

# 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)

Project No. : LBE064010

**1. Applicant**

- Name of organization : **Samsung Electronics Co., Ltd.**
- Address : 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do  
443-742 Korea
- Date of application : 2007. 01. 04

**2. Purpose for the report** : Approval for EMC

**3. Kind of product** : CCTV Camera (Model name : SCC-B5311P)

**4. Date of test** : 2006. 12. 21 ~ 2007. 01. 02

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

**6. 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. 01. 04

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

# TEST RESULT

**Test Report No.** : LBE064010

**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 Camera
2. Model name : SCC-B5311(B)P
3. Brand name : Samsung
4. Variant model : SCC-B5310P, SCC-B5313(B)P, SCC-B5315(B)P

**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. 01. 04

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# 1. General information

## 1.1 Basic information related product

Model name	SCC-B5311P
Applicant / Address	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Contact person	Je Soon, Kang
Kind of product	CCTV Camera
Variant model	SCC-B5310P, SCC-B5313P, SCC-B5315P
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

Sub-items	Units	SCC-B5311P/CHN
Color Fixed Dome Camera		1/3" D/N Color Fixed Dome Camera
Device		Super-HAD IT CCD
Size	inch	1/3" 470K
Pixels	Total	795(H) x 596(V)
	Effective	752(H) x 582(V)
System		PAL(625 Line, 2:1 Interlace)
Horizontal Frequency	Internal Mode	15,625Hz
	Line-lock Mode	15,625Hz
Vertical Frequency	Internal Mode	50Hz
	Line-lock Mode	50Hz
Color	Lux	0.3 Lux(15IRE, Sense-up Off, F2.0) 0.002 Lux(15IRE, Sense-up x128, F2.0)
B/W	Lux	0.3 Lux(15IRE, Sense-up Off, F2.0) 0.002 Lux(15IRE, Sense-up x128, F2.0)
Day/Night		Yes(S/W Method)
Sens Up(LBS : Low Speed Shutter)		Off, AUTO x128
H/V Reverse		Yes(On/Off)
DNR		Yes(On/Off)
BLC		Yes(On/Off)
AGC		Yes(On/Off)
ELC	Second	Max. 1/120K
Line Lock	AC24V Only	Yes(On/Off)
White Balance(AWB)		Yes(ATW/AWC)
Horizontal	TV Lines	540TV Lines
VBS 1.0Vp-p		VBS 1.0Vp-p(75Ω, composite)
S/N Ratio	dB	50dB
Focal Length	mm	3.8mm
Viewing Angle	Horizontal	71°
	Vertical	53°
Lens Type		3.8mm Fixed Lens
Operating Temperature	°C	14°F~122°F(-10°C~50°C)
Humidity	%	Within 90% RH
Power Requirement	V	AC24V±10%(50Hz±0.3Hz) DC12V±10%~-5%
Power Consumption	W	1.6W
LED Indicator		Yes
Dimension (WxHxD)	Net mm	102(Φ) x 78(H)
Weight	Net g	190g
Etc.	Body Color	Dark Silver

### 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 camera operating

### 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 Camera	SCC-B5311P	-	Samsung
B	Adapter	STA-24030KA	-	Samsung

### 1.6.2 Cable description

Mark	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power Cable	1.5	N	For Adapter
2	Video out	1.0	N	To the monitor

## 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

- 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>	December 22, 2006
<b>Climate condition</b>	Ambient temperature : 22.9 , Relative humidity : 32 % Atmospheric pressure : 102.3 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**

EUT Name: SCC-B5311P  
 Serial Number:  
 Test Description:  
 Operating Conditions: CCTV camera operating  
 Operator Name: SB, Choi  
 Comment:

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

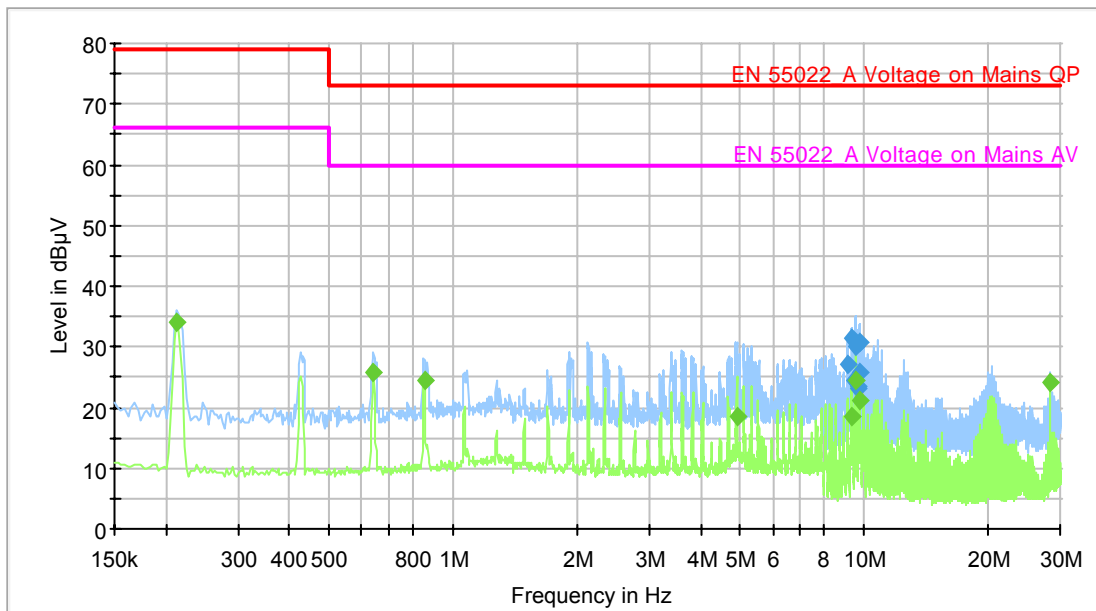
Subrange 1  
 Frequency Range: 150 kHz – 30 MHz  
 Receiver: ESCI 3  
 Transducer: ENV216 / Receiver-2-Line-LISN ENV216

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

Hardware Setup: Voltage with 2-Line-LISN  
 Level Unit: dBu V

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

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



### Final Measurement Detector 2

Frequency (MHz)	Average (dBu V)	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)
0.211500	34.0	L1	9.6	32.0	66.0
0.637500	25.8	L1	9.6	34.2	60.0
0.850500	24.6	L1	9.6	35.4	60.0
4.900500	18.4	L1	9.7	41.6	60.0
9.371500	18.5	N	9.8	41.5	60.0
9.580500	24.4	L1	9.8	35.6	60.0
9.791500	21.1	L1	9.8	38.9	60.0
28.375500	24.3	N	10.2	35.7	60.0

### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBu V)	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)
9.163500	27.2	L1	9.8	45.8	73.0
9.363500	31.4	L1	9.8	41.6	73.0
9.475500	24.6	L1	9.8	48.4	73.0
9.587500	30.2	N	9.8	42.8	73.0
9.659500	23.3	N	9.8	49.7	73.0
9.679500	23.1	N	9.8	49.9	73.0
9.719500	25.8	L1	9.8	47.2	73.0
9.779500	30.6	L1	9.8	42.4	73.0

### 3.2 Radiated Emission

#### 3.2.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	December 21, 2006
<b>Climate condition</b>	Ambient temperature : 24.6 , Relative humidity : 40 % Atmospheric pressure : 102.8 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	100289	2006-03-13	12
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	2006-03-05	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 antenna in center of table.

All ports terminated into characteristic loads.

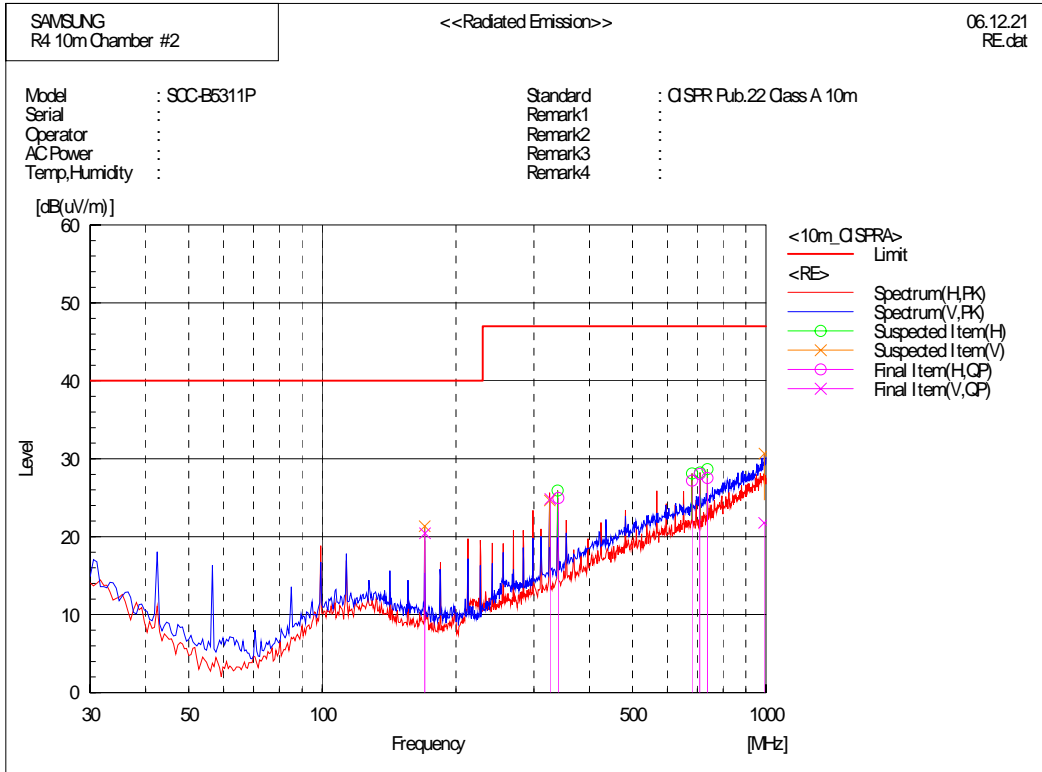
#### Test Result

#### 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]
1	680.995	33.9	-6.7	27.2	47.0	19.8
2	709.360	34.6	-6.5	28.1	47.0	18.9
3	737.753	33.3	-5.8	27.5	47.0	19.5
4	340.506	38.4	-13.4	25.0	47.0	22.0

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
1	170.246	40.0	-19.5	20.5	40.0	19.5
2	990.482	22.6	-0.8	21.8	47.0	25.2
3	326.324	38.2	-13.4	24.8	47.0	22.2

### 3.3 Harmonics

#### 3.3.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	December 26, 2006
<b>Climate condition</b>	Ambient temperature : 23.8 , Relative humidity : 41 % Atmospheric pressure : 101.4 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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**Test Data**

<b>SCC-B5311P</b>	
Product: CCTV CAMERA	2006 Dec 26 5:56pm
Serial no:	Page 1 of 1
Description:	
Result Name: SCC-B5311P	
Voltech IEC1000-3 Windows Software 3.13.08	Test Date: 2006 Dec 26 5:56pm
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	6.8 W

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	0.02mA	1.080A	N/A	3	45.16mA	2.300A	Pass
4	0.03mA	430mA	N/A	5	23.67mA	1.140A	Pass
6	0.07mA	300mA	N/A	7	4.77mA	770mA	N/A
8	0.01mA	230mA	N/A	9	0.24mA	400mA	N/A
10	0.00mA	184mA	N/A	11	1.68mA	330mA	N/A
12	0.01mA	153mA	N/A	13	0.61mA	210mA	N/A
14	0.01mA	131mA	N/A	15	0.75mA	150mA	N/A
16	0.01mA	115mA	N/A	17	0.56mA	132mA	N/A
18	0.01mA	102mA	N/A	19	0.18mA	118mA	N/A
20	0.01mA	92mA	N/A	21	0.25mA	107mA	N/A
22	0.00mA	84mA	N/A	23	0.13mA	98mA	N/A
24	0.01mA	77mA	N/A	25	0.12mA	90mA	N/A
26	0.01mA	71mA	N/A	27	0.06mA	83mA	N/A
28	0.01mA	66mA	N/A	29	0.09mA	78mA	N/A
30	0.01mA	61mA	N/A	31	0.09mA	73mA	N/A
32	0.01mA	58mA	N/A	33	0.09mA	68mA	N/A
34	0.00mA	54mA	N/A	35	0.05mA	64mA	N/A
36	0.01mA	51mA	N/A	37	0.07mA	61mA	N/A
38	0.00mA	48mA	N/A	39	0.07mA	58mA	N/A
40	0.01mA	46mA	N/A				

### 3.4 Flicker

#### 3.4.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	December 26, 2006
<b>Climate condition</b>	Ambient temperature : 23.8 , Relative humidity : 41 % Atmospheric pressure : 101.4 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.

#### 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>SCC-B5311P</b>				
Product:	CCTV CAMERA	2006 Dec 26 5:55pm		
Serial no:		Page 1 of 1		
Description:				
Result Name:	SCC-B5311P			
Voltech IEC1000-3 Windows Software 3.13.08		Test Date:	2006 Dec 26 5:37pm	
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	0.009	0.038	0

### 3.5 ESD

#### 3.5.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	December 27, 2006
<b>Climate condition</b>	Ambient temperature : 24.0 , Relative humidity : 37 % Atmospheric pressure : 101.5 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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**Test Data**

	No	Applied Point Name	Discharge Method	Test Level	Tested No	Criteria	Result
Indirect		Horizontal Plane	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 6 \text{ kV}$	150	B	A
Indirect		Vertical Plane	Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 6 \text{ kV}$	300	B	A
Direct	1	Camera	Air	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$	60	B	A
Direct	2	Video out	Air Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$ $\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 6 \text{ kV}$	60 60	B B	B B
Direct	3	Adapter in	Air Contact	$\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 8 \text{ kV}$ $\pm 2 \text{ kV} / \pm 4 \text{ kV} / \pm 6 \text{ kV}$	60 60	B B	B B

**Test Points**



### 3.6 Radiated Immunity

#### 3.6.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	December 28, 2006
<b>Climate condition</b>	Ambient temperature : 20.6 , Relative humidity : 36 % Atmospheric pressure : 101.3 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	2006-03-22	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 wooden table 0.8 m above the reference ground.

The test distance was 3 m.

#### Test Result

#### Measurement Results

**Complied**

No Operation errors were detected during or after the applied test.

**Test Data**

Test Level [V/m]	Freq. Range [MHz]	Modulation	Dwell Time	Test Side	Criteria		Result	
					Ver	Hor	Ver	Hor
10 V/m	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 V/m	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 V/m	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 V/m	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 V/m	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 V/m	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>	December 27, 2006
<b>Climate condition</b>	Ambient temperature : 23.4 , Relative humidity : 34 % Atmospheric pressure : 101.4 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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**Test Data**

Port	Coupling	Test Level		Tr/Th [ns]	Polarity	Criteria	Result
		Voltage [kV]	Frequency [kHz]				
AC Port	Live	2	5	5/50	+/-	B	B
AC Port	Neutral	2	5	5/50	+/-	B	B
AC Port	Live to Neutral	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>	December 27, 2006
<b>Climate condition</b>	Ambient temperature : 23.6 , Relative humidity : 34 % Atmospheric pressure : 101.3 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	2006-02-10	12
Surge Impulse Module	PIM 100	HAEFELY	152288	2006-02-10	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

#### Measurement Results

**Complied**

No Operation errors were detected during or after the applied test.

**Test Data**

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

### 3.9 Conducted Immunity

#### 3.9.1 Test information

<b>Test engineer</b>	Seung Beom, Choi
<b>Test date</b>	January 2, 2007
<b>Climate condition</b>	Ambient temperature : 23.4 , Relative humidity : 33 % Atmospheric pressure : 102.2 kPa
<b>Test place</b>	Shielded room #2

#### 3.9.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval
RF - Generator	NSG2070	Schaffner	AU112/9229	2006-08-01	12
Attenuator	INA2070-1	Schaffner	A0412-51	N/A	N/A
Coupling Decoupling Network	CDN M016	Schaffner	21246	2006-04-20	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 V/m	0.15 ~ 100	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	AC mains	CDN	C	B
3 V/m	0.15 ~ 100	PM with 1Hz (0.5 s ON: 0.5 s OFF)	3 s	AC mains	CDN	B	B
1 V/m	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 V/m	0.15 ~ 100	80% AM @1kHz	3 s	AC mains	CDN	C	B
3 V/m	0.15 ~ 100	80% AM @1kHz	3 s	AC mains	CDN	B	B
1 V/m	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>	December 27, 2006
<b>Climate condition</b>	Ambient temperature : 23.4 , Relative humidity : 34 % Atmospheric pressure : 102.4 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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<b>Test Data</b>
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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

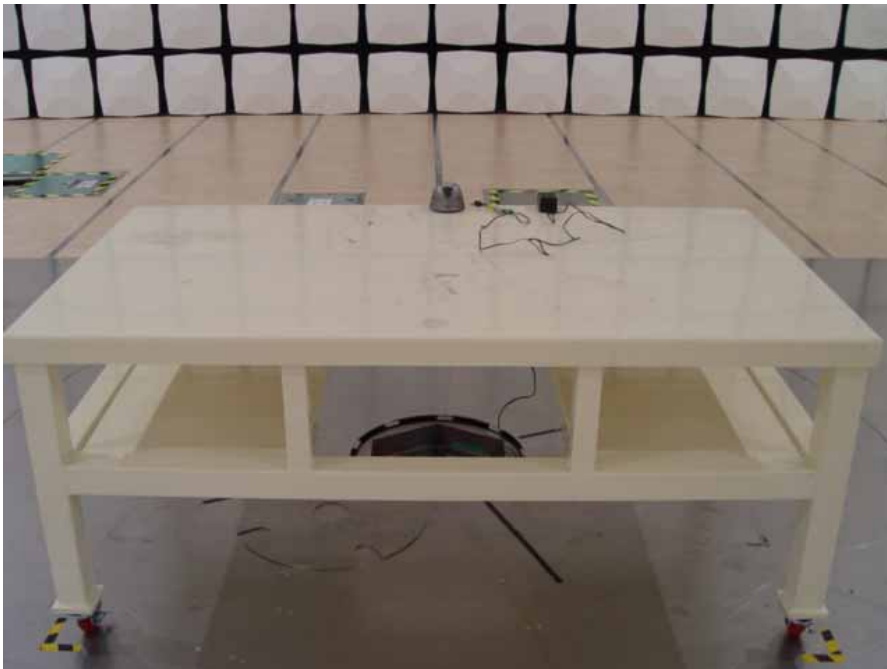
Test Voltage	Criteria	Result
10% up	A	A
15% down	A	A

## 4. Appendix

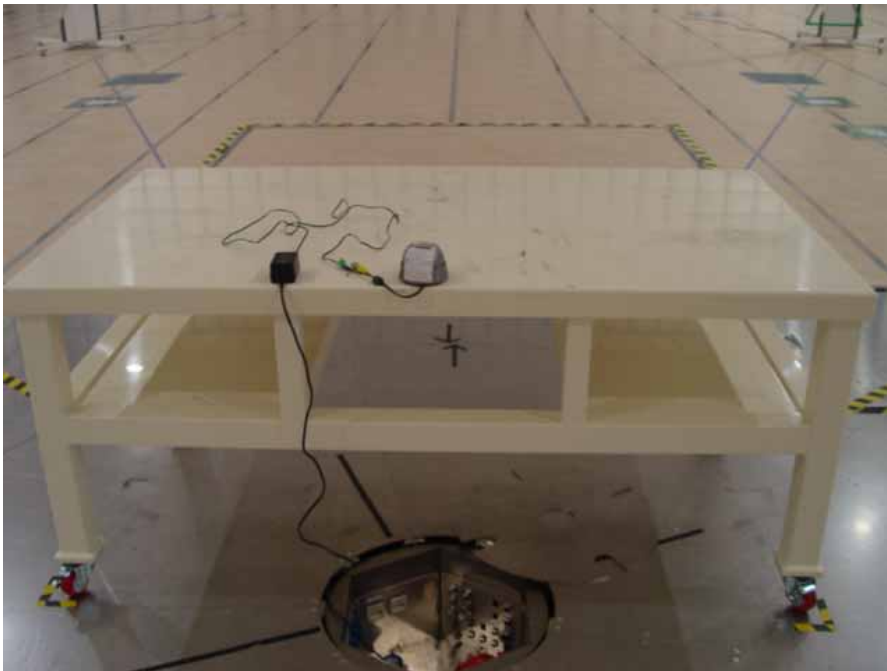
### 4.1 Test photography



Picture 1. Conducted emission



Picture 2. Radiated emission (Front)



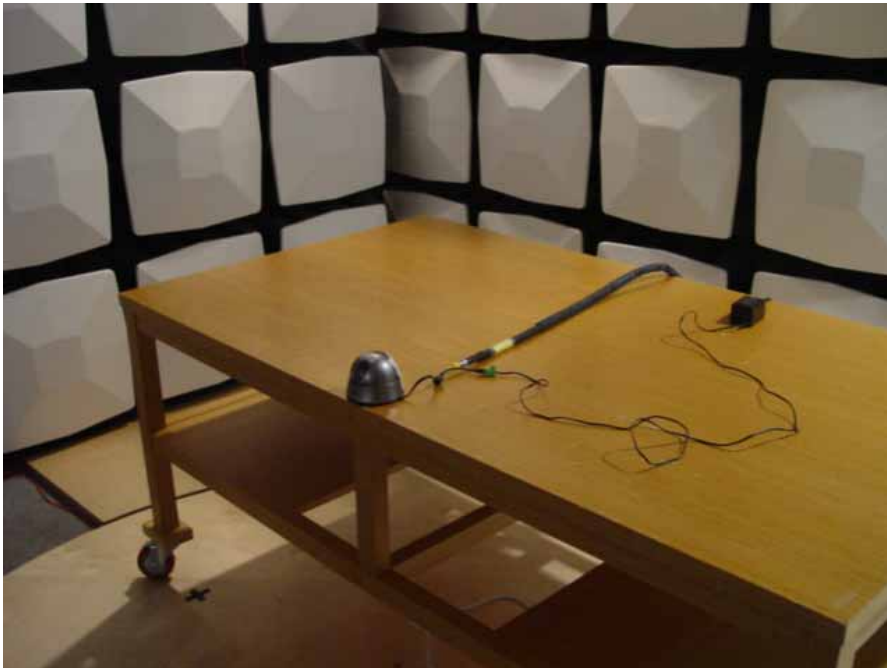
Picture 3. Radiated emission (Rear)



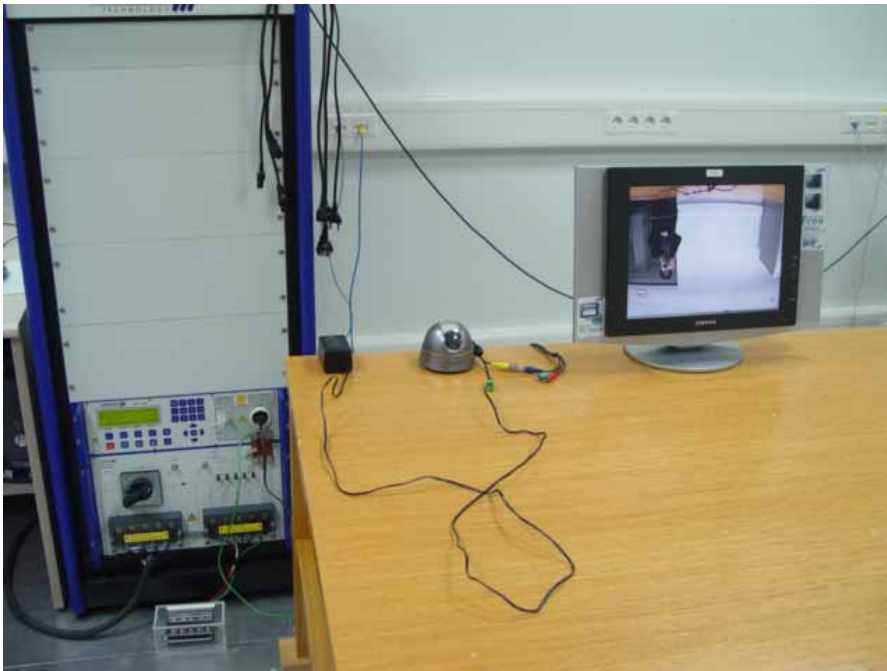
Picture 4. Harmonics & Flicker



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