

# 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 : CCTV Monitor (Model name: MT21EO)

4. Date of test : 2007. 03. 20 ~ 2007. 03. 26

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

6. Report No. : LBE070923

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 : Seung Beom, Choi

Reviewed by

Name : No Cheon, Park

This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.

2007. 03. 29

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

# TEST RESULT

**Test Report No.** : LBE070923

**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 : CCTV Monitor
2. Model name : MT21EO
3. Brand name : Samsung
4. Variant model : SMC-213P, SMC-214P

**Test Method** :

- EN 61000-4-2:1995
- EN 61000-4-3:1996
- EN 61000-4-4:1995
- EN 61000-4-5:1995
- EN 61000-4-6:1996
- EN 61000-4-11:1994

**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** : Seung Beom, Choi

**Reviewed by** : No Cheon Park

**Date of Issue** : 2007. 03. 29

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# 1. General information

## 1.1 Basic information related product

Model name	MT21EO
Applicant / Address	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Contact person	Chang Seub, Eum
Kind of product	CCTV Monitor
Variant model	None
Manufacturer / Address	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Rated power	AC 230 V, 50 Hz
New / Alternative / Permissive change information	New

## 1.2 Detail Information related product

### 1.2.1 Specification

System	SMC-213 / SMC-214 (NTSC/PAL)
CRT	21" diagonal, 0.7stripe pitch, 90° deflection
Video In/Out	2 Channel Input/2 Channel Output(SMC-213) 4 Channel Input/1 Channel Output(SMC-214)
Audio In/Out	2 Channel Input/2 Channel Output(SMC-213) 4 Channel Input/1 Channel Output(SMC-214)
Power Source	Control range of main section 110V~220V or "Indicated on the rear of the MONITOR set"
Power Consumption	90Watts (max)
Dimensions (W x D x H)	467mm x 325.7mm x 490mm (without packing)
Weight	25Kg (with packing)
Video System	Multiple system (NTSC/PAL)
Horizontal Stabilization	Pull in Range $\pm 500\text{Hz}$ Holding Range $\pm 500\text{Hz}$
Vertical Stabilization	Pull in Range $\pm 4\text{Hz}$ Holding Range $\pm 4\text{Hz}$
Sub Carrier Stabilization	Pull in Range $\pm 400\text{Hz}$ Holding Range $\pm 400\text{Hz}$
Audio	1.5Watts
Convergence	Less than 0.5mm Max (Center)
Overscan	10%
Operating Temperature	-10°C ~ +50°C
Operating Humidity	10 ~ 90% (Non-condensing)

### 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).

- CCTV Monitor operating (video in: CCTV camera connected)

### 1.4 Equipment modifications

No equipment modifications were required.

### 1.5 Test procedure

#### 1.5.1 Conducted emission

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 connected to the measuring equipment.

Frequency Band [MHz]	Instrument	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 turn table 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.

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

## 1.6 Test configuration

### 1.6.1 EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer
A	CCTV Monitor	MT21EO	-	Samsung
B	CCTV Camera	SCC-C4303AP	-	Samsung
C	Adapter	YK-12060K	-	Samsung

### 1.6.2 Cable description

Mark	Port	Length [m]	Shielded [Y/N]	Remark
1	Power	1.5	N	For EUT
2	Power	1.5	N	For Adapter (CCTV camera)
3	Video A in	1.0	N	To CCTV camera
4	Video B in	1.0	N	Termination
5	Video A out	1.0	N	Termination
6	Video B out	1.0	N	Termination
7	Audio A in	1.0	N	Termination
8	Audio B in	1.0	N	Termination
9	Audio A out	1.0	N	Termination
10	Audio B out	1.0	N	Termination

### 1.7 Applied Standards

Product or Generic Standards	Basic Standards
EN61000-6-4:2001 EN61000-3-2:2000 EN61000-3-3:1995+A1:2001 EN50130-4:1995+A1:1998	EN61000-4-2:1995 EN61000-4-3:1996 EN61000-4-4:1995 EN61000-4-5:1995 EN61000-4-6:1996 EN61000-4-11:1994

Performance Criteria
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- A. normal performance within the specification limits
- B. temporary degradation or less of function or performance which is self-recoverable
- C. temporary degradation or less 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
Electromagnetic Emission Test			
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
Electromagnetic Susceptibility(Immunity) Test			
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 Dips & Variation	EN61000-4-11:1994	Complied

### 3. Description of individual tests

#### 3.1 Conducted emission

##### 3.1.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 21, 2007
<b>Climate condition</b>	Ambient temperature : 24.6 , Relative humidity : 24 % Atmospheric pressure : 102.1 kPa
<b>Test place</b>	Shielded room #1

##### 3.1.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
Field strength meter	ESCI	R&S	100369	2006-05-10	12
L.I.S.N	ENV216	R&S	100116	2006-09-01	12

#### EUT Test Setup

The EUT was set up as per normal use on a wooden 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.

#### 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 & Graph**

**Test Information**

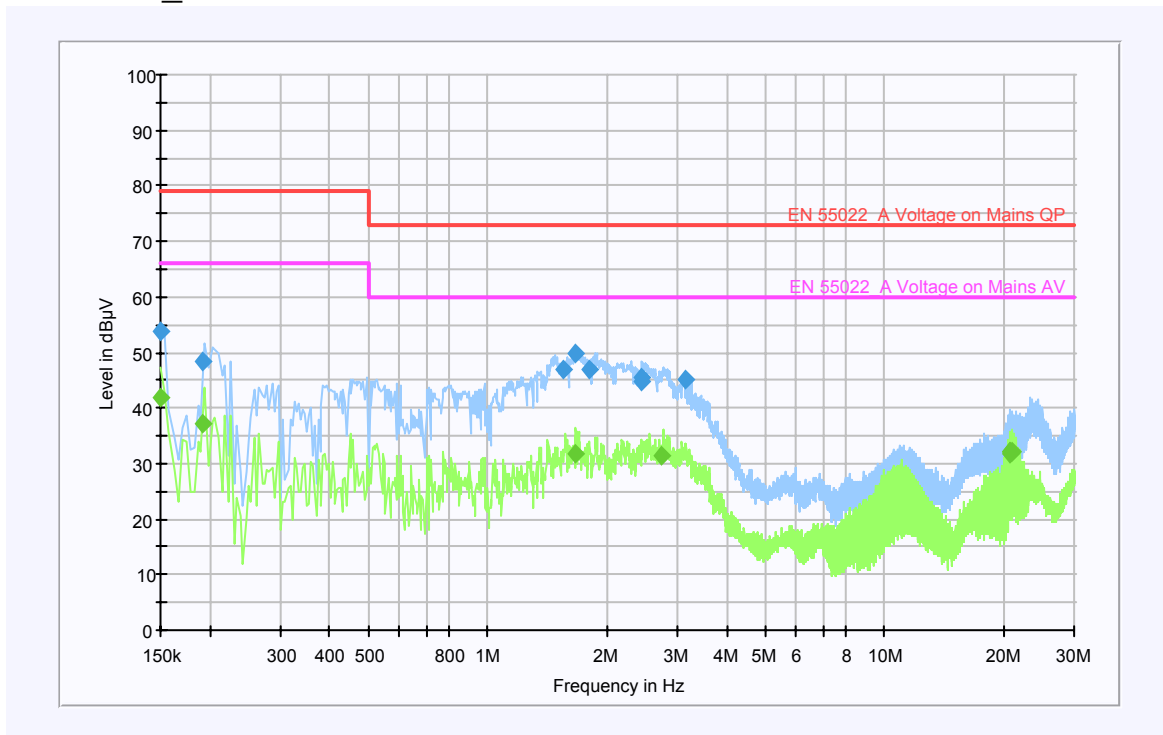
Test Description: MT21EO  
 Operating Conditions: CCTV camera connected  
 Operator Name: SB, Choi  
 Comment:

**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
150 kHz – 30 MHz	QuasiPeak; Average	9 kHz	15 s	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)
0.150000	53.9	N	9.6	25.1	79.0
0.192300	48.5	N	9.6	30.5	79.0
1.546000	46.9	L1	9.7	26.1	73.0
1.670000	50.0	L1	9.7	23.0	73.0
1.811200	47.1	N	9.7	25.9	73.0
2.433200	44.9	L1	9.7	28.1	73.0
2.441400	45.4	N	9.7	27.6	73.0
3.149600	45.1	L1	9.7	27.9	73.0

### Final Measurement Detector 2

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150000	42.0	N	9.6	24.0	66.0
0.192300	37.1	N	9.6	28.9	66.0
1.656600	31.9	N	9.7	28.1	60.0
2.749200	31.3	L1	9.7	28.7	60.0
20.578500	31.7	N	10.1	28.3	60.0
20.655500	32.0	N	10.1	28.0	60.0
20.749500	32.3	N	10.1	27.7	60.0
20.923000	32.1	N	10.1	27.9	60.0

### 3.2 Radiated Emission

#### 3.2.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 20, 2007
<b>Climate condition</b>	Ambient temperature : 23.1 , Relative humidity : 40 % Atmospheric pressure : 102.0 kPa
<b>Test place</b>	10m Semi Anechoic Chamber #2

#### 3.2.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
EMI Test Receiver	ESI-26	R&S	100147	2006-06-08	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	2007-03-17	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 antenna in center of table.

All ports terminated into characteristic loads.

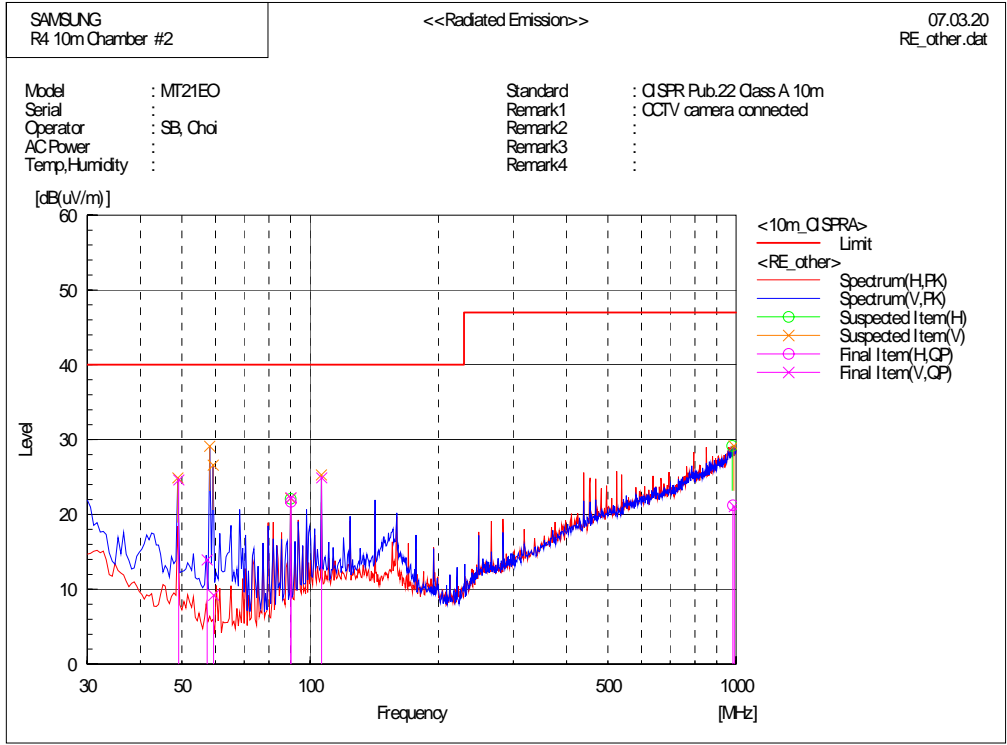
#### Test Result

#### Measurement Results

#### Complied

The measured emissions of the EUT have found to be below the specified limits.

**Test Data & Graph**



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c. f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	982.276	22.6	-1.4	21.2	47.0	25.8	
2	90.112	42.8	-21.1	21.7	40.0	18.3	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c. f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	57.333	38.5	-24.6	13.9	40.0	26.1	
2	59.389	34.2	-25.0	9.2	40.0	30.8	
3	106.501	43.2	-18.3	24.9	40.0	15.1	
4	49.146	47.3	-22.7	24.6	40.0	15.4	
5	90.106	43.4	-21.1	22.3	40.0	17.7	
6	990.524	22.4	-1.3	21.1	47.0	25.9	

### 3.3 Harmonics

#### 3.3.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 21, 2007
<b>Climate condition</b>	Ambient temperature : 23.4 , Relative humidity : 42 % Atmospheric pressure : 102.1 kPa
<b>Test place</b>	Shielded room #3

#### 3.3.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
Power Analyzer	PM3300	Voltech	AK08/9137	2006-06-23	12
IEC Network	555	ZIMMER	IB10/9466	2006-06-23	N/A

#### 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 emissions of the EUT have found to be below the specified limits.
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<b>Test Data</b>
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<b>MT21EO</b>		2007 Mar 21 1:09pm Page 1 of 1
Product:	MONITOR	
Serial no:	None	
Description:	Analog	
Result Name:	MT21EO	
Voltech IEC1000-3 Windows Software 3.13.08		Test Date: 2007 Mar 21 1:07pm
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:	<b>PASS</b>	

Class	A
Class Multiplier	1
Power	63.3 W

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	2.11mA	1.080A	N/A	3	259mA	2.300A	Pass
4	0.85mA	430mA	N/A	5	242mA	1.140A	Pass
6	1.11mA	300mA	N/A	7	222mA	770mA	Pass
8	0.81mA	230mA	N/A	9	196mA	400mA	Pass
10	0.60mA	184mA	N/A	11	168mA	330mA	Pass
12	0.24mA	153mA	N/A	13	137mA	210mA	Pass
14	0.21mA	131mA	N/A	15	107mA	150mA	Pass
16	0.07mA	115mA	N/A	17	77.55mA	132mA	Pass
18	0.24mA	102mA	N/A	19	51.13mA	118mA	Pass
20	0.24mA	92mA	N/A	21	28.48mA	107mA	Pass
22	0.32mA	84mA	N/A	23	10.76mA	98mA	Pass
24	0.35mA	77mA	N/A	25	6.06mA	90mA	Pass
26	0.31mA	71mA	N/A	27	13.74mA	83mA	Pass
28	0.14mA	66mA	N/A	29	18.37mA	78mA	Pass
30	0.07mA	61mA	N/A	31	19.43mA	73mA	Pass
32	0.03mA	58mA	N/A	33	17.77mA	68mA	Pass
34	0.04mA	54mA	N/A	35	14.12mA	64mA	Pass
36	0.14mA	51mA	N/A	37	9.53mA	61mA	Pass
38	0.21mA	48mA	N/A	39	4.75mA	58mA	N/A
40	0.22mA	46mA	N/A				

### 3.4 Flicker

#### 3.4.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 21, 2007
<b>Climate condition</b>	Ambient temperature : 23.4 , Relative humidity : 42 % Atmospheric pressure : 102.1 kPa
<b>Test place</b>	Shielded room #3

#### 3.3.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
Power Analyzer	PM3300	Voltech	AK08/9137	2006-06-23	12
IEC Network	555	ZIMMER	IB10/9466	2006-06-23	N/A

#### 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**

<b>MT21EO</b>				
Product:	MONITOR			2007 Mar 21 1:26pm
Serial no:	None			Page 1 of 1
Description:	Analog			
Result Name:	MT21EO			
Voltech IEC1000-3 Windows Software 3.13.08			Test Date: 2007 Mar 21 1:10pm	
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%(ms)
Limit	1.000	3.000	4.000	200
Reading 1	0.071	0.023	0.044	0

### 3.5 ESD

#### 3.5.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 23, 2007
<b>Climate condition</b>	Ambient temperature : 24.0 , Relative humidity : 38 % Atmospheric pressure : 101.9 kPa
<b>Test place</b>	Shielded room #3

#### 3.5.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
ESD Gun	Minizap	Thermo	0504173	2006-11-21	12

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 m 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

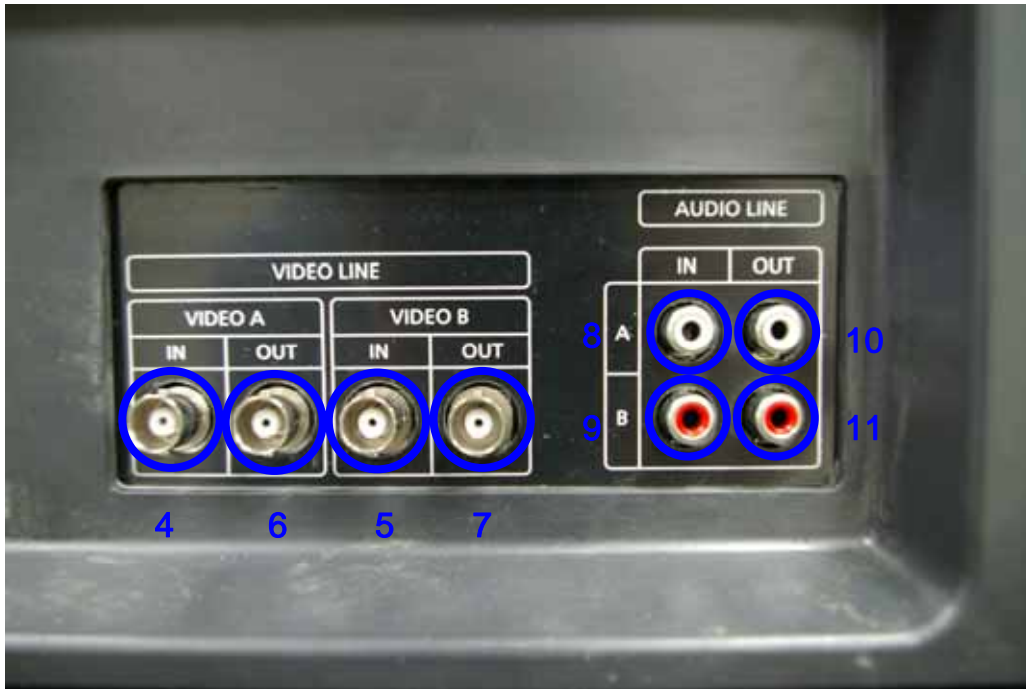
<b>Measurement Results</b>	<b>Complied</b> No Operation errors were detected during or after the applied test.
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<b>Test Data</b>
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	No	Applied Point Name	Discharge Method	Test Level	Tested No	Criteria	Result
Indirect		Horizontal Plane	Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	150	B	B
Indirect		Vertical Plane	Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	300	B	B
Direct	1	CRT	Air	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV	60	B	A
Direct	2	Buttons	Air	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV	60	B	A
Direct	3	Case	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	4	Video A in	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	5	Video B in	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	6	Video A out	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	7	Video B out	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	8	Audio A in	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	9	Audio B in	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	10	Audio A out	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	11	Audio B out	Air Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV $\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60 60	B B	B B
Direct	12	AC in	Air	$\pm 2$ kV / $\pm 4$ kV / $\pm 8$ kV	60	B	A
Direct	13	Screw	Contact	$\pm 2$ kV / $\pm 4$ kV / $\pm 6$ kV	60	B	B

**Test Points**





### 3.6 Radiated Immunity

#### 3.6.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 26, 2007
<b>Climate condition</b>	Ambient temperature : 19.5 , Relative humidity : 37 % Atmospheric pressure : 102.1 kPa
<b>Test place</b>	3m Fully Anechoic Chamber

#### 3.6.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
10V Insertion Unit	URV5-Z2	R&S	100240	2006-12-11	12
10V Insertion Unit	URV5-Z2	R&S	100241	2006-12-11	12
Signal Generator	SML03	R&S	100297	2007-03-20	12
Power meter	NRVD	R&S	841501/010	N/A	N/A
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 wooden table 0.8 m above the reference ground.

The test distance was 3 m.

#### 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**

Test Level [V/m]	Freq. Range [MHz]	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
10	80 ~ 1000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	Front	C	C	B	B
			3 s	Left	C	C	B	B
			3 s	Back	C	C	B	B
			3 s	Right	C	C	B	B
3	80 ~ 1000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B
1	80 ~ 1000	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	Front	A	A	A	A
			3 s	Left	A	A	A	A
			3 s	Back	A	A	A	A
			3 s	Right	A	A	A	A

Test Level [V/m]	Freq. Range [MHz]	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
10	80 ~ 1000	80% AM @1kHz	3 s	Front	C	C	B	B
			3 s	Left	C	C	B	B
			3 s	Back	C	C	B	B
			3 s	Right	C	C	B	B
3	80 ~ 1000	80% AM @1kHz	3 s	Front	B	B	B	B
			3 s	Left	B	B	B	B
			3 s	Back	B	B	B	B
			3 s	Right	B	B	B	B
1	80 ~ 1000	80% AM @1kHz	3 s	Front	A	A	A	A
			3 s	Left	A	A	A	A
			3 s	Back	A	A	A	A
			3 s	Right	A	A	A	A

### 3.7 EFT

#### 3.7.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 22, 2007
<b>Climate condition</b>	Ambient temperature : 23.3 , Relative humidity : 31 % Atmospheric pressure : 102.0 kPa
<b>Test place</b>	Shielded room #2

#### 3.7.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
EFT/Burst Generator	PEFT 4010	HAEFELY	19872	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 m 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	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Ground	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Neutral	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Live to Ground	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Neutral to Ground	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Live to Neutral	0.5 / 1 / 2	5	5/50	+/-	B	B
AC Port	Live to Neutral to Ground	0.5 / 1 / 2	5	5/50	+/-	B	B

### 3.8 Immunity to Surge

#### 3.8.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 22, 2007
<b>Climate condition</b>	Ambient temperature : 22.9 , Relative humidity : 42 % Atmospheric pressure : 102.1 kPa
<b>Test place</b>	Shielded room #3

#### 3.8.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
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	N/A	N/A
Coupling Decoupling Network	FP-SURGE 100M	HAEFELY	152636	N/A	N/A
Impulse Module	PIM 120	HAEFELY	150663	N/A	N/A

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 m 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 [ $\mu$ s]	Polarity	Criteria	Result
		Voltage [kV]	Repetition Time [s]	No.				
AC Port	Live to Neutral	0.5 / 1	60	40	1.2/50(8/20)	+/-	B	B
AC Port	Live to Ground	0.5 / 1 / 2	60	40	1.2/50(8/20)	+/-	B	B
AC Port	Neutral to Ground	0.5 / 1 / 2	60	40	1.2/50(8/20)	+/-	B	B

### 3.9 Conducted Immunity

#### 3.9.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 23, 2007
<b>Climate condition</b>	Ambient temperature : 23.6 , Relative humidity : 31 % Atmospheric pressure : 101.9 kPa
<b>Test place</b>	Shielded room #2

#### 3.9.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
Coupling Decoupling Network	CDN M016	Schaffner	21246	2006-04-20	12
Coupling Decoupling Network	CDN M016	Schaffner	20574	2006-05-01	12
Coupling Decoupling Network	CDN T400	Schaffner	21225	2006-06-05	12
Coupling Decoupling Network	CDN T200	Schaffner	16899	2006-06-05	12
Attenuator	INA2070-1	Schaffner	2118	2007-02-22	12
RF - Generator	NSG2070	Schaffner	1118	2006-06-07	12

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 m 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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Test Level [V]	Freq. Range [MHz]	Modulation	Dwell Time	Port	Coupling	Criteria	Result
10	0.15 ~ 100	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	AC mains	CDN	C	B
3	0.15 ~ 100	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	AC mains	CDN	B	B
1	0.15 ~ 100	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	AC mains	CDN	A	A

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

### 3.10 Voltage Dips & Variation

#### 3.10.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	March 22, 2007
<b>Climate condition</b>	Ambient temperature : 23.3 , Relative humidity : 31 % Atmospheric pressure : 102.0 kPa
<b>Test place</b>	Shielded room #2

#### 3.10.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
Voltage Dip & Interruption	PLINE1610	HAEFELY	083690-21	2006-06-09	12

#### EUT Test Setup

The EUT was operated on a wooden table 0.8 m 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**

Test Voltage		Number of Applications	Time Between Application	Angle [°]	Criteria	Result
Reduction Level	Duration of reduction [p]					
30 % UT	0.5 / 1 / 5 / 10	10	10 s	0 / 180	B / C	A
60 % UT	0.5 / 1 / 5 / 10	10	10 s	0	B / C	A
100 % UT	0.5 / 1 / 5	10	10 s	0	B / C	A

Test Voltage	Criteria	Result
10% up	A	A
15% down	A	A

## 4. Appendix

### 4.1 Test photography



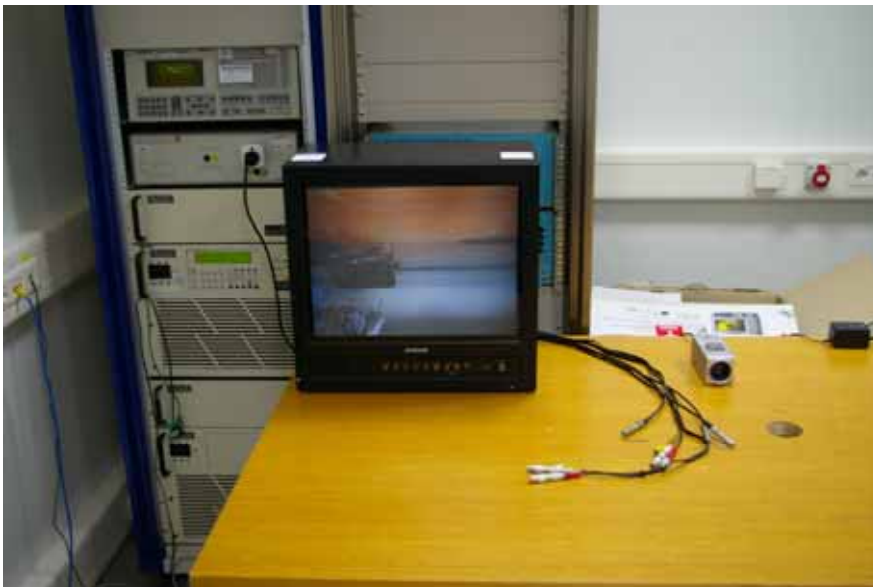
Picture 1. Conducted emission



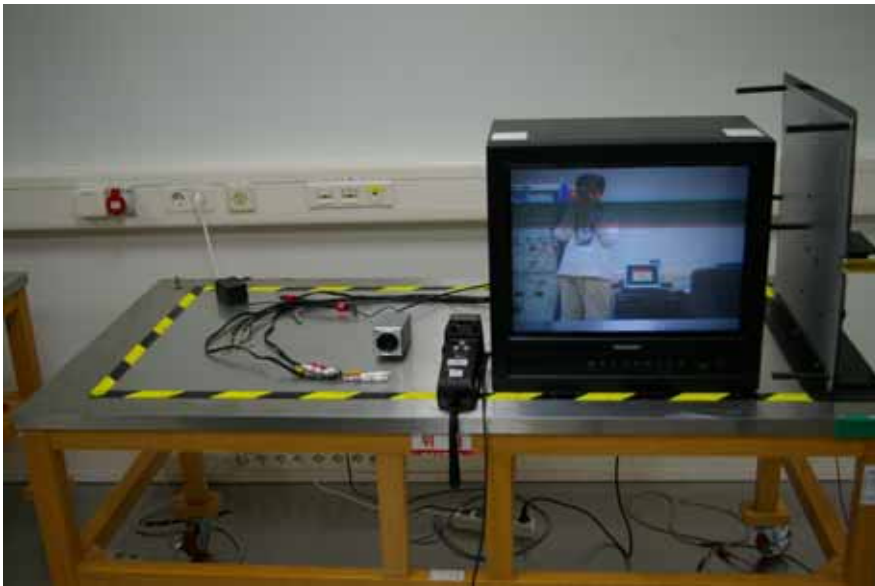
Picture 2. Radiated emission (Front)



Picture 3. Radiated emission (Rear)



Picture 4. Harmonics & Flicker



Picture 5. ESD



Picture 6. Radiated immunity



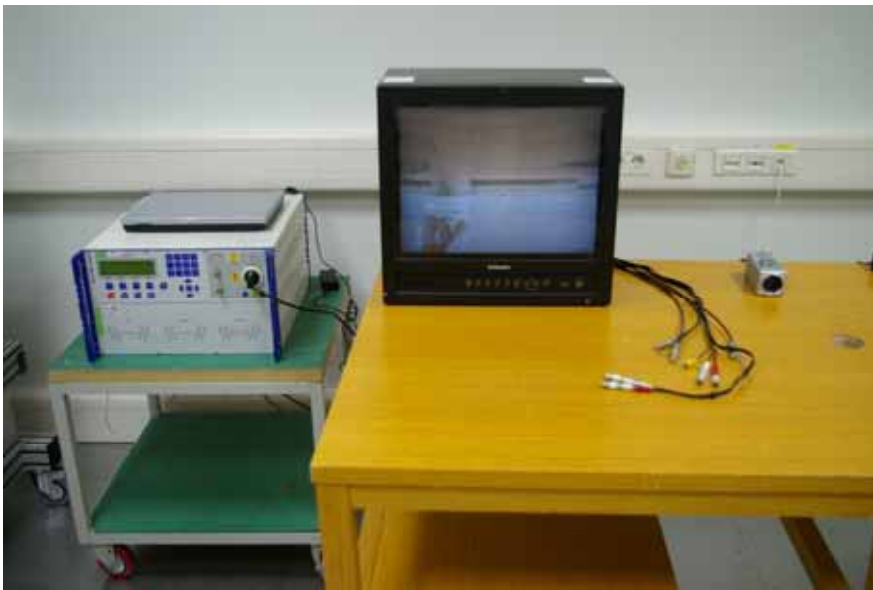
Picture 7. EFT



Picture 8. Surge



Picture 9. Conducted Immunity



Picture 10. Voltage Dips & Variation

## 4.2 EUT photography



Picture 11. EUT (Front)



Picture 12. EUT (Rear)