2.300A	Pass
4	1.33mA	None	N/A	5	143mA	1.140A	Pass
6	1.21mA	None	N/A	7	131mA	770mA	Pass
8	1.07mA	None	N/A	9	117mA	400mA	Pass
10	0.96mA	None	N/A	11	101mA	330mA	Pass
12	0.74mA	None	N/A	13	83.30mA	210mA	Pass
14	0.56mA	None	N/A	15	65.92mA	150mA	Pass
16	0.40mA	None	N/A	17	49.44mA	132mA	Pass
18	0.25mA	None	N/A	19	34.81mA	118mA	Pass
20	0.13mA	None	N/A	21	23.04mA	107mA	Pass
22	0.10mA	None	N/A	23	15.54mA	98mA	Pass
24	0.10mA	None	N/A	25	13.26mA	90mA	Pass
26	0.14mA	None	N/A	27	14.31mA	83mA	Pass
28	0.11mA	None	N/A	29	15.43mA	78mA	Pass
30	0.10mA	None	N/A	31	15.31mA	73mA	Pass
32	0.05mA	None	N/A	33	13.95mA	68mA	Pass
34	0.07mA	None	N/A	35	11.62mA	64mA	Pass
36	0.03mA	None	N/A	37	8.76mA	61mA	Pass
38	0.04mA	None	N/A	39	5.94mA	58mA	Pass
40	0.07mA	None	N/A				

**This EUT don't need to test. Because the Power of EUT is below 75W.**

### 3.4 Flicker

#### 3.4.1 Test information

Test engineer	Tae Young Jang
Test date	March 21, 2007
Climate condition	Ambient temperature : 23.8 °C, Relative humidity : 39 % Atmospheric pressure 102.2 kPa
Test place	Shielded room # 3

#### 3.4.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Universal Power Analyzer	PM3300	Voltech	AK08/9137	2006-06-23	12
IEC Network	555	Voltech	IB10/9466	2006-06-23	12

#### EUT Test Setup

The EUT was set up is accordance with the requirements of the applied standard.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> The measured emissions of the EUT have found to be below the specified limits.
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**Test Data**

Product:	MONITOR	2007 Mar 21 11:26am
Serial no:	None	Page 1 of 1
Description:	CCTV Monitoring	
Result Name:		
Voltech IEC1000-3 Windows Software 3.13.08		Test Date: 2007 Mar 21 11:14am
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM3300 v1.67 s/n 9157	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
<b>PASS</b>	Tested using an IEC60868 compliant flickermeter Measurement method - Voltage	

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.015	0.044	0

**The measured value of dmax(%) is 0.044**

### 3.5 ESD

#### 3.5.1 Test information

Test engineer	Tae Young Jang
Test date	March 21, 2007
Climate condition	Ambient temperature : 23.8 °C, Relative humidity : 39 % Atmospheric pressure : 102.2 kPa
Test place	Shielded room # 3

#### 3.5.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
ESD Gun	Minizap	Thermo keytek	504173	2006-11-21	12
Vertical Plane	VCP-1	Thermo keytek	-	-	N/A

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.  
A HCP is lying on the table. Between the EUT and the HCP 0.5 mm is isolated base.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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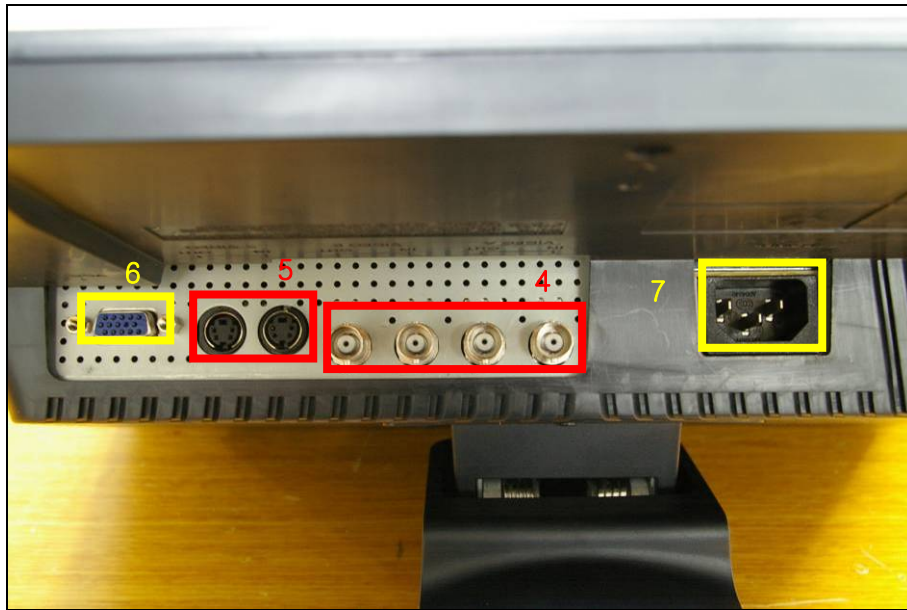
<b>Test Data</b>
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	No	Applied Point Name	Discharge Method	Test Level	Tested No	Criteria	Result
Indirect		Horizontal Plane	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV}$	150	B	A
Indirect		Vertical Plane	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV}$	300	B	A
Direct	1	LCD panel	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	A
Direct	2	Function Button	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	B
Direct	3	Audio IN	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	B
Direct	4	Video in/out	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV}$	40	B	B
Direct	5	S-Video in/out	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV}$	40	B	B
Direct	6	VGA	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	A
Direct	7	Power Port	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	A

- Air
- Contact
- Air/Contact



[ Front ]



[ Rear ]



[ Side ]

### 3.6 Radiated Immunity

#### 3.6.1 Test information

Test engineer	Tae Young Jang
Test date	March 21,2007
Climate condition	Ambient temperature : 20.8 ℃, Relative humidity : 30 % Atmospheric pressure 79.5 kPa
Test place	3m Fully-anechoic Chamber

#### 3.6.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
10V Insertion Unit	URV5-Z2	R&S	100240	2006-03-22	12
10V Insertion Unit	URV5-Z2	R&S	100241	2006-03-22	12
Signal Generator	SML03	R&S	102190	2006-03-17	12
Mill volt Meter	URV5	R&S	100243	2006-03-22	12
Antenna	AT1080	AR	310700	N/A	N/A
Antenna Master	TP1000A	AR	311200	N/A	N/A
Amplifier	250W1000A	AR	312241	N/A	N/A
Amplifier	60SIG3	AR	311853	N/A	N/A
Relay Switching Unit	TS-RSP	R&S	N/A	N/A	N/A

#### EUT Test Setup

The EUT was operated on a PVC table 0.8 meter above the reference ground.

The test distance was 3 meter.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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<b>Test Data</b>
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Test Level	Freq. Range	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
[V/m]	[MHz]							
10 V/m	80 ~ 2000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	Front	C	C	B	A
			3 s	Left	C	C	B	A
			3 s	Back	C	C	B	A
			3 s	Right	C	C	B	A
3 V/m	80 ~ 2000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	2 s	Front	B	B	A	A
			2 s	Left	B	B	A	A
			2 s	Back	B	B	A	A
			2 s	Right	B	B	A	A
1 V/m	80 ~ 2000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	1 s	Front	A	A	A	A
			1 s	Left	A	A	A	A
			1 s	Back	A	A	A	A
			1 s	Right	A	A	A	A

Test Level	Freq. Range	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
[V/m]	[MHz]							
10 V/m	80 ~ 2000	80% AM @1kHz	3 s	Front	C	C	B	A
			3 s	Left	C	C	B	A
			3 s	Back	C	C	B	A
			3 s	Right	C	C	B	A
3 V/m	80 ~ 2000	80% AM @1kHz	2 s	Front	B	B	B	A
			2 s	Left	B	B	B	A
			2 s	Back	B	B	B	A
			2 s	Right	B	B	B	A
1 V/m	80 ~ 2000	80% AM @1kHz	1 s	Front	A	A	A	A
			1 s	Left	A	A	A	A
			1 s	Back	A	A	A	A
			1 s	Right	A	A	A	A

### 3.7 EFT

#### 3.7.1 Test information

Test engineer	Tae Young Jang
Test date	March 20, 2007
Climate condition	Ambient temperature : 23.2 °C, Relative humidity : 31 % Atmospheric pressure 102.1 kPa
Test place	Shielded room # 2

#### 3.7.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
EFT/Burst Generator	PEFT 4010	HAEFELY	152608	2006-05-18	12
3 Phases CDN 690V/100A	FP-EFT 100M	HAEFELY	152635	2006-05-18	12

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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<b>Test Data</b>
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Port	Coupling	Test Level		Phase wave shape (kHz)	Polarity	Criteria	Result
		Voltage (kV)	Frequency (kHz)				
AC Port	Live	1	5	5/50	+/-	B	B
AC Port	Ground	1	5	5/50	+/-	B	B
AC Port	Neutral	1	5	5/50	+/-	B	B
AC Port	Live to Ground	1	5	5/50	+/-	B	B
AC Port	Neutral to Ground	1	5	5/50	+/-	B	B
AC Port	Live to Neutral	1	5	5/50	+/-	B	B
AC Port	Live to Neutral to Ground	1	5	5/50	+/-	B	B

### 3.8 Surge

#### 3.8.1 Test information

Test engineer	Tae Young Jang
Test date	March 19, 2007
Climate condition	Ambient temperature : 24.7 °C, Relative humidity : 35 % Atmospheric pressure 102.0 kPa
Test place	Shield room #3

#### 3.8.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Surge Tester	PSURGE 8000	HAEFELY	152602	2007-01-26	12
Surge Impulse Module	PIM 100	HAEFELY	152288	2007-01-26	12
Coupling Decoupling Network	PCD 120	HAEFELY	148918	2007-01-26	N/A
Coupling Decoupling Network	FP-SURGE 100M	HAEFELY	152636	2007-01-26	N/A
Impulse Module	PIM 120	HAEFELY	150663	2007-01-26	N/A

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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**Test Data**

Port	Coupling	Test Level			Phase wave shape [us]	Polarity	Criteria	Result
		Voltage [KV]	Repetition Time	No				
AC	Line-PE	2	60 s	40	1.2/50(8/20)	+/-	B	A
AC	Neutral-PE	2	60 s	40	1.2/50(8/20)	+/-	B	A
AC	Line-Neutral	1	60 s	40	1.2/50(8/20)	+/-	B	A

### 3.9 Conducted Immunity

#### 3.9.1 Test information

Test engineer	Tae Young Jang
Test date	March 21, 2007
Climate condition	Ambient temperature : 23.2 °C, Relative humidity : 31 % Atmospheric pressure 102.1 kPa
Test place	Shield room #2

#### 3.9.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
RF - Generator	NSG2070	Schaffner	1118	2006-06-07	12
Attenuator	INA2070-1	Schaffner	2118	2007-02-22	12
Coupling Decoupling Network	CDN M016	Schaffner	21246	2006-04-20	12

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 meter above the reference ground.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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**Test Data**

Port Coupling	Freq. Range	Level	Dwell Time	Modulation	Coupling	Criteria	Result
AC Mains	0.15~100MHz	10 V	3 s	80% AM @1kHz	CDN	C	A
AC Mains	0.15~100MHz	3 V	3 s	80% AM @1kHz	CDN	B	A
AC Mains	0.15~100MHz	1 V	3 s	80% AM @1kHz	CDN	A	A

Port Coupling	Freq. Range	Level	Dwell Time	Modulation	Coupling	Criteria	Result
AC Mains	0.15~100MHz	10 V	3 s	PM with 1Hz (0.5 s ON: 0.5 s OFF)	CDN	C	A
AC Mains	0.15~100MHz	3 V	3 s	PM with 1Hz (0.5 s ON: 0.5 s OFF)	CDN	B	A
AC Mains	0.15~100MHz	1 V	3 s	PM with 1Hz (0.5 s ON: 0.5 s OFF)	CDN	A	A

### 3.10 Voltage Dips

#### 3.10.1 Test information

Test engineer	Tae Young Jang
Test date	March 21, 2007
Climate condition	Ambient temperature : 23.2 °C, Relative humidity : 31 % Atmospheric pressure 102.1 kPa
Test place	Shield room #2

#### 3.10.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Power Fail Simulator	PFS503	EM Test	63A-0513100236	2006-06-01	12

#### EUT Test Setup

The EUT was operated on a PVC table 0.8 meter above the reference ground.

#### Test Result

<b>Measurement Results</b>	<b>Complied</b>
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<b>Test Data</b>
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**Voltage Dips/Interference**

Test Voltage		Number of Applications	Time Between Application	Angle	Criteria	Result
Reduction Level	Duration of reduction (s)					
Reduction 30 %	0.5 / 1 / 5 / 10	10	10 s	0 / 180	A	A
Reduction 60 %	0.5 / 1 / 5 / 10	10	10 s	0 / 180	A	A
Reduction 100 %	0.5 / 1 / 5	10	10 s	0/180	A	A

**Mains supply voltage variation**

Voltage	Criteria	Result
10 % UP	A	A
15 % DOWN	A	A

## 4. Appendix

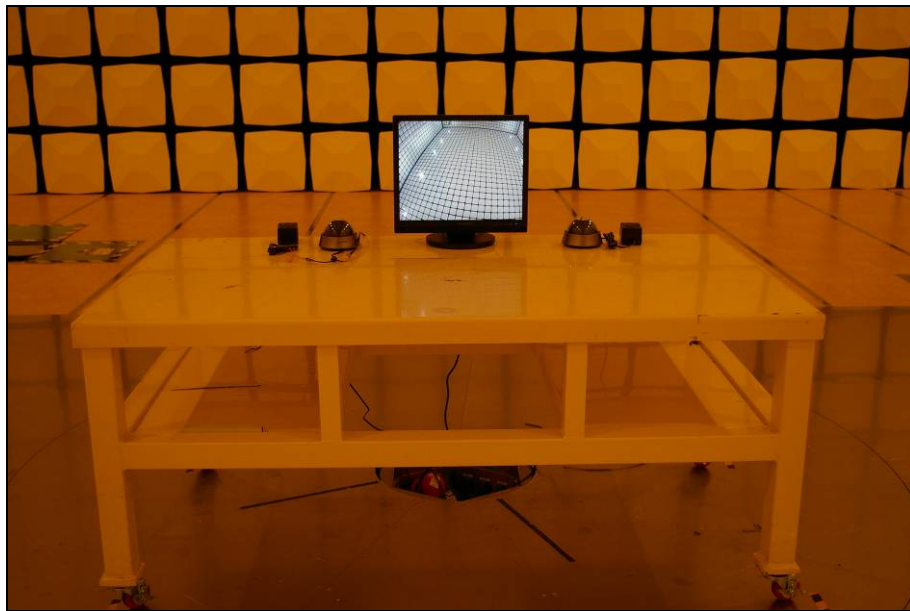
### 4.1 Test photography



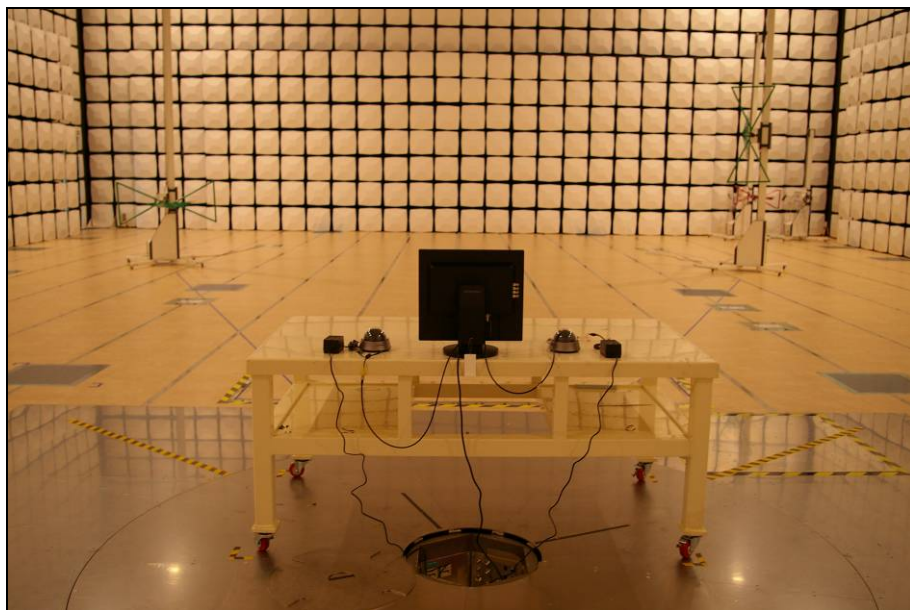
Picture 1. Conducted emission (Front)



Picture 2. Conducted emission (Rear)



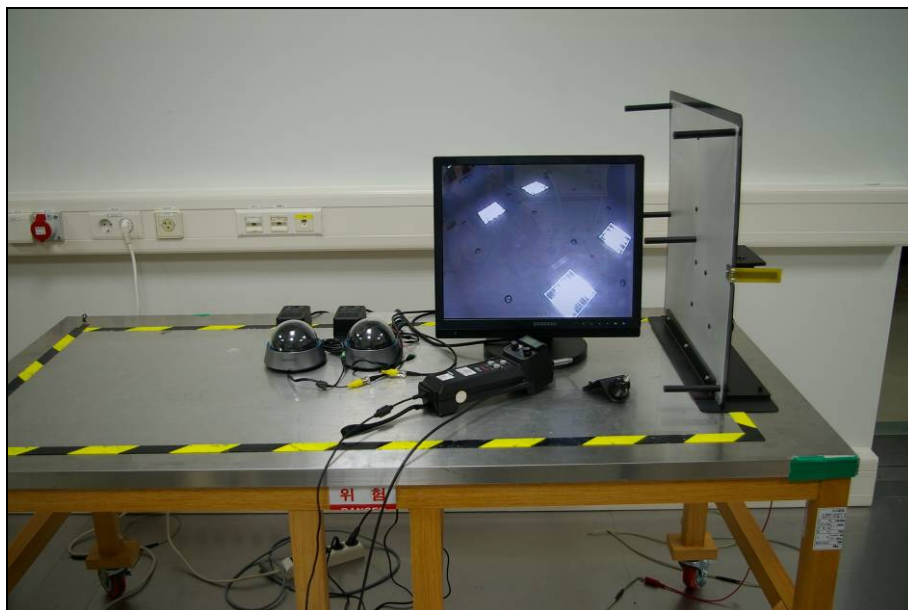
Picture 3. Radiated emission (Front)



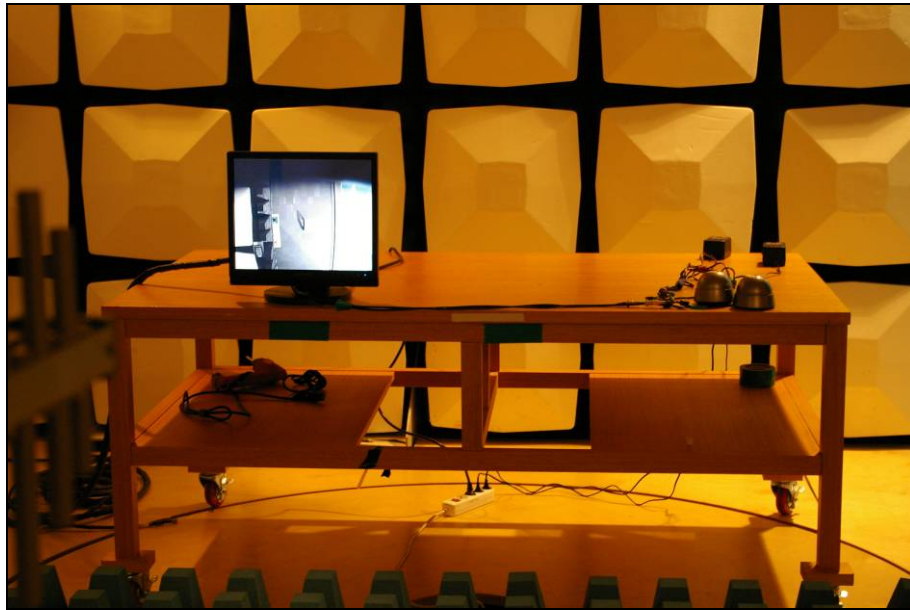
Picture 4. Radiated emission (Rear)



Picture 5. Harmonics & Flicker



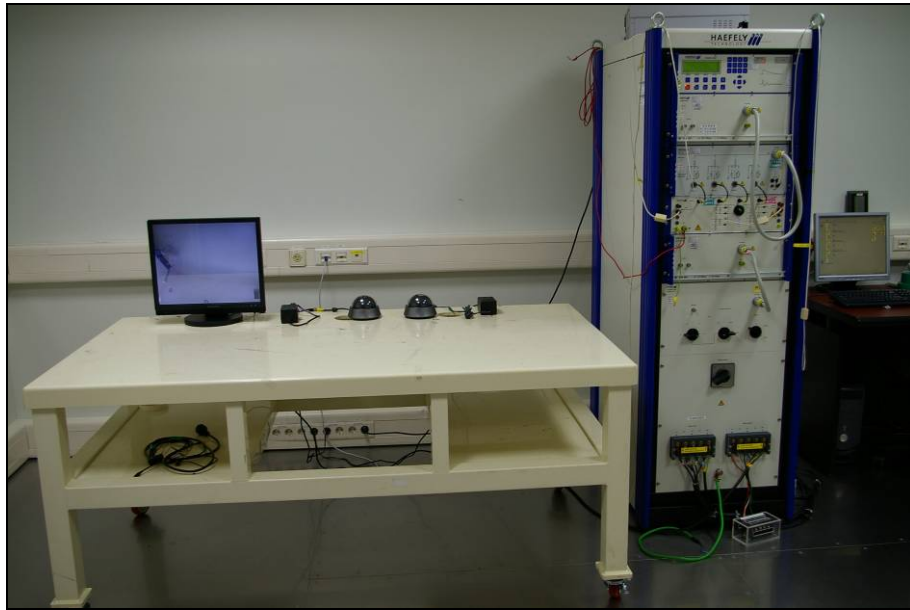
Picture 6. ESD



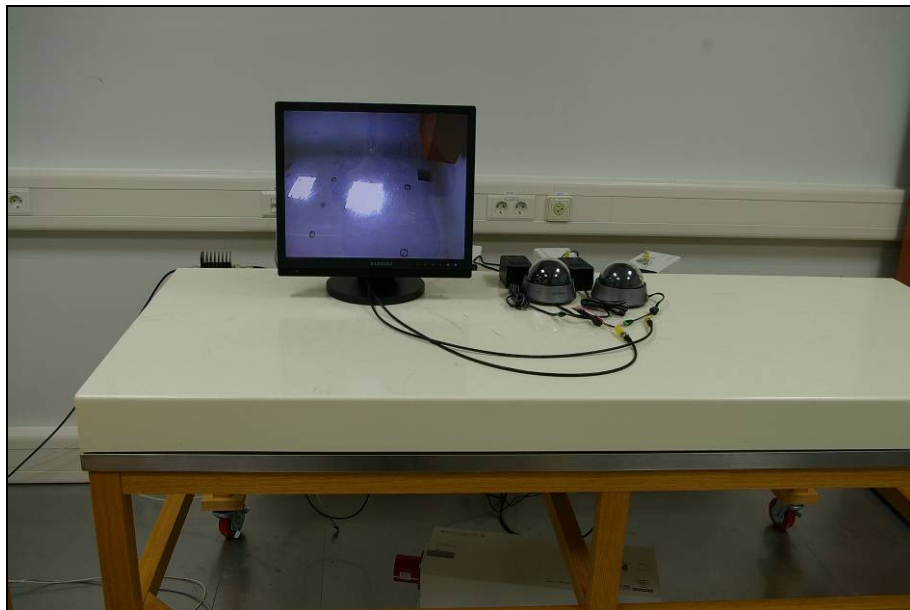
Picture 7. Radiated Immunity



Picture 8. EFT



Picture 9. Surge



Picture 10. Conducted Immunity



Picture 11. Voltage Dip

#### 4.2 EUT photography



Picture 4. EUT (Front)



Picture 5. EUT (Rear)