SAMSUNG ELECTRONICS

EMC TEST REPORT

Project NO. : LBE020639

Product : CCTV Camera

Model No. : SCC - 931TP

Date of test : September 13 - 24, 2002

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1. General Information

1.1 Applicant : SAMSUNG

1.2 Applied Standards :

Product or Generic standards	Basic standards
EN 50081-1 :1992	EN 55022 :1998
EN 50130-4 :1995 +A1:1998	EN 61000-4-2:1995
	EN 61000-4-3:1995
	EN 61000-4-4:1995
	EN 61000-4-5:1995
	EN 61000-4-6:1996
	EN 61000-4-11:1994

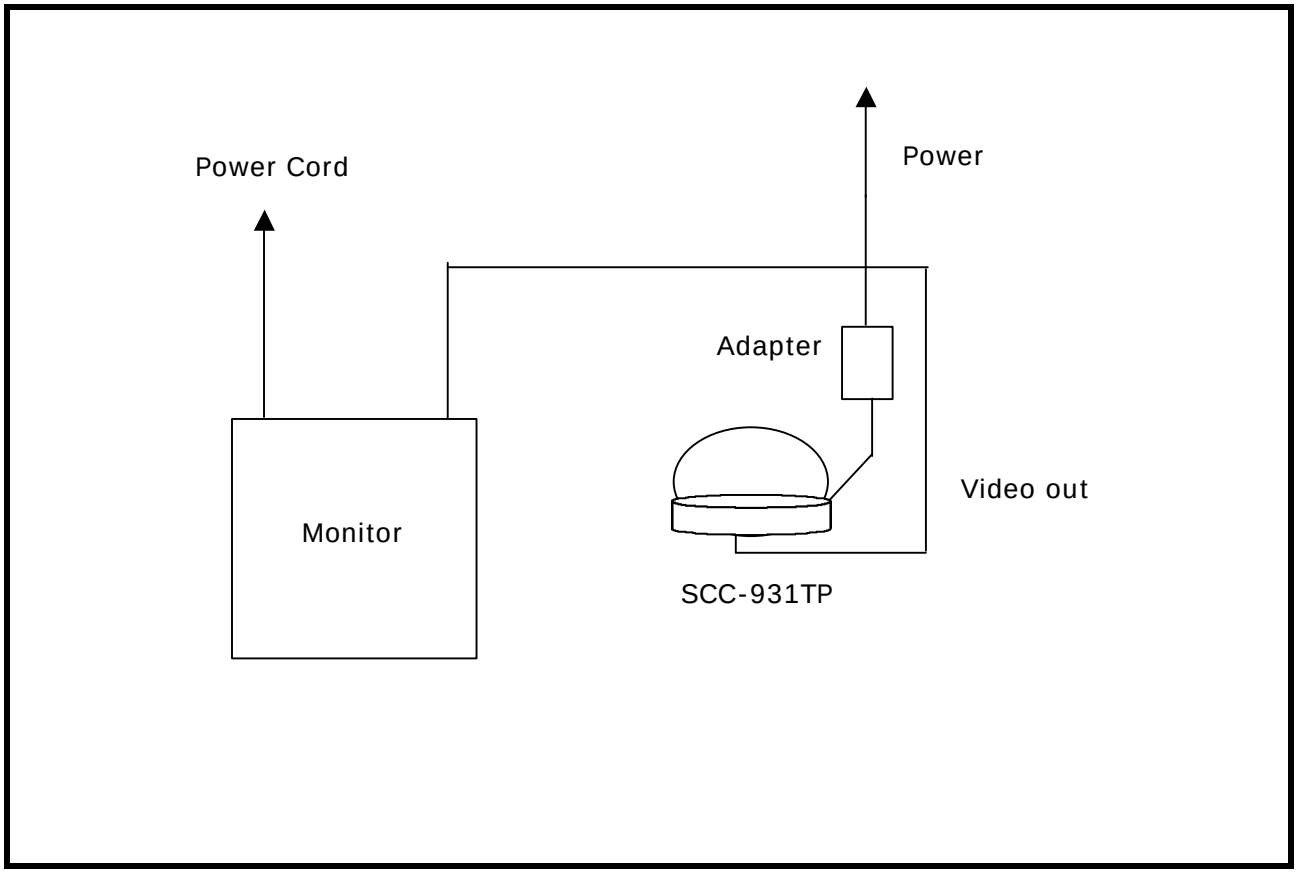
1.3 Type of EUT : CCTV Camera

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	EN 55022	Class B	Pass
Radiated Emissions	EN 55022	Class B	Pass
Harmonic Emissions	EN61000-3-2	Class B	N/A
Voltage Fluctuations	EN61000-3-3	Class D<75W	N/A
Electromagnetic Susceptibility(Immunity)			
Electro Static Discharge	EN61000-4-2	Air Discharge +/-2;4;8kV Contact Discharge +/-2;4;6kV	Pass
RF Electromagnetic Field	EN61000-4-3	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;1;2kV 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
Power Frequency Magnetic Field	EN61000-4-8	3 A/m	N/A
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

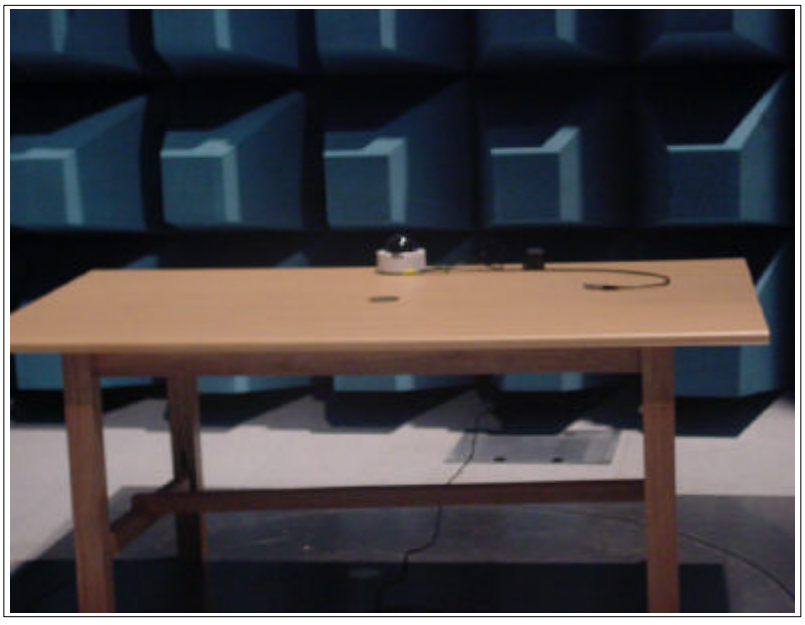
3.1 Conducted and Radiated Interference Measurement

* 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 Sheet

Frequency	Line	Meter reading (a)		Total Loss (b)	Results (a) + (b)		Limits		Margin (Limits - Result)	
		QP	AV		QP	AV	QP	AV	QP	AV
[MHz]		[dBμV]		[dB]	[dBμV]		[dBμV]		[dB]	
0.171	L	24.70	16.30	0.20	24.90	16.50	64.91	54.91	40.01	38.41
0.206	L	21.10	14.60	0.16	21.26	14.76	63.36	53.36	42.11	38.61
0.262	L	20.60	15.50	0.14	20.74	15.64	61.37	51.37	40.63	35.73
0.339	N	15.00	10.50	0.13	15.13	10.63	59.23	49.23	44.10	38.60
0.423	N	23.50	16.30	0.14	23.64	16.44	57.39	47.39	33.75	30.95
0.437	N	19.80	13.30	0.14	19.94	13.44	57.12	47.12	37.18	33.68
0.591	L	18.60	14.80	0.16	18.76	14.96	56.00	46.00	37.24	31.04
0.794	N	17.80	13.70	0.16	17.96	13.86	56.00	46.00	38.04	32.14
0.850	N	15.80	13.30	0.16	15.96	13.46	56.00	46.00	40.04	32.54
1.011	N	15.60	11.90	0.16	15.76	12.06	56.00	46.00	40.24	33.94
1.991	L	10.40	9.50	0.15	10.55	9.65	56.00	46.00	45.45	36.35
4.245	L	10.40	9.20	0.10	10.50	9.30	56.00	46.00	45.50	36.70
5.995	N	20.30	15.90	0.04	20.34	15.94	60.00	50.00	39.66	34.06
10.391	L	19.90	16.50	0.33	20.23	16.83	60.00	50.00	39.77	33.17
28.374	L	17.40	15.40	0.60	18.00	16.00	60.00	50.00	42.00	34.00

* QP : Quasi-peak, AV: Average
* Results = Meter Reading(QP or AV) + Total Loss(LISN Insertion loss + Cable loss)

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 :

Frequency Range [MHz]	Tested Frequency [MHz]	ANT Pol.	Meter Reading [A] [dBuV/m]	Total Loss [B] [dB]	Antenna Height [Cm]	Turn table Degree [Deg]	Results [A+B] [dBuV/m]	Limits at 10m [dBuV/m]	Margin (Limit-Result) [dB]
30 - 230	79.8	H	8.3	7.77	400	340	16.1	**30**	13.9
	85.0	H	11.9	8.66	389	360	20.6	**30**	9.4
	156.0	H	10.1	11.07	395	289	21.2	**30**	8.8
	198.7	H	14.2	10.75	377	360	24.9	**30**	5.1
	212.8	H	13.1	10.83	314	11	23.9	**31**	7.1
	227.4	V	13.8	11.81	100	299	25.6	**30**	4.4
230 - 1000	233.5	H	10.5	12.51	240	183	23.0	**37**	14.0
	238.2	H	11.7	13.00	288	348	24.7	**37**	12.3
	241.5	H	14.2	13.32	244	29	27.5	**37**	9.5
	248.6	H	10.7	13.95	391	360	24.6	**37**	12.4
	255.6	V	16.1	14.63	103	212	30.7	**37**	6.3
	270.2	H	10.8	14.88	192	360	25.7	**37**	11.3

** Receiving Antenna Mode : **Horizontal, Vertical***
** Test distance : 10m (Semi Anechoic Chamber)*
** Results = Meter Reading + Total Loss(Antenna factor + Cable loss)*

3.2 Immunity to Electrostatic Discharge

3.2.1 Test Result

*** Performance Criterion : B**

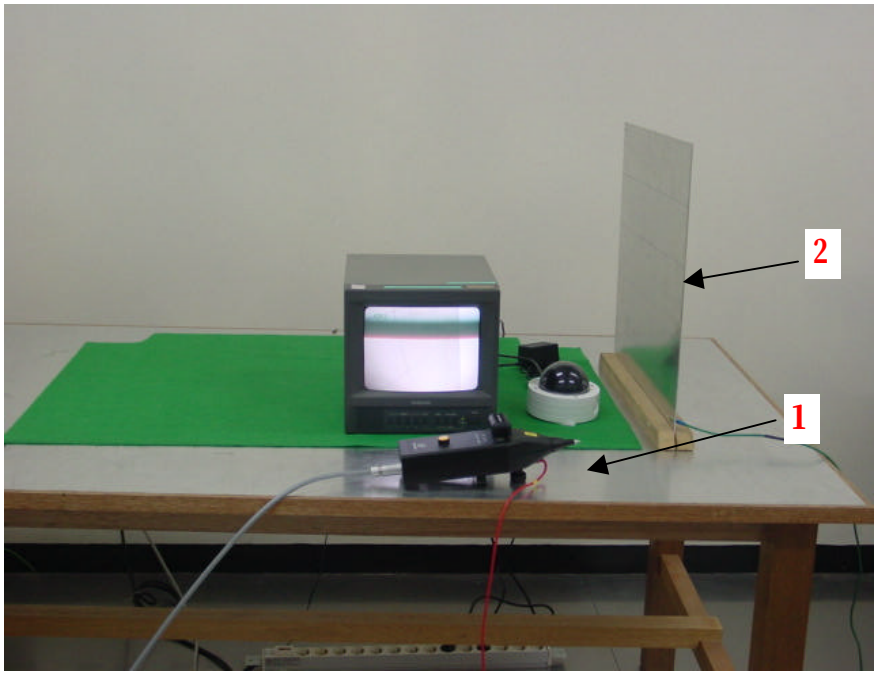
Point	Test voltage 2kV				Test voltage 4kV				Test voltage 6kV/8kV			
	Polarity of the output voltage				Polarity of the output voltage				Polarity of the output voltage			
	Positive		Negative		Positive		Negative		Positive		Negative	
	Con	Air	Con	Air	Con	Air	Con	Air	Con	Air	Con	Air
1	A		A		B		B		B		B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

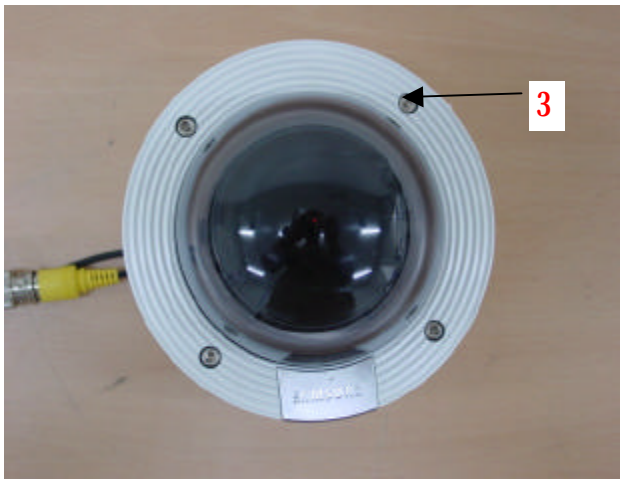
Note : contact discharge 6kV . Air discharge : 8kV "Con" : contact

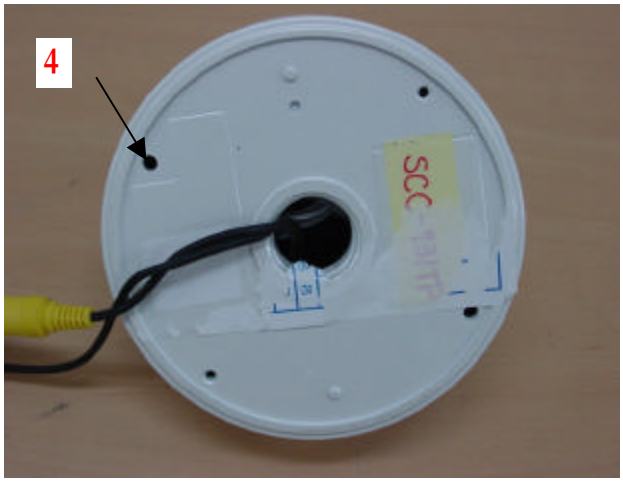
3.2.2 Climate conditions during the test

- ambient temperature 24 ℃ (EN Limit : 15 ℃ to 35 ℃)
- relative humidity 47 **%** (EN Limit : 30 % to 60 %)
- atmospheric pressure 1020 **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 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, 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 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, 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	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

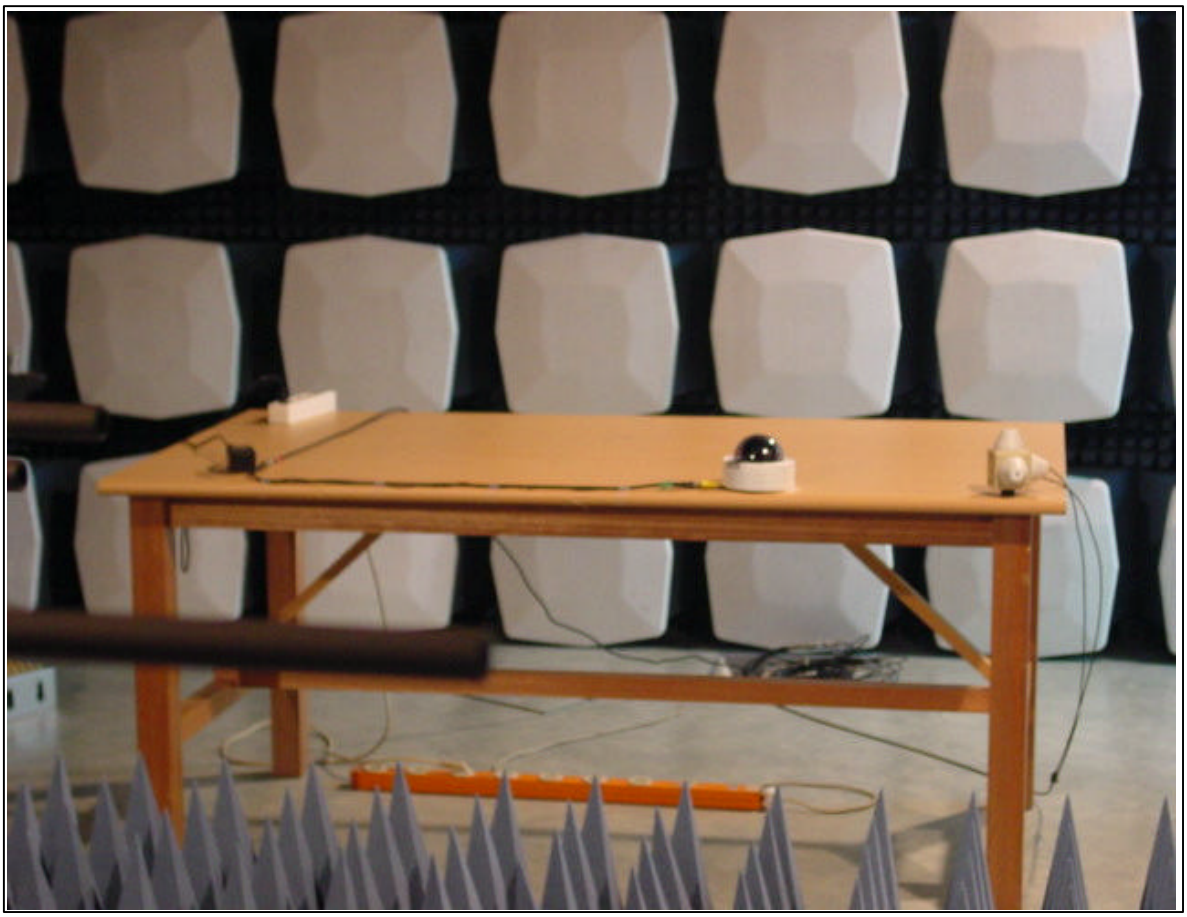
*** Performance Criterion : A**

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

3.3.3 Climate conditions during the test

- ambient temperature **24.0** ℃(EN Limit : 15 ℃ to 35 ℃)
- relative humidity **46%** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1020 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 Tr/Th(ns)	Polarity	Result
		Voltage (kV)	Repetition frequency(kHz			
AC Port	Live	0.5	5	5/50	+/-	B
		1	5	5/50	+/-	B
		2	5	5/50	+/-	B
	Neutral	0.5	5	5/50	+/-	B
		1	5	5/50	+/-	B
		2	5	5/50	+/-	B
	PE	0.5	5	5/50	+/-	*
		1	5	5/50	+/-	*
		2	5	5/50	+/-	*
	Live + Neutral	0.5	5	5/50	+/-	B
		1	5	5/50	+/-	B
		2	5	5/50	+/-	B
	Live + PE	0.5	5	5/50	+/-	*
		1	5	5/50	+/-	*
		2	5	5/50	+/-	*
	Neutral + PE	0.5	5	5/50	+/-	*
		1	5	5/50	+/-	*
		2	5	5/50	+/-	*
	Live + Neutral + PE	0.5	5	5/50	+/-	*
		1	5	5/50	+/-	*
		2	5	5/50	+/-	*
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 **23.0** ℃ (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **52 %** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1013 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**

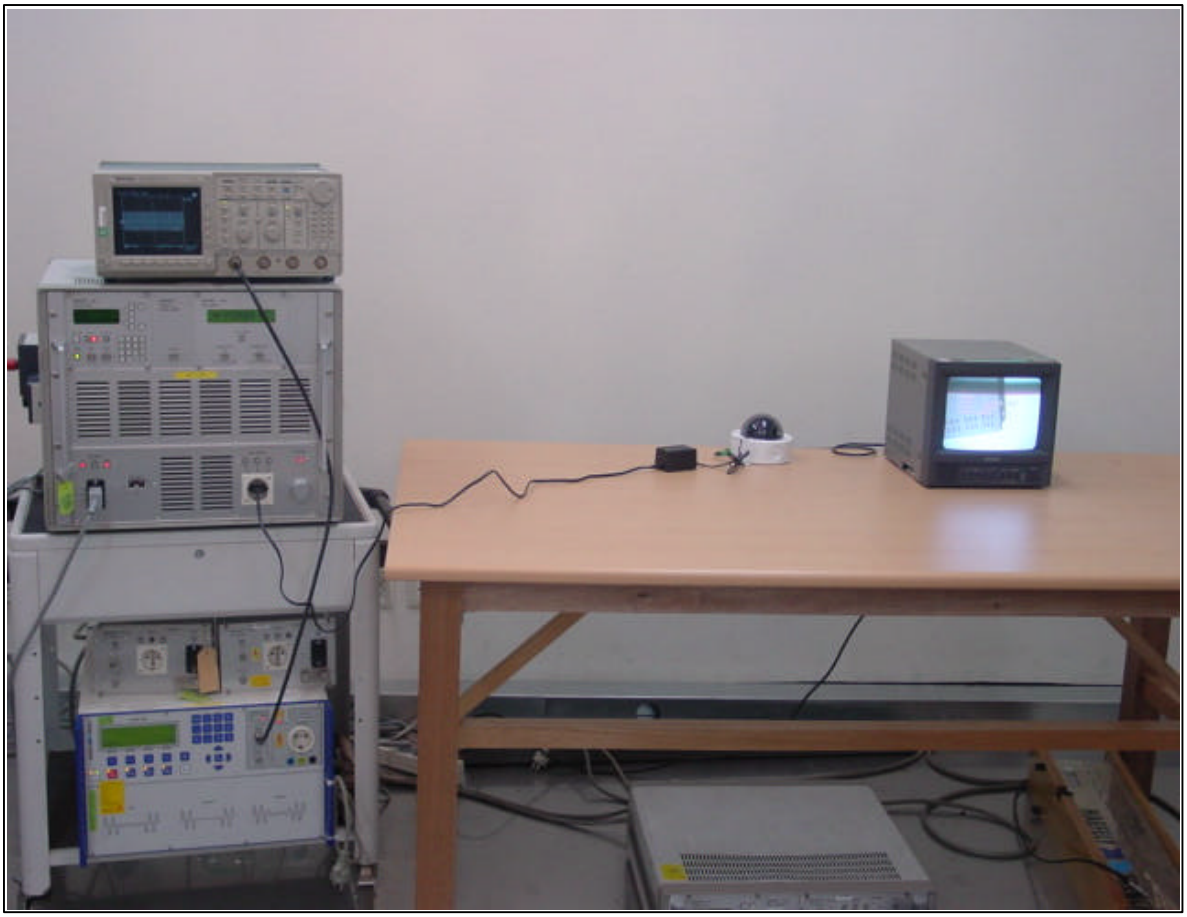
Port Coupling		Test Level		Pulse wave shape (μs)	Polarity	Result
		Voltage (kV)	Repetition time(s)			
AC Port	Live + Neutral	0.5	60	1.2/50(8/20)	+/-	A
		1	60	1.2/50(8/20)	+/-	A
	Live + PE	0.5	60	1.2/50(8/20)	+/-	*
		1	60	1.2/50(8/20)	+/-	*
		2	60	1.2/50(8/20)	+/-	*
	Neutral + PE	0.5	60	1.2/50(8/20)	+/-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

"*" : N / A

3.5.2 Climate conditions during the test

- ambient temperature **23** ℃(EN Limit : 15 ℃ to 35 ℃)
- relative humidity **52 %** (EN Limit : 10 % to 75 %)
- atmospheric pressure **1013 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 150	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 150	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 **24 ℃** (EN Limit : 15 ℃ to 35 ℃)
- relative humidity **52 %** (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

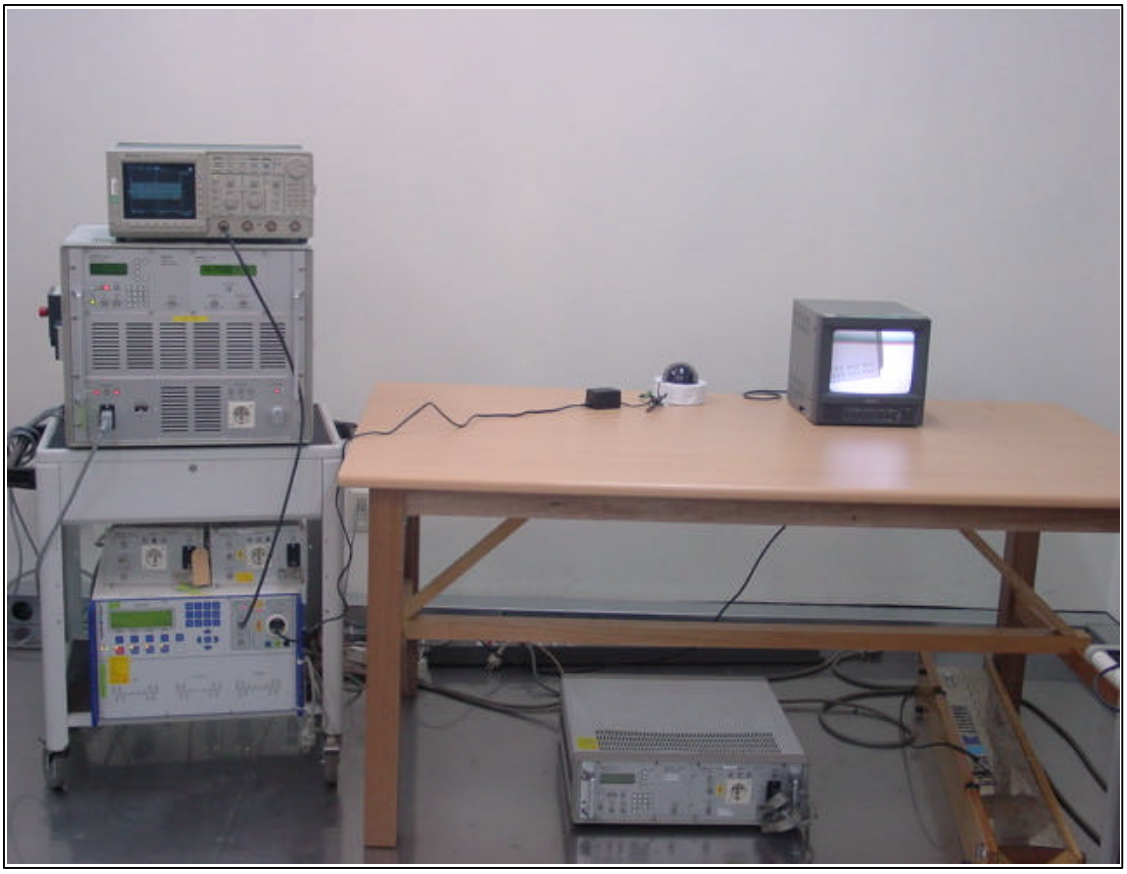
Mains supply voltage variation *** Performance Criterion : A**

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

3.7.2 Climate conditions during the test

- ambient temperature **24** ℃(EN Limit : 15 ℃ to 35 ℃)
- relative humidity **51 %** (EN Limit : 25 % to 75 %)
- atmospheric pressure **1012mbar** (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	ESVP	860688/015	R & S	2002-02-28
	ESCS30	839809/002	R & S	2002-06-27
L.I.S.N	ESH3-Z5	847265/028	R & S	2001-10-09
ESD Tester	ESD 30	0901-23	EM TEST	2002-06-01
Biconilog Antenna	6112B	2766	SCHAFFNER	2002-04-26
Amplifier	AR200W1000M7A	17282	A.R	-
Amplifier	150A220	17077	A.R	-
Dual Directional Coupler	DCU	316976/001	R & S	2001-11-05
Signal Generator	SMY01	840703/019	R & S	2001-11-05
RMS/PEAK Volt Meter	URE3	839432/032	R & S	2001-11-06
Power Meter	NRVD	841501/010	R & S	2001-11-05
EFT/Burst Generator	PEFT	083057-25	HAEFELY	2001-11-07
Surge Tester	PSURGE4.1	083665-11	HAEFELY	2001-11-05
Voltage DIP & Interruption	PLINE1610	083690-21	HAEFELY	2001-11-05
Oscilloscope	TDS520A	B011740	TEK	2001-10-12
Coupling Decoupling Network	CDN801-M2/M3	425	LUTHI	2001-12-28