SAMSUNG ELECTRONICS

EMC TEST REPORT

Project NO. : LBE040587

Product : CCTV Camera

Model No. : SCC-B5301GP

*** Variant Model : SCC-B5301P, SCC-B5303GP, SCC-B5303P, SCC-B5305GP, SCC-B5305P**

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1. General Information

1.1 Applicant : SAMSUNG

1.2 Applied Standards :

Product or Generic standards	Basic standards
EN 61000-6-3 :2001	EN 61000-4-2:1995 + A1:1998
EN 50130-4 :1995 +A1:1998	EN 61000-4-3:1996 + A1:1998
	EN 61000-4-4:1995
	EN 61000-4-5:1995
	EN 61000-4-6:1996
	EN 61000-4-11:1994

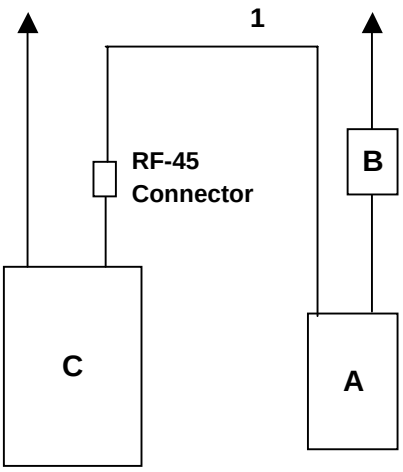
1.3 Type of EUT : CCTV Camera

1.4 Manufacturer : Samsung Electronics Co,. Ltd

1.5 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

1.6 System Block Diagram of Test Configuration



2. Summary of Test Results

2.1 Result : PASS

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

Test item	Spec	Level	Result
Electromagnetic Interference			
Conducted Emissions	EN61000-6-3	Class B	Pass
Radiated Emissions	EN61000-6-3	Class B	Pass
Electromagnetic Susceptibility(Immunity)			
Electro Static Discharge	EN61000-4-2	Air Discharge +/-2;4;8kV Contact Discharge +/-2;4;6kV	Pass
RF Electromagnetic Field	IEC1000-4-3	10 V/m;3 V/m;1 V/m (AM 80%) (PM 1Hz 0.5s ON:O.5s OFF)	Pass
Fast transients - Common Mode	EN61000-4-4	+/- 0,5;1&2KV AC Port	Pass
Surge - Line to Ground / Line to Line	EN61000-4-5	+/-0,5;1kV AC Port	Pass
RF Common Mode	EN61000-4-6	10V,3V,1V AC Power Port (AM 80%) (PM 1Hz 0.5s ON:O.5s OFF)	Pass
Voltage Dips and interruptions	EN61000-4-11	40% ;100% / 10s	Pass
Mains supply voltage variations		Umax +10%;Umin -15%	Pass

* N/A:Not Applicable

3. Description of individual tests

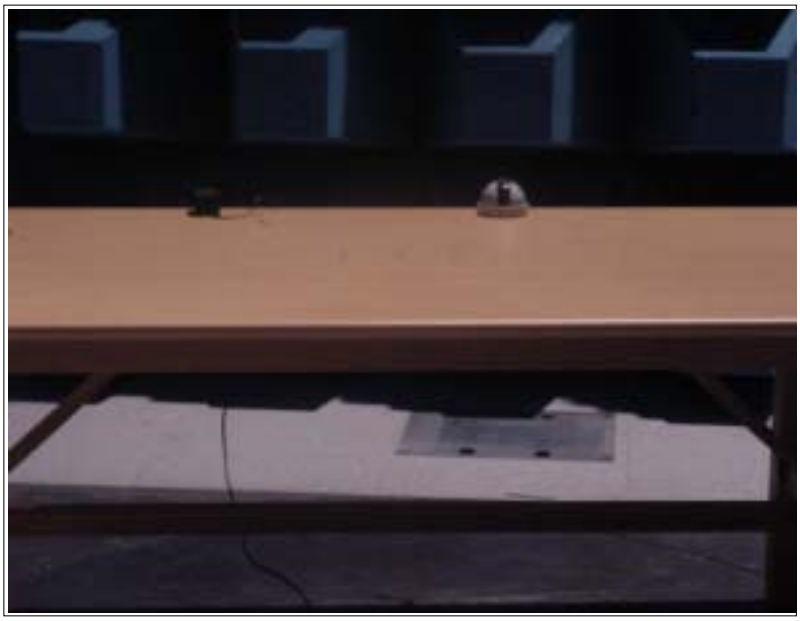
3.1 Conducted and Radiated Interference Measurement

* Cabling was taken into consideration and test data was taken under worst case conditions.

3.1.1 Configuration

1)Conduction

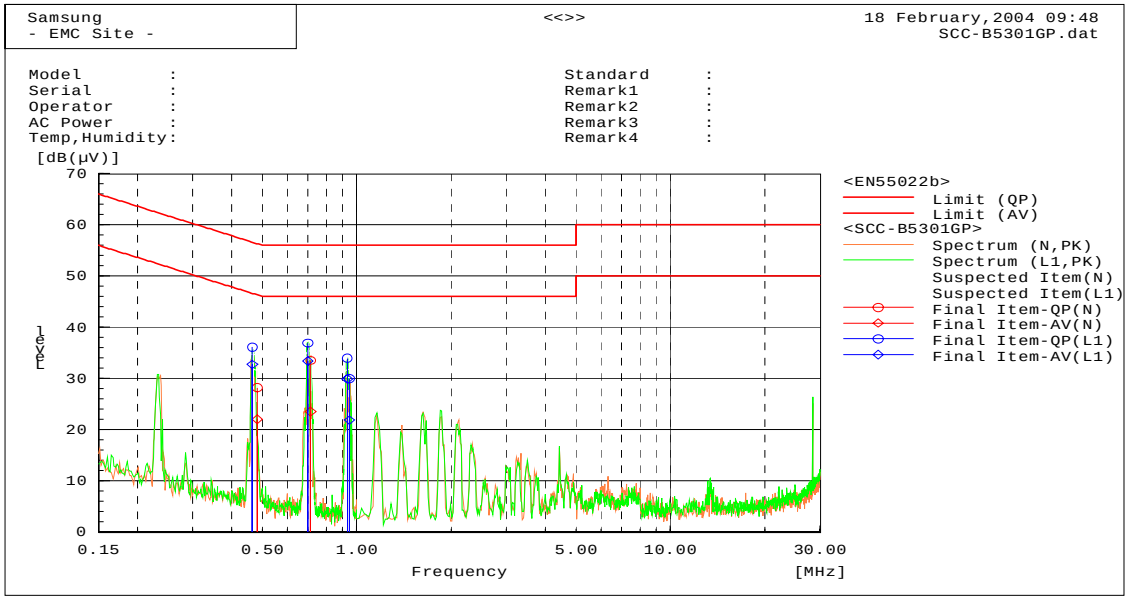
2) Radiation



3.1.2 Conducted Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak and average scan over the measurement range using a receiver.
The final data represents worst-case emissions.

○ Test Data LISN Mode : Live & Neutral



Final Result

--- N Phase ---

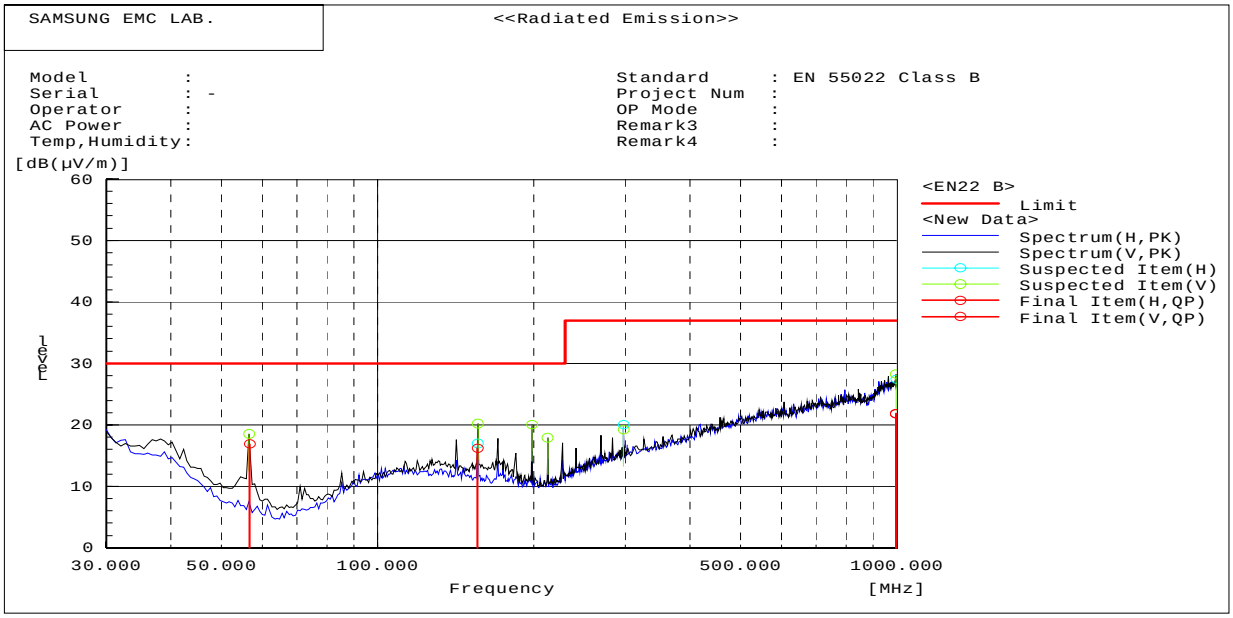
No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	0.48224	28.1	21.9	0.1	28.2	22.0	56.3	46.3	28.1	24.3
2	0.71321	33.4	23.4	0.1	33.5	23.5	56.0	46.0	22.5	22.5

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	0.46529	36.0	32.6	0.1	36.1	32.7	56.6	46.6	20.5	13.9
2	0.70011	36.8	33.3	0.1	36.9	33.4	56.0	46.0	19.1	12.6
3	0.933	33.9	29.8	0.1	34.0	29.9	56.0	46.0	22.0	16.1
4	0.94833	29.9	21.7	0.1	30.0	21.8	56.0	46.0	26.0	24.2

3.1.3 Radiated Emission Test Data

The initial step in collecting radiated data was to perform a quasi-peak scan over the measurement range using a receiver.
All modes of operation were investigated and the worst-case emission are reported.
All other emission are non-significant.
The minimum margin to the limit is as follows :



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Remark
1	997.080	21.3	0.5	21.8	37.0	15.2	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Remark
1	56.750	38.1	-21.2	16.9	30.0	13.1	
2	997.590	21.3	0.5	21.8	37.0	15.2	
3	156.063	32.9	-16.7	16.2	30.0	13.8	

3.2 Immunity to Electrostatic Discharge

3.2.1 Test Result

*** Performance Criterion : B**

Point	Test voltage 2kV				Test voltage 4kV				Test voltage 6kV/8kV			
	Polarity of the output voltage				Polarity of the output voltage				Polarity of the output voltage			
	Positive		Negative		Positive		Negative		Positive		Negative	
	Con	Air	Con	Air	Con	Air	Con	Air	Con	Air	Con	Air
1	B		B		B		B		B		B	
2	B		B		B		B		B		B	
3	B		B		B		B		B		B	
4	B		B		B		B		B		B	
5		A		A		A		A		A		A
6												
7												
8												
9												
10												
11												

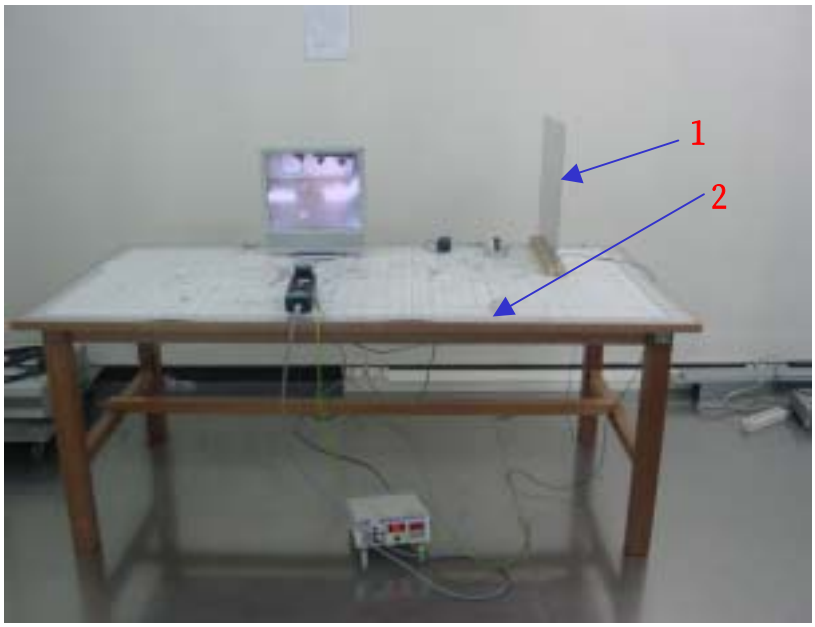
"Con" : contact

Note : contact discharge 6kV . Air discharge : 8kV

3.2.2 Climate conditions during the test

- ambient temperature 24 ℃ (EN Limit : 15 ℃ to 35 ℃)
- relative humidity 33 % (EN Limit : 30 % to 60 %)
- atmospheric pressure 1011 mbar (EN Limit : 860 mbar to 1060 mbar)

3.2.3 Photographs of Test set ups - ESD Test points



3.3 Immunity to Radiated RF Electromagnetic Field

The EUT was monitored visually using CCTV Monitor for change of mode or picture quality.

3.3.1 Test Result of Pulse Modulation

The EUT was subjected to the following electromagnetic fields :

80MHz to 1GHz : Pulse modulation

with frequency step of 1% at each field strength of 10V/m,3V/m,1V/m, sinusoidal carrier, amplitude modulated with 1kHz audio frequency at 80% depth and with a dwell time of 3 seconds.

*** Performance Criterion : C**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
10V/m	Front	B	B
	Left	B	B
	Back	B	B
	Right	B	B

*** Performance Criterion : B**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
3V/m	Front	B	B
	Left	B	B
	Back	B	B
	Right	B	B

*** Performance Criterion : A**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
1V/m	Front	A	A
	Left	A	A
	Back	A	A
	Right	A	A

3.3.2 Test Result of Amplitude Modulation

The EUT was subjected to the following electromagnetic fields :

80MHz to 1GHz : Amplitude modulation

with frequency step of 1% at each field strength of 10V/m,3V/m,1V/m sinusoidal carrier, Pulse modulated with1Hz(0.5s ON : 0.5s OFF) and with a dwell time of 3 seconds.

*** Performance Criterion : C**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
10V/m	Front	B	B
	Left	B	B
	Back	B	A
	Right	B	B

*** Performance Criterion : B**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
3V/m	Front	B	B
	Left	B	B
	Back	B	B
	Right	B	B

*** Performance Criterion : A**

Field Strength	Side of EUT exposed to field	Result(Performance Criterion)	
		Horizontal	Vertical
1V/m	Front	A	A
	Left	A	A
	Back	A	A
	Right	A	A

3.3.3 Climate conditions during the test

- ambient temperature **24.5℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **33%** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1011 mbar** (EN Limit : 860 mbar to 1060 mbar)

3.3.4 Photographs of Test set up

3.4 Immunity to Electrical Fast Transients

3.4.1 Test Result

*** Performance Criterion : B**

Port Coupling		Test Level		Pulse wave shape	Polarity	Result
		Voltage (kV)	Repetition frequency(kHz	Tr/Th(ns)		
AC Port	Live	0.5	5	5/50	+/-	A
		1	5	5/50	+/-	A
		2	5	5/50	+/-	B
	Neutral	0.5	5	5/50	+/-	A
		1	5	5/50	+/-	A
		2	5	5/50	+/-	B
	Live + Neutral	0.5	5	5/50	+/-	A
		1	5	5/50	+/-	A
		2	5	5/50	+/-	B
DC Port		0.5	5	5/50	+/-	*
Signal & Control Line		0.5	5	5/50	+/-	*

"*" : N / A

3.4.2 Climate conditions during the test

- ambient temperature **24℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **31%** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1011 mbar** (EN Limit : 860 mbar to 1060 mbar)

3.4.3 Photographs of Test set up

3.5 Immunity to Surge

3.5.1 Test Result

*** Performance Criterion : B**

Port Coupling		Test Level		Pulse wave shape (μs)	Polarity	Result
		Voltage (kV)	Repetition time(s)			
AC Port	Live + Neutral	0.5	60	1.2/50(8/20)	+/-	A
		1	60	1.2/50(8/20)	+/-	A
	Live + PE	0.5	60	1.2/50(8/20)	+/-	*
		1	60	1.2/50(8/20)	+/-	*
		2	60	1.2/50(8/20)	+/-	*
	Neutral + PE	0.5	60	1.2/50(8/20)	+/-	*
		1	60	1.2/50(8/20)	+/-	*
		2	60	1.2/50(8/20)	+/-	*
DC Port		0.5	60	1.2/50(8/20)	+/-	*
other signal lines		0.5	60	1.2/50(8/20)	+/-	*

"*" : N / A

3.5.2 Climate conditions during the test

- ambient temperature **24 ℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **32 %** (EN Limit : 10 % to 75 %)
- atmospheric pressure **1011 mbar** (EN Limit : 860 mbar to 1060 mbar)

3.5.3 Photographs of Test set up

3.6 Immunity to Conducted RF Immunity

3.6.1 Test Result of Amplitude Modulation

0.15 to 100MHz, with frequency step of 1% at 10V/3V/1V sinusoidal carrier, amplitude modulated with 1kHz audio frequency at 80% depth and with a dwell time of 2.2 seconds.

Port Coupling	Coupling method	Test Level (Vemf. in 150Ω)	Result	Performance Criterion
AC Port	Direct via CDN	10	B	C
		3	B	B
		1	A	A

3.6.2 Test Result of Pulse Modulation

0.15 to 100MHz, with frequency step of 1% at 10V/3V/1V sinusoidal carrier, pulse modulated with 1Hz(0.5s ON : 0.5s OFF)and with a dwell time of 2.2 seconds.

Port Coupling	Coupling method	Test Level (Vemf. in 150Ω)	Result	Performance Criterion
AC Port	Direct via CDN	10	B	C
		3	B	B
		1	A	A

3.6.3 Climate conditions during the test

- ambient temperature **21℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **32%** (EN Limit : 10 % to 75 %)
- atmospheric pressure **1011mbar** (EN Limit : 860 mbar to 1060 mbar)

3.6.4 Photographs of Test set up

3.7 Immunity to Voltage Dips and Interruptions

3.7.1 Test Result

Voltage reduction 60% *** Performance Criterion : B/C**

Duration of reduction	Number of applications	Time between application (s)	Result
0.5	3	10	A
1	3	10	A
5	3	10	A
10	3	10	A

Voltage reduction 100% *** Performance Criterion : B/C**

Duration of reduction	Number of applications	Time between application (s)	Result
0.5	3	10	A
1	3	10	A
5	3	10	A

Mains supply voltage variation *** Performance Criterion : A**

	Voltage	Result
Supply voltage max(Umax)	10% UP	A
3	15% DOWN	A

3.7.2 Climate conditions during the test

- ambient temperature **26.5℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **31%** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1016mbar** (EN Limit : 860 mbar to 1060 mbar)

3.7.3 Photographs of Test set up

4. Test Equipment Used

Equipment	Model No.	Serial No.	Makers	Calibration Date
Field strength meter	ESCS30	839809/002	R & S	6/27/2003
	Firmware versions : Main 1.08, OTP 02.01, GRA 02.03			
Spectrum Analyzer	E7405A	MY42000109	Agilent	11/29/2003
RF Relais Matrix	PSU	861206/024	R & S	N/A
Measurement Software	EP5CE	Version : 2.0.860	TOYO	N/A
RF Selector	NS4900	0303-015	TOYO	N/A
Measurement Software	EP5RE	Version : 2.0.860	TOYO	N/A
Amplifier	8447D	2944A10430		7/25/2003
EMC Analyzer	E7405A	US41110272	Agilent	6/14/2003
Field strength meter	ESCS30	100104	R & S	2/19/2004
L.I.S.N	ESH3-Z5	100261	R & S	7/16/2003
Biconilog Antenna	CBL6112B	2766	SCHAFFNER	6/20/2003
ESD Tester	PSD 25B	082597-36	HAEFELY	2/21/2004
Amplifier	AR200W1000M7A	17282	A.R	-
Amplifier	150A220	17077	A.R	-
Dual Directional Coupler	DCU	316976/001	R & S	11/7/2003
Signal Generator	SML01	100802	R & S	11/6/2003
RMS/PEAK Volt Meter	URE3	839432/032	R & S	11/13/2003
Power Meter	NRVD	841501/010	R & S	11/13/2003
EFT/Burst Generator	NSG2025	19872	SCHAFFNER	5/21/2003
Measurement Software	WIN2025	-	SCHAFFNER	N/A
Surge Tester	NSG2050	200242-146AR	SCHAFFNER	7/7/2003
Measurement Software	WIN2050	-	SCHAFFNER	N/A
Voltage DIP & Interruption	NSG1007	55407	SCHAFFNER	7/31/2003
Voltage DIP & Interruption	NSG1007	55408	SCHAFFNER	7/31/2003
Measurement Software	WIN2120	-	SCHAFFNER	N/A
Power Attenuator	50FH-006-300-2	-	JFW	-
Coupling Decoupling Network	CDN-801M2/M3	425	LUTHI	3/3/2003
Turn Table	DS412	HD	-	N/A
Antenna Mast	MA240		240/620	N/A