


# EMC TEST REPORT

<b>Project No.</b>	<b>LBE073030</b>	<b>Revision No.</b>	NONE
<b>Applicant</b>	<b>Name of organization</b>	Samsung Electronics Co., Ltd.	
	<b>Address</b>	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea	
	<b>Date of application</b>	2007.09.19	
<b>EUT Equipment Under Test</b>	<b>Kind of product</b>	<b>CCTV Camera</b>	
	<b>Model No.</b>	<b>SCC-C6435P</b>	
		<b>Variant Model No.</b>	SCC-C6433P
	<b>Manufacturer</b>	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742, Korea Tianjin Samsung Electronics Display Co., Ltd. Red star road, Wang chuan, He bei district, Tianjin, China	
<b>Applied Standards</b>	EN61000-6-4:2001		
	EN61000-3-2:2000		
	EN61000-3-3:1995+A1:2001		
	EN50130-4:1995+A1:1998		
<b>Issue date</b>	2007.10.23		
<b>Test result : <span style="color: red;">Complied</span></b>			
The equipment under test has found to be compliant with the applied standards. (Refer to the attached test result for more detail.)			
<b>Tested by</b> : Seung Beom, Choi		<b>Reviewed by</b> : No Cheon, Park	
			
<p>This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.</p> <p>The test results in this report only apply to the tested sample. This report must not be reproduced, except in full, without written permission from SEC EMC Laboratory.</p>			
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# 1. Summary of test results

## 1.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result	Remarks
<input checked="" type="checkbox"/>	Conducted Disturbance (Mains Port)	EN61000-6-4:2001	Complied	Minimum margin is 34.2 dB at 10.000 MHz
<input checked="" type="checkbox"/>	Radiated Disturbance		Complied	Minimum margin is 11.8 dB at 319.983 MHz
<input checked="" type="checkbox"/>	Harmonics current	EN61000-3-2:2000	N/A	The power of EUT is below 75W
<input checked="" type="checkbox"/>	Voltage fluctuation & Flicker	EN61000-3-3:1995+ A1:2001	Complied	Meets the Requirements

## 1.2 Immunity

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Performance Criterion	
			Result	Specification
<input checked="" type="checkbox"/>	Electrostatic discharge	EN61000-4-2:1995	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	<b>B</b>
<input checked="" type="checkbox"/>	Radiated, radio-frequency, electromagnetic field	EN61000-4-3:1995	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>	<b>C</b>
<input checked="" type="checkbox"/>	Electrical fast transient/burst	EN61000-4-4:1995	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	<b>B</b>
<input checked="" type="checkbox"/>	Surge	EN61000-4-5:1995	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	<b>B</b>
<input checked="" type="checkbox"/>	Radio-frequency conducted	EN61000-4-6:1996	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>	<b>C</b>
<input checked="" type="checkbox"/>	Voltage dips, short interruptions and voltage variations	EN61000-4-11:1994	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	B : 30%,60%, 100%Reduction A : Voltage 10% Up Voltage 15% Down
			A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	
			A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	
<input type="checkbox"/>	Power-frequency magnetic field	EN61000-4-8:1993	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>	<b>A</b>

## 2. General Information












### 2.1 Test facility

The SEC EMC Laboratory is located on Samsung Electronics Co., Ltd. at 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, South Korea.

All testing are performed in Semi-anechoic chambers conforming to the site attenuation Characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms.

The SEC EMC Laboratory is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1995.

### 2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	KOLAS(Korea Laboratory Accreditation Scheme)	Accredited : 124
	Radio Research Laboratory	Accredited : KR0004
	FCC(Federal Communications Commission)	Accredited : KR0004
	National Voluntary Laboratory Accreditation Program	Lab Code: 200623-0
	Norges Elektriske Materiellkontroll	Accredited : ELA 195
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	C-2421,R-2224
	China Quality Certification Center	5-053, 5-054
	TUV Rhineland	H9354285
	GOST(GOSTSTANDART)	ROSTEST
	Elektrotechnicky Zkusebni Ustav	Reg. No.: 001
	IC(Industry Canada)	Assigned Code: 5871

### 3. Test Setup configuration

#### 3.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Model No.	Serial No.	Manufacturer	Cable Type
CCTV Camera	SCC-C6435P	-	Samsung	-
AC adapter	STC-24150AK	-	Samsung	-

#### 3.2 EUT operating mode

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	CCTV Camera
------------------	-------------

#### 3.3 Details of Sampling

Customer selected, single unit.

#### 3.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected;

No.	From the port of EUT	To	Length[m]	NOTE
1	DC in	AC adapter	1.5	Yes
2	Video out	75 $\Omega$ Termination	1.0	No

### 3.5 EUT Description

The following features describe EUT represented by this report:

Items	Sub-items	Units	SCC-C6435P	
Camera Type	Color/BW		Color	
Image	Device		ExView-HAD PS CCD	
	Size	inch	1/4	
	Pixels	Total		795 x 596
		Effective		752 x 582
Scanning	System		Interlace	
	Horizontal Frequency	Internal Mode	Hz	15,625
		Line-lock Mode	Hz	15,625
	Vertical Frequency	Internal Mode	Hz	50
		Line-lock Mode	Hz	50
	Min. Scene Illumination	Color	Lux	0.3 Lux(15IRE, Off) 0.001 Lux(15IRE, Sense x256)
B/W		Lux	0.03 Lux(15IRE, Off) 0.0001 Lux(15IRE, Sense x256)	
PAN/TILT	Speed	Manual Pan	° /sec	1.5~45
		Preset Pan	° /sec	120
		Manual Tilt	° /sec	1.5~45
		Preset Tilt	° /sec	120
	Range	Panning	°	0~360(endless)
		Tilting	°	0~180(Manual)
	Number of Auto PAN			4
	Number of Preset			128
Number of Pattern			3	
Functions	Number of Privacy Zone			16
	Day/Night			Color/BW/Auto(Moving Filter)
	Motion Detection			Yes
	Wide Dynamic Range			Yes
	D-Zoom			Yes(~ 16X)
	High Speed Shutter			Yes(OFF ~ 1/10K)
	Sens Up			Yes(X2 ~ X256)
	PIP			N/A
	BLC			Off/On(Area setting)



	AGC		Off/Low/High	
	ELC		-	
	Line Lock		Off/On(Area setting)	
	Anti Vandal		-	
	Camera ID		Max 20 Character	
	White Balance		ATW1/ATW2/AWC/MANUAL	
Resolution	Horizontal	TV Lines	540(Color)/570(BW)	
	Vertical	TV Lines	350	
Video Output	VBS 1.0Vp-p		VBS 1.0Vp-p	
S/N Ratio	S/N Ratio	dB	about 50	
Lens	focal Length	mm	3.55 ~ 113mm	
	Zoom ratio		32x Optical	
	Aperature Ratio		F1.6(W)/F4.2(T)	
	Viewing Angle	Tele		1.78 ° (H) x 1.34 ° (V)
		Wide		56.41 ° (H) x 43.01 ° (V)
	Lens Drive Type		DC Auto Iris	
Mount Type		Board-in type		
OSD	OSD		N/A	
	Language		E/F/D/S/I, E/R/P, C	
Alarm	Input		8	
	Output		3(Open Collector 1 relay)	
Remote Control	RS485		RS485(Half&Full Duplex)/RS422	
Environmental Conditions	Operating Temperature	° C	-10 ° C ~ +50 ° C	
	Humidity	%	Less than 90%	
Power	Power Requirement	V	<b>24 VAC, 50Hz</b>	
	Power Consumption	W	<b>20W</b>	
	LED Indicator		Yes	
Physical Specification	Dimensions (WxHxD)	Net	φ 177(mm) X H233.5(mm)	
		Package	382(mm) X 307(mm) X 275(mm)	
	Weight	Net	g	2,400
		Package	g	4,360
	Loading Quantity	20/40ft	SET	640/1280
Color	Body		SILVER	

## 3.6 Performance Criteria

### Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

### Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

### Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

### 3.7 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4 and UKAS Lab 34.)

#### 3.7.1 Emission

Test type		Measurement uncertainty (C.L. 95 %, k = 2)
Conducted disturbance		± 2.8 dB
Radiated Disturbance	Horizontal	± 4.82 dB
	Vertical	± 5.42 dB
Harmonics current		± 2.37 dB
Voltage fluctuation & Flicker		± 2.37 dB

## 4. Results of individual test

### 4.1 Conducted disturbance

Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in Clause 9.

#### Limits for conducted disturbance at the mains ports of class A ITE

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60

NOTE The lower limit shall apply at the transition frequency

#### Limits for conducted disturbance at the mains ports of class B ITE

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE 1 The lower limit shall apply at the transition frequency  
 NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

#### 4.1.1 Test instrumentation

Test instrumentation used in the Conducted disturbance test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Field Strength meter	ESCI	R&S	100368	2007-06-01	12
L.I.S.N (For EUT)	ENV216	R&S	100116	2007-09-13	12
L.I.S.N (For peripheral)	ESH3-Z5	R&S	100262	2007-09-03	12
Test Software	EMC32	R&S	Ver 5.20.2	N/A	N/A

## 4.1.2 Photograph of the test Configuration

(Front)



(Rear)



### 4.1.3 Test results

Operating condition	CCTV Camera					
Test date	2007.09.19		Test engineer		Seung Beom, Choi	
Climate condition	Ambient temperature	23.5 °C	Relative humidity	57 %	Atmospheric Pressure	99.9 KPa
Test place	Shielded Room #1					

### 4.1.4 Test data

#### ■ Operating Mode: CCTV camera

#### Test Information

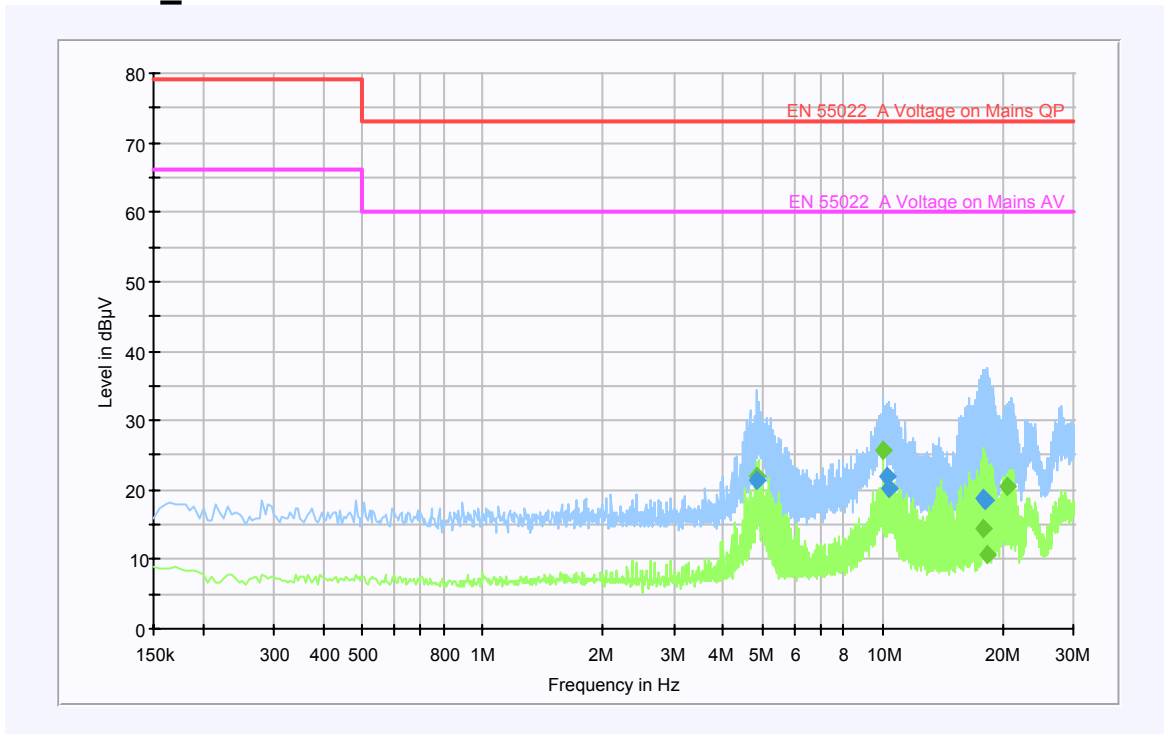
EUT Model Name : SCC-C6435P  
 Operating Conditions:  
 Operator Name:  
 Comment:

#### Scan Setup: EN55022\_A\_2-Line-LISN fin [EMI conducted]

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

<b>Subrange</b>	<b>Detectors</b>	<b>IF Bandwidth</b>	<b>Meas. Time</b>	<b>Receiver</b>
150kHz - 30MHz	QuasiPeak; Average	9kHz	0.1s	ESCI 3

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



### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.847 250	21.5	L1	9.8	51.5	73.0
10.205 000	22.1	L1	9.9	50.9	73.0
10.405 000	20.4	L1	9.9	52.6	73.0
17.864 000	18.8	L1	10.1	54.2	73.0
18.061 500	18.5	L1	10.1	54.5	73.0

### Final Measurement Detector 2

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
4.839 250	21.8	L1	9.8	38.2	60.0
10.000 000	25.8	N	9.9	34.2	60.0
17.861 000	14.4	L1	10.1	45.6	60.0
18.258 500	10.8	L1	10.1	49.2	60.0
20.609 000	20.5	L1	10.2	39.5	60.0

## 4.2 Radiated disturbance

Of those disturbances above ( $L - 20\text{dB}$ ), where  $L$  is the limit level in logarithmic units, record at least the disturbance levels and the frequencies of the six highest disturbances.

The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin. All measurements were taken utilizing quasi-peak detection unless stated otherwise. Measurements were performed at an antenna to EUT distance of 10 meters and elevated between 1 and 4 meters. Both vertical and horizontal antenna polarizations were measured.

### Limits for radiated disturbance of ITE at a measuring distance of 10 m

Frequency range Limits MHz	Quasi-peak Limits dB dB( $\mu\text{V}/\text{m}$ )	
	Class A	Class B
30 to 230	40	30
230 to 30	47	37

NOTE 1 The lower limit shall apply at the transition frequency  
 NOTE 2 Additional provisions may be required for cases where interference occurs.

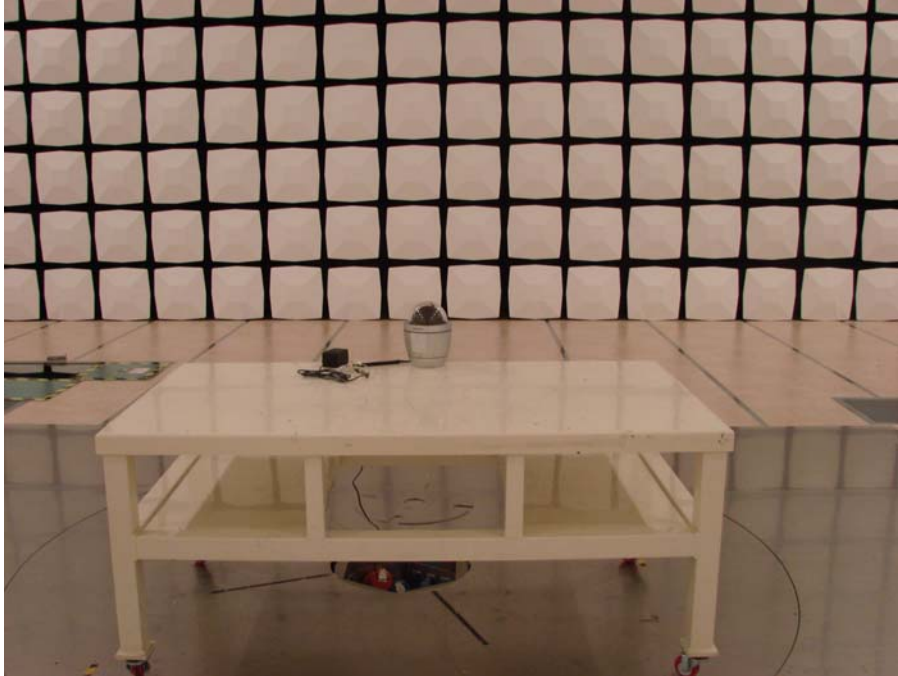
### 4.2.1 Test instrumentation

Test instrumentation used in the Radiated disturbance was as follows:

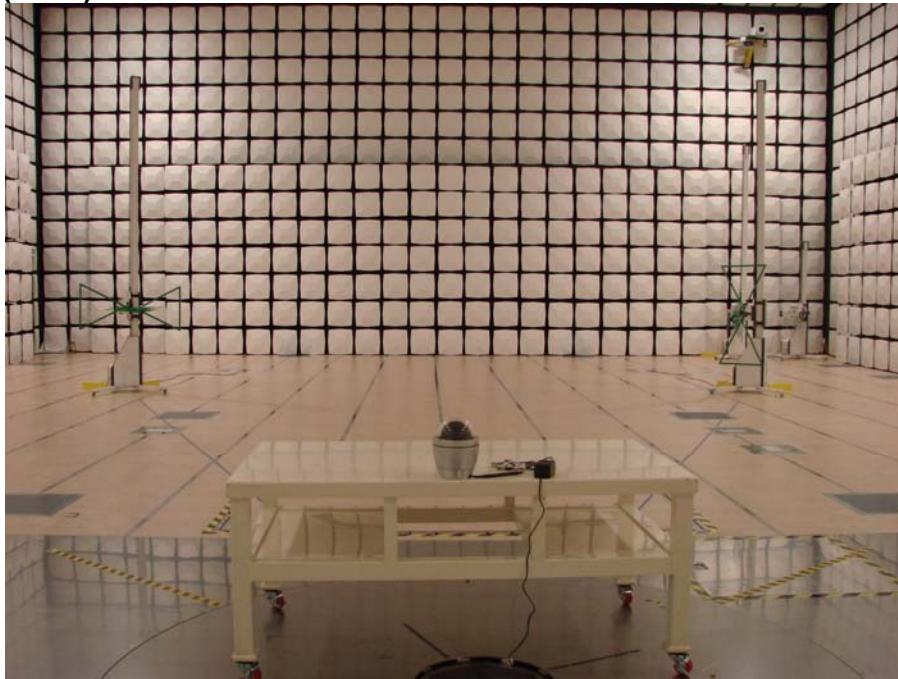
Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
EMI Test Receiver	ESIB-26	R&S	100147	2007-06-15	12
EMI Test Receiver	ESIB-26	R&S	832692/002	2007-02-28	12
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Mast Controller	CO2000	inn-co	-	N/A	N/A
Amplifier	310N	SONOMA	251674	2007-03-17	12
Amplifier	310N	SONOMA	186465	2007-04-09	12
RF selector	NS4900	inn-co	-	N/A	N/A
RF selector	NS4900	inn-co	-	N/A	N/A
Bi-log Antenna	CBL6112D	SCHAFFNER	22603	2007-04-02	24
Bi-log Antenna	CBL6112D	SCHAFFNER	22604	2006-06-26	24

## 4.2.2 Photograph of the test Configuration

(Front)

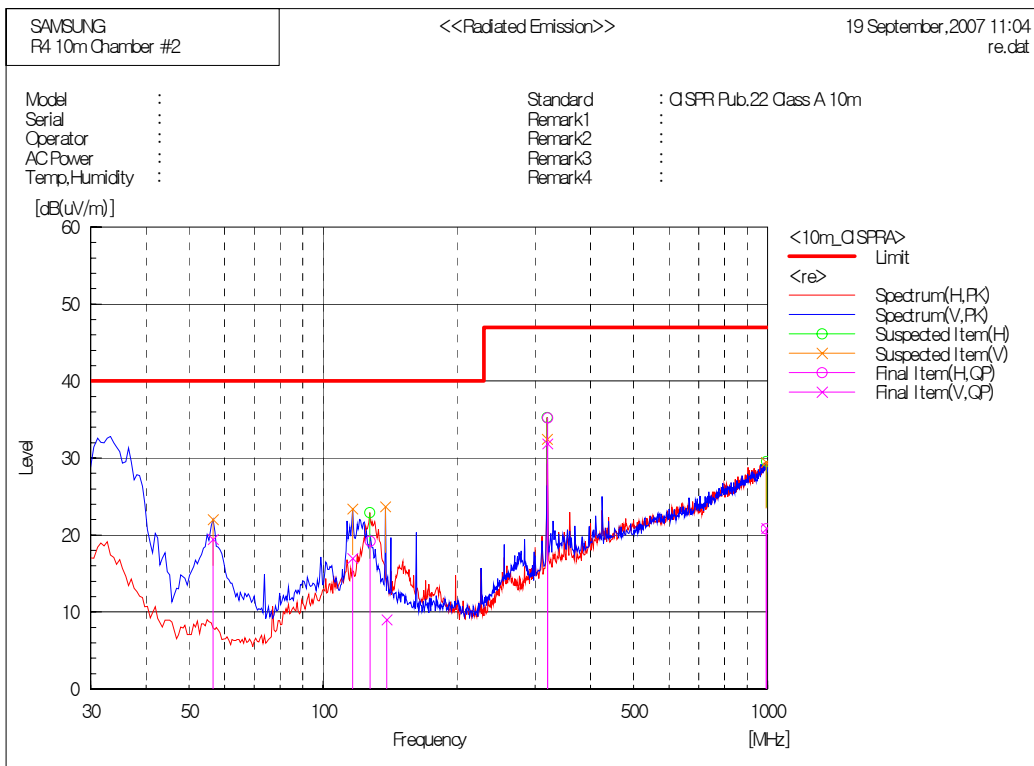


(Rear)



### 4.2.3 Test results

<b>Operating condition</b>	CCTV Camera					
<b>Test date</b>	2007.09.19		<b>Test engineer</b>		Seung Beom, Choi	
<b>Climate condition</b>	<b>Ambient temperature</b>	22.1 °C	<b>Relative humidity</b>	63%	<b>Atmospheric Pressure</b>	100.1KPa
<b>Test place</b>	10m Semi-Anechoic Chamber					
<b>Note</b>	* Test distance : 10 m * Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain) * Margin = Limit – Result					



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	127.576	36.4	-17.2	19.2	40.0	20.8	
2	319.983	48.9	-13.7	35.2	47.0	11.8	
3	993.680	22.2	-1.4	20.8	47.0	26.2	

--- 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	56.602	43.0	-23.6	19.4	40.0	20.6	
2	116.570	33.5	-16.5	17.0	40.0	23.0	
3	139.085	26.0	-17.0	9.0	40.0	31.0	
4	319.983	45.4	-13.5	31.9	47.0	15.1	
5	995.827	21.6	-0.7	20.9	47.0	26.1	

### 4.3 Harmonics current

The EUT operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The power consumption, steady state harmonic currents were measured in the tested operating mode(s). The EUT measured in accordance with the test conditions described in Annex C (C.10).

#### Limits for Class A equipment

Harmonic order n	Maximum permissible harmonic current A
<b>Odd Harmonics</b>	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,30
13	0,21
15 ≤ n ≤ 39	0,15 15/n
<b>Even harmonics</b>	
2	1,08
4	0,43
6	0,30
8 ≤ n ≤ 40	0,23 8/n

#### 4.3.1 Test instrumentation

Test instrumentation used in the Harmonics current test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Power Analyzer	PM3000A	Voltech	Au112/9229	2007-03-20	12
IEC Network	555	ZIMMER	IB10/9466	N/A	N/A
Test Software	IEC1000-3	Voltech	Ver 3.13.08	N/A	N/A

### 4.3.2 Photograph of the test Configuration





### 4.3.3 Test results

<b>Operating condition</b>	CCTV Camera				
<b>Test date</b>	2007.10.01		<b>Test engineer</b>	Seung Beom, Choi	
<b>Climate condition</b>	<b>Ambient temperature</b>	24.7 °C	<b>Relative humidity</b>	40%	<b>Atmospheric Pressure</b> 99.8KPa
<b>Test place</b>	Shielded Room #3				

<b>Product:</b> CCTV CAMERA		2007 Oct 01 3:13pm	
Serial no:		Page 1 of 1	
Description:			
<b>Test Date:</b> 2007 Oct 01 2:41pm			
<b>Result Name:</b> SCC-C6435P			
<b>Type of Test:</b> EN61000:2001 Harmonics			
<b>Limits:</b> Class A			
<b>Power Analyzer:</b> Voltech PM3000A v2.22 s/n 9229			
<b>AC Source:</b> Mains / Manual Source			
<b>Harmonic Results Against Chosen Limits:</b>	<b>Notes:</b>		
<b>PASS</b>			
<b>Test Parameter Details</b>	<b>User Entered</b>	<b>Measured</b>	
Operating Frequency:	50	49.9873	
Operating Voltage:	230	231.1722	
Specified Power:	21.0000	16.3208	
Fundamental Current:	0.0000	0.1541	
Power Factor:	0.0000	0.3914	
Average Input Current:		0.1799	
Maximum POHC:		0.0018	
POHC Limit:		0.2514	
Maximum THC:		0.0952	
Minimum Power:	75		
Class Multiplier:	1.0000		
Test Duration:	00:02:30		

\* This EUT doesn't need to be tested because the power of EUT is below 75 W.

## 4.4 Voltage fluctuation & Flicker

The EUT operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

During the flicker measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes.

### Limits of voltage fluctuations and flicker at the supply terminals

short-term flicker indicator, Pst	the relative steady-state voltage change, dc	the value of $d(t)$ during a voltage change, $d(t) > 3.3\%$	the maximum relative voltage change, $d_{max}$
1.0	3.3 %	500 ms	4 %

### 4.4.1 Test instrumentation

Test instrumentation used in the Voltage fluctuation & Flicker test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Power Analyzer	PM3000A	Voltech	Au112/9229	2007-03-20	12
IEC Network	555	ZIMMER	IB10/9466	N/A	N/A
Test Software	IEC1000-3	Voltech	Ver 3.13.08	N/A	N/A

### 4.4.2 Photograph of the test Configuration

Is Same the Harmonic current test photograph.



### 4.4.3 Test results

<b>Operating condition</b>	CCTV Camera					
<b>Test date</b>	2007.10.01		<b>Test engineer</b>	Seung Beom, Choi		
<b>Climate condition</b>	<b>Ambient temperature</b>	24.7 °C	<b>Relative humidity</b>	40%	<b>Atmospheric Pressure</b>	99.8KPa
<b>Test place</b>	Shielded Room #3					

Product:	CCTV CAMERA	2007 Oct 01 3:15pm
Serial no:		Page 1 of 1
Description:		
Result Name:	SCC-C6435P	
Voltech IEC1000-3 Windows Software 3.13.08		Test Date: 2007 Oct 01 2:47pm
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM3000A v2.22 s/n 9229	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
PASS	Plt test duration only 20 minutes Measurement method - Voltage	

	Plt
Limit	0.650
Reading	0.039

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.024	0.032	0
Reading 2	0.071	0.024	0.032	0

## 4.5 Electrostatic discharge

### Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points are subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane.

The remaining three test points are each receive at least 50 direct contact discharges.

If no direct contact test points are available, then at least 200 indirect discharges be applied in the indirect mode. Test is performed at a maximum repetition rate of one discharge per second.

### Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur.

Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user.

A minimum of 10 single air discharges shall be applied to the selected test point for each such area. The EUT was tested with all I/O ports exercised. Test results are listed below.

The basic test procedure was in accordance with IEC 61000-4-2.

### Performance criteria

Application of discharge	Test specification (kV)	Performance criteria
Contact discharge	6	B
Air Discharge	8	B

## 4.5.1 Test instrumentation

Test instrumentation used in the Electrostatic discharge test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
ESD Gun	MINIZAP	THERMO	0007323	2007-06-01	12
Vertical Plane	VCP-1	Thermo Keytek	-	-	-

## 4.5.2 Photograph of the test Configuration



### 4.5.3 Test results

<b>Operating condition</b>	CCTV Camera				
<b>Test date</b>	2007.10.01		<b>Test engineer</b>		Seung Beom, Choi
<b>Climate condition</b>	<b>Ambient temperature</b>	24.3 °C	<b>Relative humidity</b>	42%	<b>Atmospheric Pressure</b> 100.9KPa
<b>Test place</b>	Shielded Room #3				

Test Method	No	Applied Point	Discharge Method	Test Level(KV)	Observation [Note No.]	Test Result
Indirect	-	HCP	Contact	±2☒ ±4☒ ±6☒	<b>Note 1</b> ☒ <b>2</b> ☐	A☒ B☐ C☐
		VCP	Contact	±2☒ ±4☒ ±6☒	<b>Note 1</b> ☒ <b>2</b> ☐	A☒ B☐ C☐
Direct	1	COVER	Air	±2☒ ±4☒ ±8☒	<b>Note 1</b> ☒ <b>2</b> ☐	A☒ B☐ C☐

**NOTE**

1. There was no change compared with initial operation during the test.
2. While the electrostatic discharge tests, malfunction appeared in normal operate, but self-recoverable after the test.

#### 4.5.4 Tested points

 Air discharge points	 Contact discharge points	 Air/Contact discharge points
--	--	--

##### ■ Front



## 4.6 Radiated, radio-frequency, electromagnetic field

The test was performed with the EUT exposed to both vertically and horizontally polarized fields. on each of the four sides.

The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond. The basic test procedure was in accordance with IEC 61000-4-3.

### Performance criteria

Test range [MHz]	Test specification	Performance criteria	Remarks
80~2000	10V/m 80% AM (1KHz) 10V/m 1Hz PM	C	The test level specified is prior to modulation
	3V/m 80% AM (1KHz) 3V/m 1Hz PM	B	The test level specified is prior to modulation
	1V/m 80% AM (1KHz) 1V/m 1Hz PM	A	The test level specified is prior to modulation

### 4.6.1 Test instrumentation

Test instrumentation used in the Radiated, radio-frequency, and electromagnetic field test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval
Sinal Generator	SML03	R&S	101297	2007-03-20	12
Milivolt Meter	URV5	R&S	100243	2007-04-07	12
10V Insertion Unit	URV5-Z2	R&S	100240	2007-04-07	12
10V Insertion Unit	URV5-Z2	R&S	100241	2007-04-07	12
Amplifier	250W1000A	AR	312241	N/A	N/A
Amplifier	60SIG3	AR	311853	N/A	N/A
Antenna	AT1080	AR	310700	N/A	N/A
Antenna Mast	TP1000A	AR	311200	N/A	N/A
Relay Switching Unit	TS-RSP	AR	-	N/A	N/A

#### 4.6.2 Photograph of the test Configuration



### 4.6.3 Test results

Operating condition	CCTV Camera				
Test date	2007.10.02		Test engineer		Seung Beom, Choi
Climate condition	Ambient temperature	20.9℃	Relative humidity	65%	Atmospheric Pressure 100.5KPa
Test place	3m Fully Anechoic Chamber				

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	10V/m 80% AM	0	Horizontal	See Note 1	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 80% AM	90	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 80% AM	180	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 80% AM	270	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	3V/m 80% AM	0	Horizontal	See Note 2	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 80% AM	90	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 80% AM	180	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 80% AM	270	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	1V/m 80% AM	0	Horizontal	See Note 2	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 80% AM	90	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 80% AM	180	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 80% AM	270	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	10V/m 1Hz PM	0	Horizontal	See Note 1	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 1Hz PM	90	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 1Hz PM	180	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
80~2000	10V/m 1Hz PM	270	Horizontal		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	3V/m 1Hz PM	0	Horizontal	See Note 2	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 1Hz PM	90	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 1Hz PM	180	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	3V/m 1Hz PM	270	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>



Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	1V/m 1Hz PM	0	Horizontal	See Note 2	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 1Hz PM	90	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 1Hz PM	180	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
80~2000	1V/m 1Hz PM	270	Horizontal		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
			Vertical		A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Note

1. EUT was turned off during the test, and recovered by operator's handling.
2. There was no change compared with initial operation during the test.

## 4.7 Electrical fast transient/burst

### ■ Test on power supply ports and on protective earth terminals

#### **Stationary, floor-mounted equipment**

The test voltage applied between a reference ground plane and each of the power supply terminals, a.c. or d.c., and on the terminal for the protective or function earth on the cabinet of the EUT.

The EFT/B-generator shall be located on the reference plane.

The length of the "hot wire" from the coaxial output of the EFT/B-generator to the terminals on the EUT is not exceeding 1 m. This connection was unshielded but well insulated.

All other connections of the EUT are in accordance with its functional requirements.

#### **Non-stationary mounted EUT, connected to the mains supply by flexible cord and plugs**

The test voltage is applied between each of the power supply conductors and the protective earth at the power supply outlet to which the EUT is to be connected.

### ■ Test on I/O and communication ports

As far as possible, the capacitive coupling clamp is used for coupling the test voltage into the lines.

However, if the clamp cannot be used due to mechanical problems (size, cable routing) in the cabling, it may be replaced by a tape or a conductive foil enveloping the lines under test. The capacitance of this coupling arrangement with foil or tape is equivalent to that of the standard coupling clamp.

In other cases, it is useful to couple the EFT/B-generator to the terminals of the lines via discrete 100 pF capacitors instead of the distributed capacitance of the clamp or of the foil or tape arrangement.

All tests carried out in shielded room.

The EUT was tested with all I/O ports exercised. Test results are listed below.

#### Performance criteria

Applied conditions	Test specification	Performance criteria
<b>Open-circuit output test voltage</b> a.c. power ports signal and telecommunication ports d.c. power ports	2 kV(Peak) 1 kV(Peak) 1 kV(Peak)	<b>B</b>
<b>Wave shape of the pulse</b>	5/50 Tr/Th ns	
<b>Repetition Frequency</b>	5 kHz	

## 4.7.1 Test instrumentation

Test instrumentation used in the Electrical fast transient/burst test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
EFT/Burst Generator	PEFT4010	HAEFELY	152608	2007-05-16	12
3 Phase CDN 690V/100A	FP-EFT 100M	HAEFELY	152635	2007-05-16	12

## 4.7.2 Photograph of the test Configuration



### 4.7.3 Test results

Operating condition	CCTV Camera					
Test date	2007.10.02	Test engineer		Seung Beom, Choi		
Climate condition	Ambient temperature	23.7 °C	Relative humidity	66%	Atmospheric Pressure	101.0KPa
Test place	Shielded Room #2					

Test Point		Polarity	Test Level (kV)	Phase wave Shapes & Repetitions	Observation [Note No.]	Test Result
a.c. power ports	Live	+/-	2	5/50ns, 5kHz	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/>
	Neutral	+/-	2	5/50ns, 5kHz	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/>

**NOTE**

1. There was no change compared with initial operation during the test.
2. The transmission of data was stopped during the test, but self-recoverable after the test.

## 4.8 Surge

The basic test procedure was in accordance with IEC 61000-4-5.

### Performance criteria

Applied conditions	Test specification	Performance criteria
<b>Combination wave</b>  <b>a.c. power ports</b>  <b>signal and telecommunication ports</b>  <b>d.c. power ports</b>	Line to Line 0.5,1 kV(Peak) ① Line to earth 0.5,1,2 kV(Peak) ① Line to ground 0.5,1kV(Peak) ② 0.5,1 kV(Peak) ③	<b>B</b>
<b>Waveform parameter</b>  <b>Open-circuit voltage</b> <b>Short-circuit current</b>	<b>1.2/50 Tr/Th <math>\mu</math>s</b> <b>8/20 Tr/Th <math>\mu</math>s</b>	

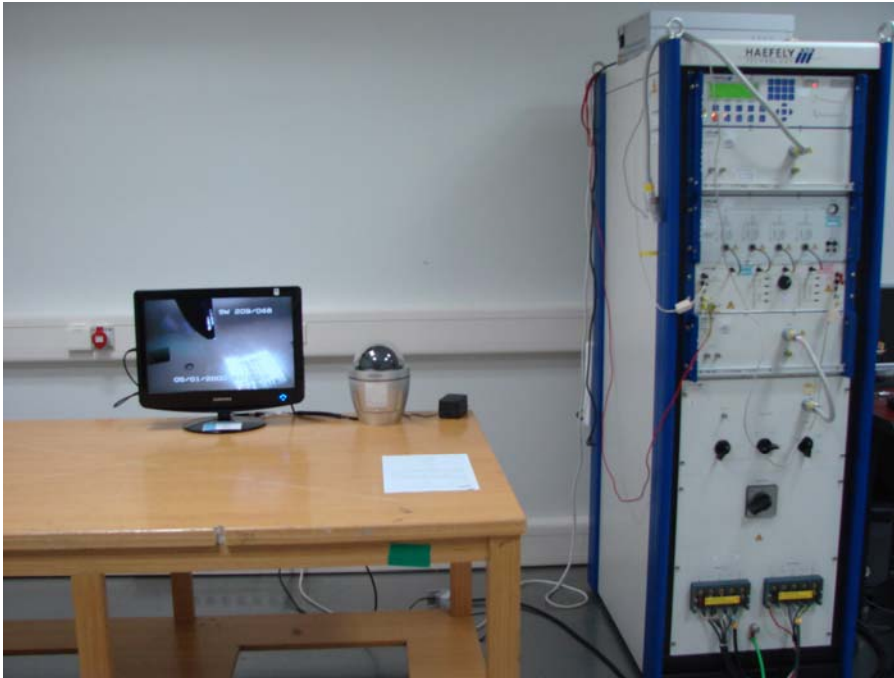
- ① Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables. Where normal functioning cannot be achieved because of the impact of the CDN on the EUT, no test shall be required.
- ② When the manufacturer specifies protection measures and it is impractical to simulate these measures during the tests, then the applied test levels shall be reduced to 0,5 kV and 1 kV.
- ③ Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables.

### 4.8.1 Test instrumentation

Test instrumentation used in the Surge test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	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	12
Coupling Decoupling Network	FP-SURGE 100M	HAEFELY	152636	2007-01-26	12
Impulse Module	PIM 120	HAEFELY	150663	2007-01-26	12

## 4.8.2 Photograph of the test Configuration





### 4.8.3 Test results

Operating condition	CCTV Camera				
Test date	2007.10.02	Test engineer		Seung Beom, Choi	
Climate condition	Ambient temperature	24.3℃	Relative humidity	41%	Atmospheric Pressure 100.5KPa
Test place	Shielded Room #3				

Test Point		Polarity	Number of Surge	Test Level (kV)	Phase wave Shape [μs]	Observation [Note No.]	Test Result
a.c. power ports	Live + Neutral	+/-	20	0.5	1.2/50(8/20)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/>
				1	1.2/50(8/20)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/>

**NOTE**

1. There was no change compared with initial operation during the test.
2. The transmission of data was stopped during the test, but self-recoverable after the test.

## 4.9 Conducted disturbances, induced by radio-frequency fields

The test was performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility. Test results are listed below.

The basic test procedure was in accordance with IEC 61000-4-6.

### Performance criteria

Test range [MHz]	Test specification	Performance criteria	Remarks
0.15~100	10V/m 80% AM (1KHz) 10V/m 1Hz PM	C	See 1) , 2)
	3V/m 80% AM (1KHz) 3V/m 1Hz PM	B	See 1) , 2)
	1V/m 80% AM (1KHz) 1V/m 1Hz PM	A	See 1) , 2)
1) The frequency range is scanned as specified. However, when specified in Annex A, an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted tests are: 0,2; 1; 7,1; 13,56; 21; 27,12 and 40,68 MHz ( $\pm 1$ %). 2) Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3m.			

### 4.9.1 Test instrumentation

Test instrumentation used in the Conducted disturbances, induced by radio-frequency fields test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval (Month)
RF - Generator	NSG2070	Schaffner	1118	2007-06-12	12
Attenuator	INA2070-1	Schaffner	2118	2007-02-22	N/A
Test Software	Win 2070	Schaffner	V01.05	N/A	N/A
Coupling Decoupling Network	CDN M016	Schaffner	20574	2007-05-11	12

### 4.9.2 Photograph of the test Configuration



### 4.9.3 Test results

Operating condition	CCTV Camera				
Test date	2007.10.01		Test engineer		Seung Beom, Choi
Climate condition	Ambient temperature	24.4 °C	Relative humidity	54%	Atmospheric Pressure 100.7KPa
Test place	Shielded Room #2				

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	1V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 80% AM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 80% AM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 80% AM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 80% AM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 80% AM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	3V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 80% AM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 80% AM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 80% AM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 80% AM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 80% AM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	10V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
	10V/m 80% AM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 80% AM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 80% AM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 80% AM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 80% AM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	1V/m 1Hz PM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 1Hz PM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 1Hz PM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 1Hz PM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 1Hz PM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1V/m 1Hz PM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	3V/m 1Hz PM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 1Hz PM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 1Hz PM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 1Hz PM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 1Hz PM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	3V/m 1Hz PM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	10V/m 1Hz PM	CDN-M3	AC power line(1.8m)	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/>
	10V/m 1Hz PM	CDN-T4	LAN (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 1Hz PM	CDN-T2	Telephone (10m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 1Hz PM	CLAMP	DC (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 1Hz PM	CLAMP	Printer (2m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10V/m 1Hz PM	CLAMP	VGA (1.8m)	Note 1 <input type="checkbox"/> 2 <input type="checkbox"/>	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

**NOTE**

1. There was no change compared with initial operation during the test.
2. The transmission of data from modem port stopped during the test, but self-recoverable after the test. This permissive loss of performance is specified by the manufacturer, and this phenomenon will be put as a clear statement in the User's Manual to avoid misunderstanding.

## 4.10 Voltage dips, short interruptions and voltage variations

The EUT is tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform. The basic test procedure was in accordance with IEC 61000-4-11.

### Performance criteria

Environmental phenomenon	Test specification	Units	Performance criteria	Remarks
Voltage dips	30 0.5;1;5;10	% reduction periods	B	See NOTE
	60 0.5;1;5;10		B	
	100 0.5;1;5		B	
Voltage variations	10% Up 15% Down		A	

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

### 4.10.1 Test instrumentation

Test instrumentation used in the Voltage dips, short interruptions and voltage variations test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval (Month)
Voltage Dip & Interruption	<input type="checkbox"/> PFS 503	EM TEST	PFS503/63A -0513100236	2007-06-16	12
	<input checked="" type="checkbox"/> PLINE 1610	HAEFELY	083690-21	2007-05-16	12

#### 4.10.2 Photograph of the test Configuration



### 4.10.3 Test results

Operating condition	CCTV Camera				
Test date	2007.10.02		Test engineer		Seung Beom, Choi
Climate condition	Ambient temperature	23.7 °C	Relative humidity	66%	Atmospheric Pressure 101.0KPa
Test place	Shielded Room #2				

#### Voltage Dips/ Interference

Test Voltage	Period	Number of Applications	Angle [Degrees]	Observation [Note No.]	Test Result
Reduction 30%	0.5	10	0, 180	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	5	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
Reduction 60%	0.5	10	0, 180	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	5	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	10	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
Reduction 100%	0.5	10	0,180	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	1	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
	5	10	0	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

#### Voltage Variations

Test Voltage	Time for decreasing voltage	Time at reduced voltage	Time at increasing voltage	Observation [Note No.]	Test Result
10% UP	2s	2s	2s	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>
15% DOWN	2s	2s	2s	Note 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/>	A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/>

#### NOTE

1. There was no change compared with initial operation during the test.
2. While The Voltage Dip & Interruption tests, malfunction appeared in normal operate, but self-recoverable after the test.

## Appendix – EUT photography

### Front



### Rear

