EMC TEST REPORT

Project No.	LBE20133589	**Revision No.**	None
Applicant	**Name of organization**	Samsung TECHWIN Co., Ltd.	
	Address	28，Seongju-dong Changwon-si，Gyeongsangsam-do，Rep of Korea	
	Date of application	June 21, 2013	
EUT Equipment Under Test	**Kind of product**	**CCTV camera**	
	Model No.	**SCD-2021RN**	
		Variant Model	None
	Manufacturer	Attach the next page	
	New / Alternative / Permissive change information	*) New	
Applied Standards		VCCI V-3/2012.04	
Test Period		June 24, 2013~ June 24, 2013	
Issued date		June 30, 2013	

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 : **Jie Yang**	**Reviewed by :** Zhongyuan Gao

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 CSQAL.

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Factories :

1. Samsung TECHWIN Co.,Ltd.
2. Tianjin Samsung TECHWIN Opto-Electronics Display Co., Ltd

Factories Address :

1. 28，Seongju-dong Changwon-si，Gyeongsangsam-do， Rep of Korea
2. No.11 Weiliu Rd. Micro-Electronic Industrial Park,Jingang Rd.Tianjin,300385 China

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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
☒	Conducted Disturbance	VCCI V-3/2012.04	Complied	Meets Class A Limit
☒	Radiated Disturbance		Complied	Meets Class A Limit

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2. General Information

2.1 Test facility

CSQAL is LOCATED ON Block D, 17-19 ,MIP Fourth Road, Jingang Highway, Tianjin China
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.

CSQAL is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	FCC(Federal Communications Commission)	Number: 745469
	Korea Communications Commission Radio Research Agency	Accredited : KR0148
	KC（Korean Testing Laboratory）	KTL-002/SMT
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	Member No: 271
	NVLAP(National Voluntary Laboratory Accreditation Program)	CODE: 500036-0
	CNAS（China National Accreditation Service for Conformity Assessment）	L5281

Test Power:110v@60Hz

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3. Test Setup configuration

3.1 Test peripherals

The peripherals which were interconnected to the EUT during the test are as follows:

Item	Model No.	Serial No.	Manufacturer	Note
CCTV camera	SCD-2021RN	-	Samsung	EUT
AC Adapter	–	–	–	FOR EUT

3.2 EUT operating mode(s)

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

Operating Mode 1	CCTV camera operating
-	-

3.3 Details of Sampling

Customer selected, single unit.

3.4 Cable description

The type(s) of cables which were connected to the ports (of the EUT) are as follows:

No.	From the port of EUT	To	Length[m]	Shielded[Y/N]
1	DC in	DC adapter	1.5	Yes
2	Video out	75 ohm termination	1.5	Yes

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3.5 EUT Description

The following features describe EUT represented by this report:

SCD-2021R

Product Concept	Small IR Dome Camera
Main Features	1. Horizontal Resolution of 650TV Lines 2. Min. Illumination 0Lux (IR LED on), IR distance 20m 3. Built-in Fixed Lens(3.6mm), DNR, 12V DC, IP66

Model Name	SCD-2021RN	SCD-2021RP
Electrical		
Input Voltage	DC 12V	DC 12V
Power	Not Fixed	Not Fixed
Video		
Imaging Device	1/3" CMOS(MT9V138)	1/3" CMOS(MT9V138)
Total Pixels	680 x 512	680 x 512
Scanning System	Interlace	Interlace
Synchronization	Internal	Internal
Frequency	H: 15,734 Hz	H: 15,625
	V: 59.94 Hz	V: 50 Hz
Horizontal	650TVL	650TVL
Min. Illumination	OLux (IR-LED)	OLux (IR-LED)
S/N Ratio (Y	46dB	46dB
Lens		
Focus Length	3.6mm	3.6mm
Angular Field of View	TBD	TBD
	TBD	TBD
Operational		
Gain Control	Auto	Auto
White Balance	Auto	Auto
	(3200°K~6500°K)	(3200°K~6500°K)
Digital Noise Reduction	Auto	Auto
Day & Night	Auto	Auto
IR Distance	20m(12EA)	20m(12EA)
Environmental		
Operating Temperature/Humidity	-10°C ~ +40°C (+14°F~+104°F) / Less than 90% RH	-10°C ~ +40°C (+14°F~+104°F) / Less than 90% RH
Mechanical		
Dimension (W x H x D)	W102 X H71.7	W102 X H71.7
Weight	160g	160g

Highest Frequency: 27MHz

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3.6 Description of the EUT exercising method

The EUT exercise program used during EMI and Immunity (EMS) testing was CSQAL standardized test program. The program is camera operating.

3.7 Performance Criteria

During and/or after immunity testing, the EUT was monitored to the following performance criterion.

Criterion	Operating mode(s)	Description
A	**1**	No noticeable degradation or loss of function is allowed during the test. The EUT shall continue to operate as intended without operator intervention. The product conforms with the requirements of clause 7.1 of EN55024:2010 The product conforms with the requirements of Annex B.2 of EN55024:2010 The product conforms with the requirements of Annex C of EN55024:2010
B	**1**	No noticeable degradation or loss of function is allowed after the test. The EUT shall continue to operate as intended without operator intervention. During the test, no degradation of performance is allowed. No change of operating state or stored data is allowed to persist after the test. The product conforms with the requirements of clause 7.1 of EN55024:2010 The product conforms with the requirements of Annex B.2 of EN55024:2010 The product conforms with the requirements of Annex C of EN55024:2010.
C	**1**	Loss of function is allowed, provided that the function is self recoverable or can be restored by the operation of the controls by the user. The product conforms with the requirements of clause 7.1 of EN55024:2010. The product conforms with the requirements of Annex B.2 of EN55024:2010 The product conforms with the requirements of Annex C of EN55024:2010.

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3.8 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.)

3.8.1 Emission

Test type			Measurement uncertainty (C.L. 95%, k = 2)
Conducted Disturbance	Main terminal		2.8 dB
Radiated Disturbance	Horizontal	4.96 dB	4.96 dB
	Vertical	4.62 dB	4.62 dB

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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 standards.

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 1: 1 μV is regarded as 0 dB.
Note 2: If the average limit is met in the measurement with quasi-peak detector, the measurement with average detector at the same frequency is unnecessary.
Note 3: The lower limit shall apply at the transition frequency.

Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports for class A equipment

Frequency range Limits MHz	Voltage limits dB(μV)		Current limits dB(μA)	
	Quasi-peak	Quasi-peak	Quasi-peak	Average
0,15 to 0,50	97 to 87	84 to 74	53 to 43	40 to 30
0,50 to 30	87	74	43	30

Note 1: 1 μV is regarded as 0 dB. 1 μA is regarded as 0dB.
Note 2: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.
Note 3: If the average limit is met in a measurement with quasi-peak detector receiver, the measurement with average detector receiver at the same frequency is unnecessary.
Note 4: The conversion factor between voltage limits and current limits is 20 $\log_{10}$ 150/I = 44 dB.

If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 seconds at each measurement frequency, the highest reading shall be recorded, with the exception of any brief isolated high reading (which shall be ignored).

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4.1.1 Test instrumentation

Test instrumentations which were used in the Conducted disturbance test are as follows;

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5CE	TOYO	V 4.7.10	N/A	N/A
Measuring receiver	ESCI	R&S	101027	2013.03.02	12
Artificial mains network	ENV216	R&S	101122	2012.08.23	12
Artificial mains network	ENV216	R&S	101059	2012.08.23	12
ISN	ISN T800	TESEQ	28602	2012.08.23	12
ISN	ISN T8-CAT6	TESEQ	27286	2013.03.02	12

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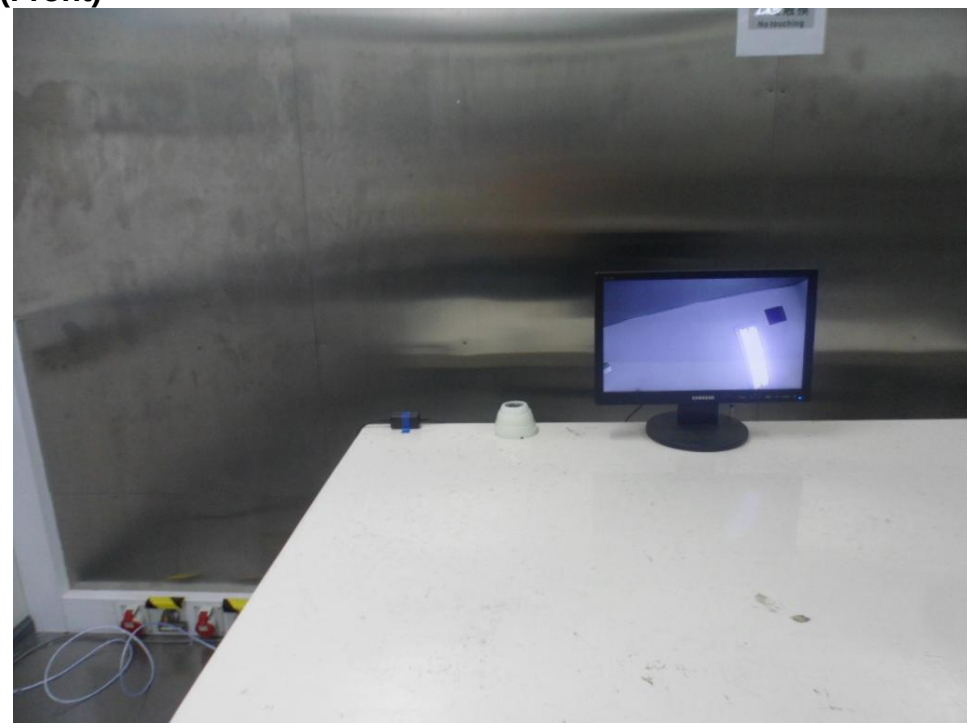
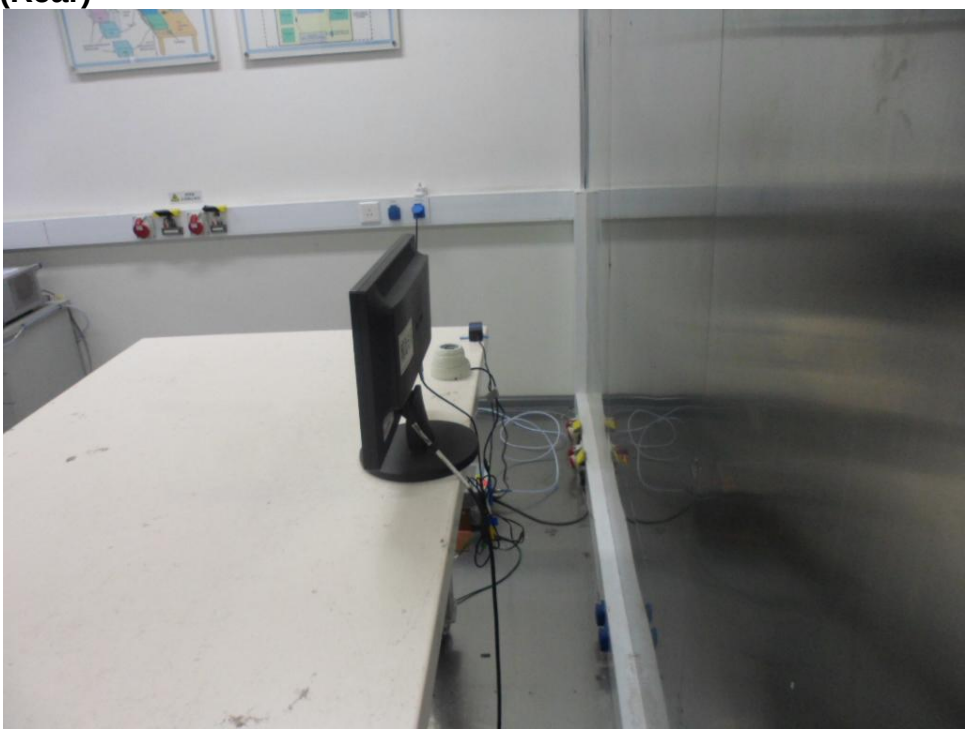
4.1.2 Photograph of the test Configuration

(Front)



(Rear)



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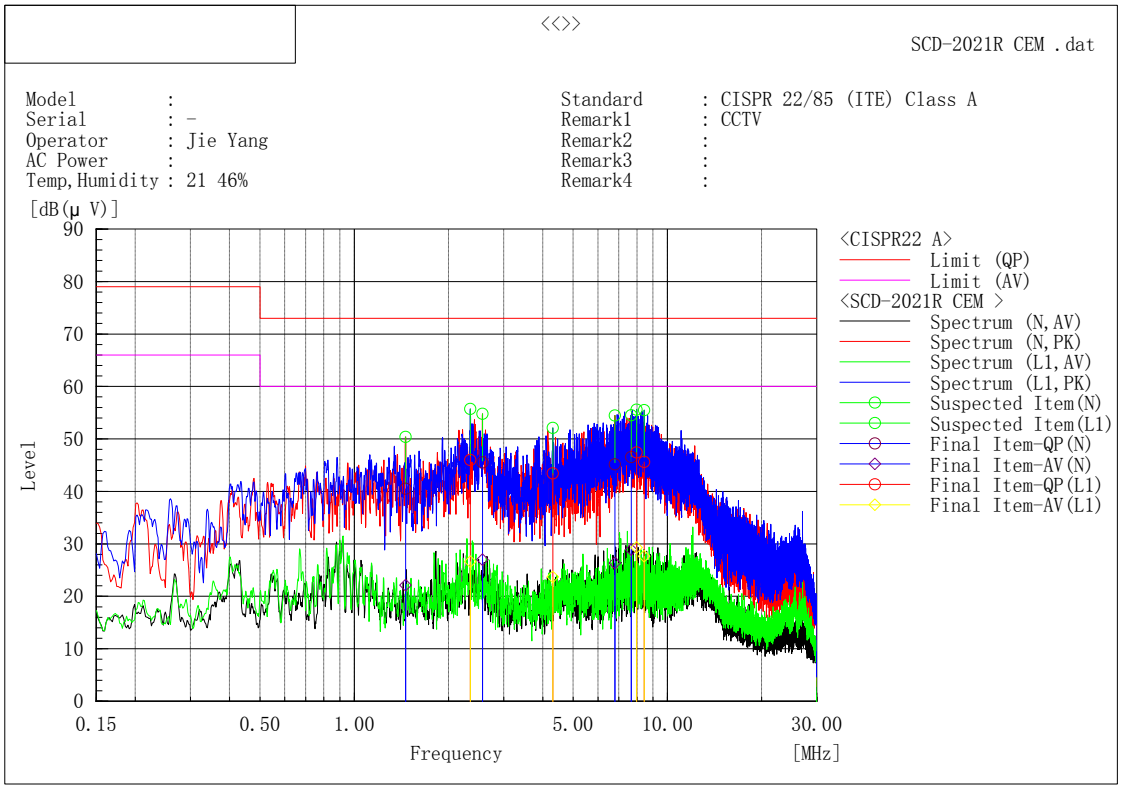
4.1.3 Test result

Test date	2013.06.24		**Test engineer**		Jie Yang	
Climate condition	**Ambient temperature**	21 ℃	**Relative humidity**	46%	**Atmospheric pressure**	100.8kPa
Test place	Shielded Room #2					

4.1.4 Test data

■ Operating Mode: CCTV camera operating



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]	Remark
1	2.56663	35.8	17.3	9.7	45.5	27.0	73.0	60.0	27.5	33.0	
2	7.6605	36.7	19.1	9.8	46.5	28.9	73.0	60.0	26.5	31.1	
3	1.45862	30.8	12.4	9.7	40.5	22.1	73.0	60.0	32.5	37.9	
4	6.79996	35.4	16.5	9.8	45.2	26.3	73.0	60.0	27.8	33.7	

--- 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]	Remark
1	2.34728	36.3	16.9	9.7	46.0	26.6	73.0	60.0	27.0	33.4	
2	7.97359	37.6	19.5	9.8	47.4	29.3	73.0	60.0	25.6	30.7	
3	8.42355	35.8	17.8	9.8	45.6	27.6	73.0	60.0	27.4	32.4	
4	4.30458	33.7	14.0	9.7	43.4	23.7	73.0	60.0	29.6	36.3	

Note) Result (Quasi-Peak and/or Average) = Reading (Quasi-Peak and/or Average) + c.f (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

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4.2 Radiated disturbance（30MHz to 1GHz）

Of those disturbances above (*L* – 20 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.
Including the worst-case data points for each tested configuration.

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

Frequency range Limits MHz	Quasi-peak Limits dB(μV/m)	
	Class A	Class B
30 to 230	40	30
230 to 1000	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.
Note 3: 1 μV/m is regarded as 0 dB.

4.2.1 Test instrumentation

Test instrumentations which were used in the Radiated disturbance are as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5/RE	TOYO	V 4.7.10	N/A	N/A
Bi-log Antenna	CBL6112D	TESEQ	30997	2013.04.03	24
Bi-log Antenna	CBL6112D	TESEQ	30999	2013.04.03	24
EMI Receiver	ESU26	R&S	100244	2013.03.02	12
EMI Receiver	ESCI	R&S	101024	2013.03.02	12
EMI Receiver	ESCI	R&S	101032	2013.03.02	12
AMPLIFIER	310N	SONOMA	300913	2012.08.23	12
AMPLIFIER	310N	SONOMA	300914	2012.08.23	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
RF Selector	NS4900N	TOYO	-	N/A	N/A
RF Selector	NS4900N	TOYO	-	N/A	N/A

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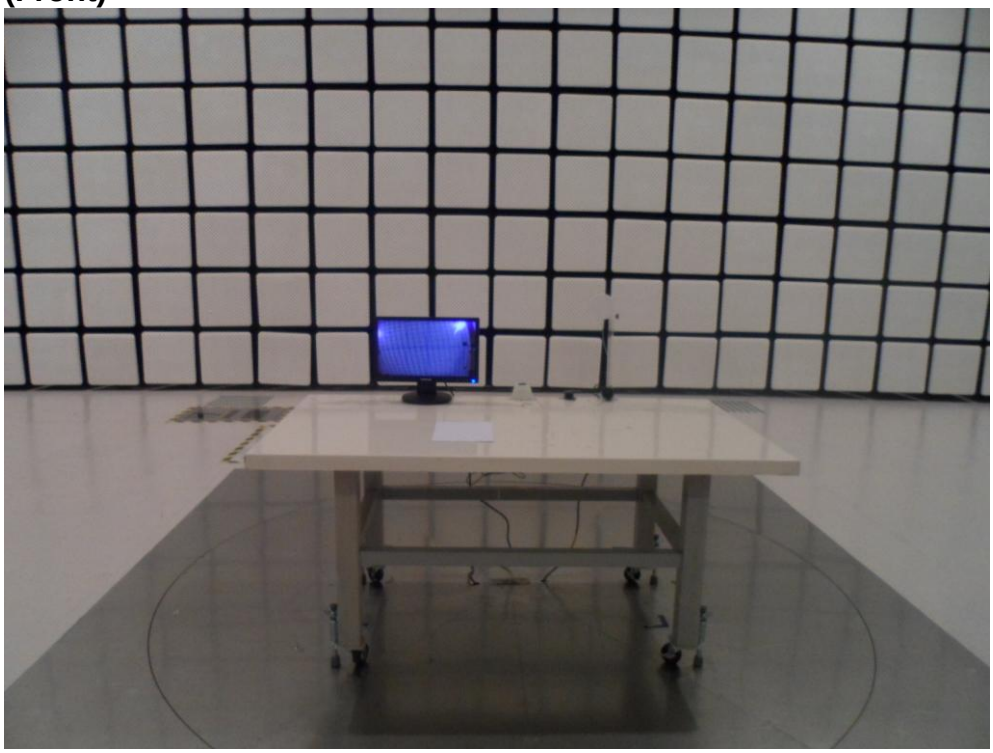
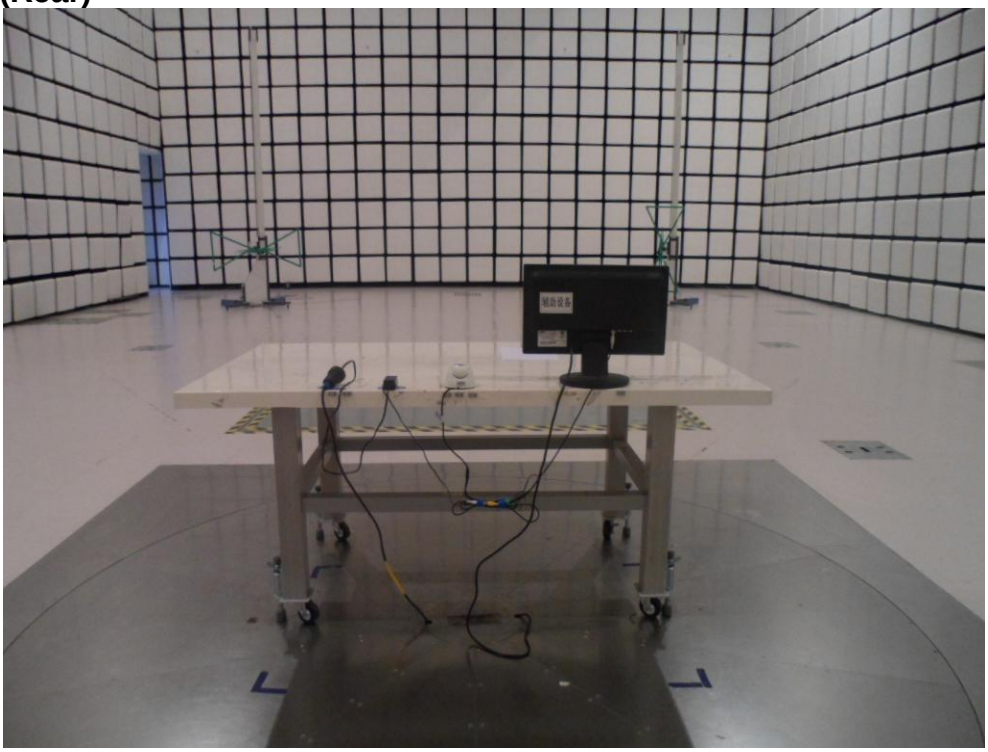
4.2.2 Photograph of the test Configuration

(Front)



(Rear)



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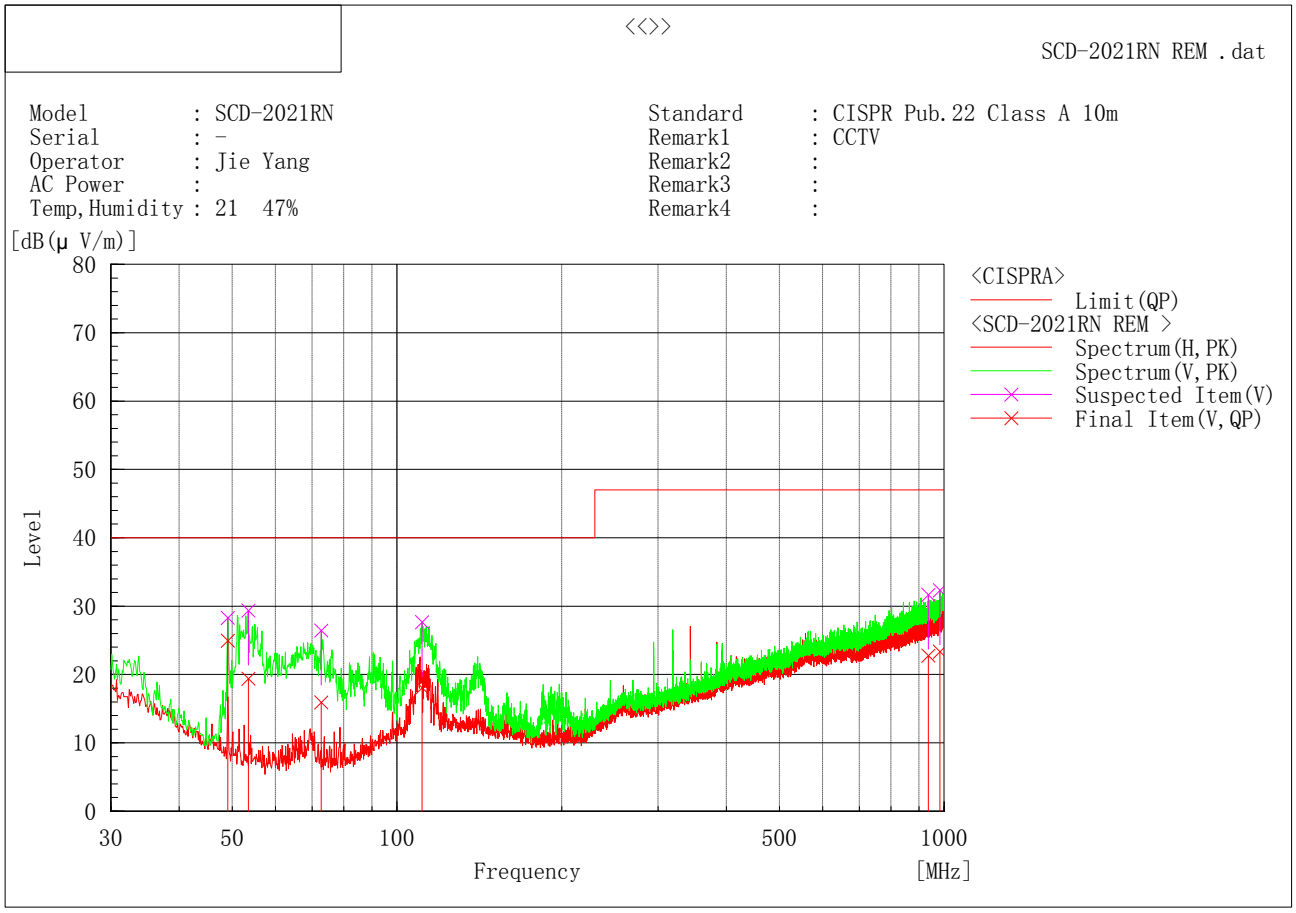
4.2.3 Test results

Test date	2013.06.24		**Test engineer**		Jie Yang	
Climate condition	**Ambient temperature**	21℃	**Relative humidity**	47%	**Atmospheric pressure**	100.8 kPa
Test place	10m Semi-Anechoic Chamber					

4.2.4 Test data

■ Operating Mode: CCTV Camera Operating



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]	System	Remark
1	53.523	V	38.9	-19.5	19.4	40.0	20.6	298.0	182.3	2	
2	49.036	V	43.2	-18.2	25.0	40.0	15.0	198.0	5.6	2	
3	111.116	V	32.0	-13.9	18.1	40.0	21.9	100.0	2.9	2	
4	72.680	V	36.2	-20.3	15.9	40.0	24.1	300.0	268.8	2	
5	982.297	V	20.7	2.7	23.4	47.0	23.6	199.0	350.8	2	
6	935.859	V	21.0	1.8	22.8	47.0	24.2	300.0	121.3	2	

Note) Receiving antenna polarization : Horizontal and/or Vertical

Test Distance : 10m, Antenna Height : 1 to 4 meters

Result (Quasi-Peak) = Reading QP + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit – Level QP

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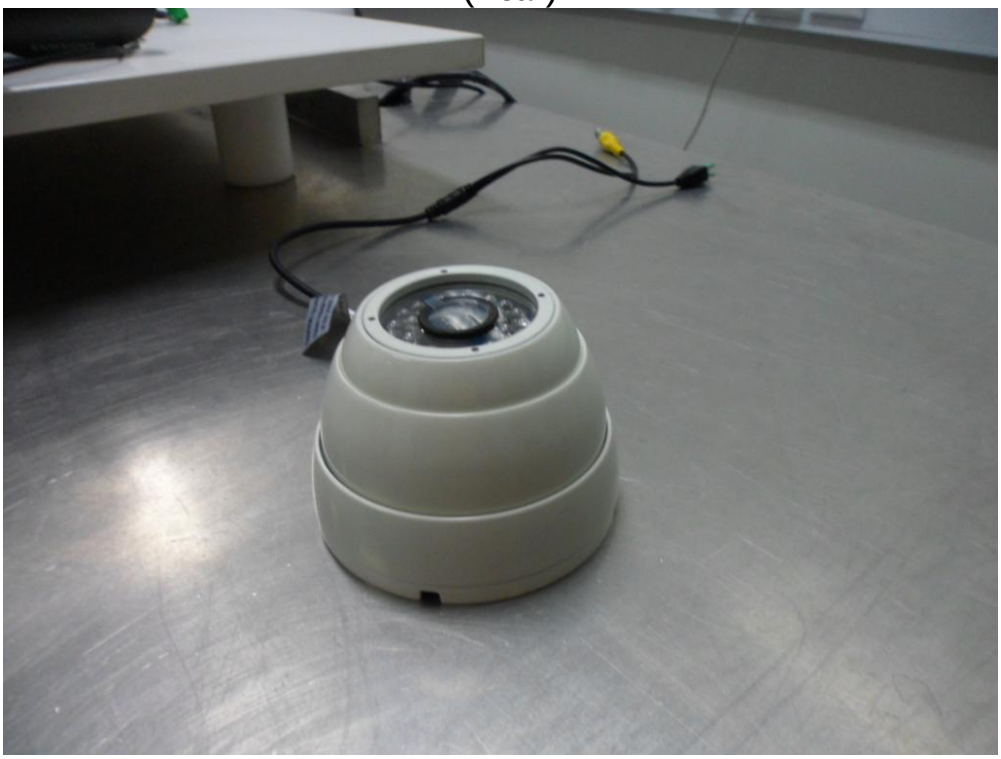
Appendix A – EUT photography

(Front)

(Rear)



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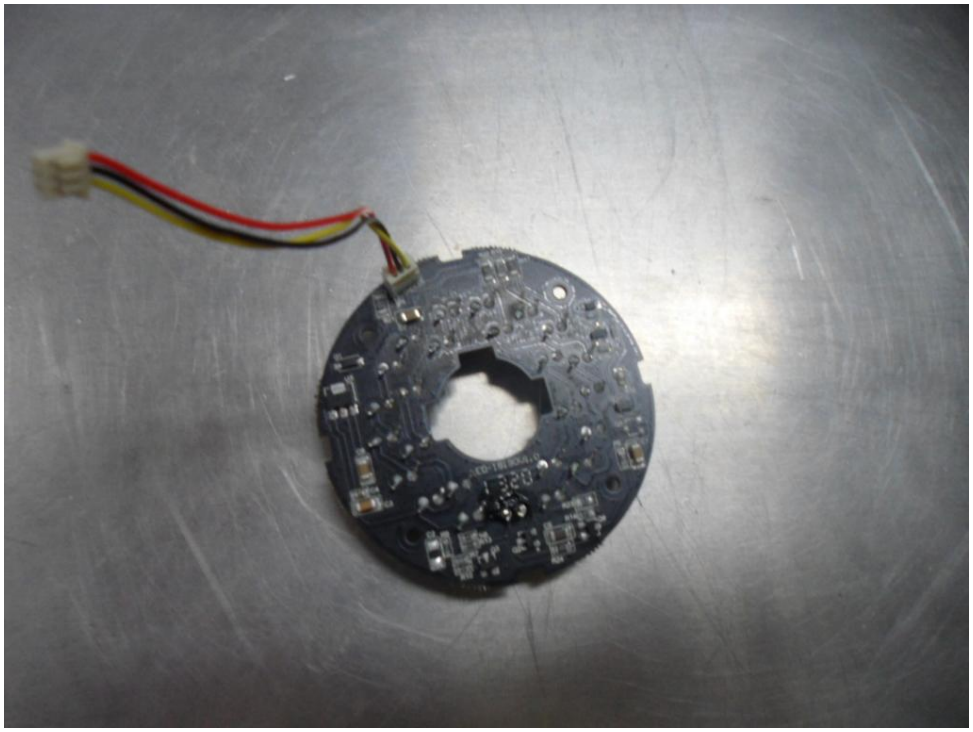
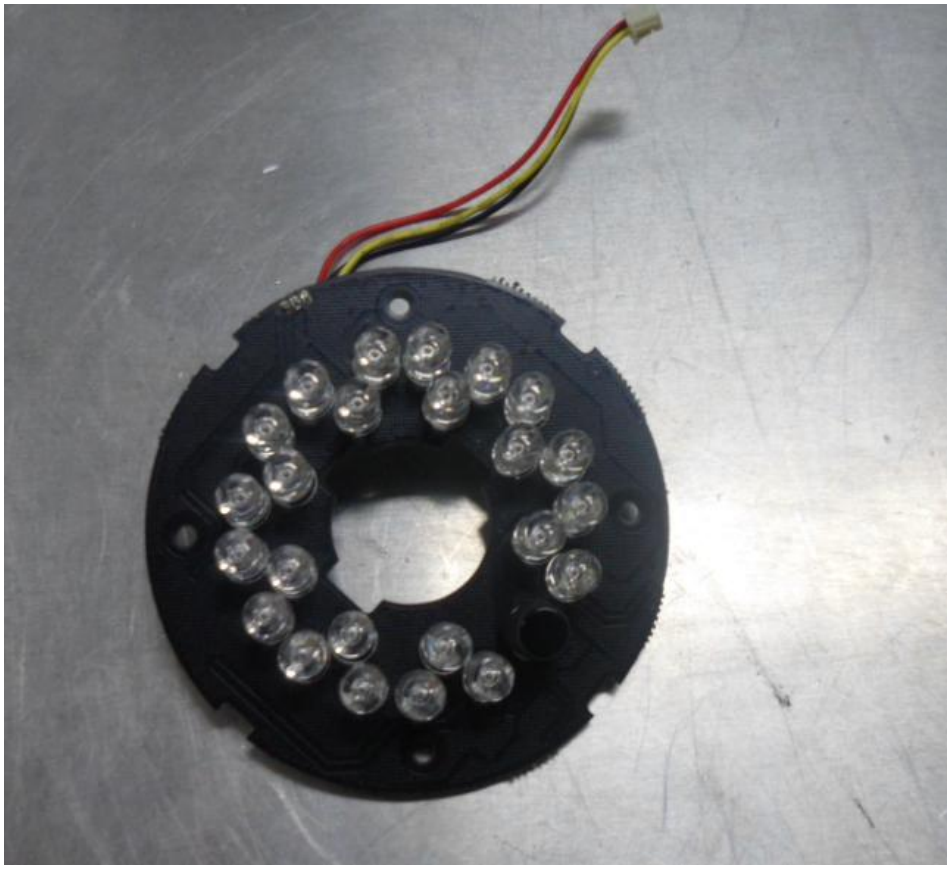
（LED Board）





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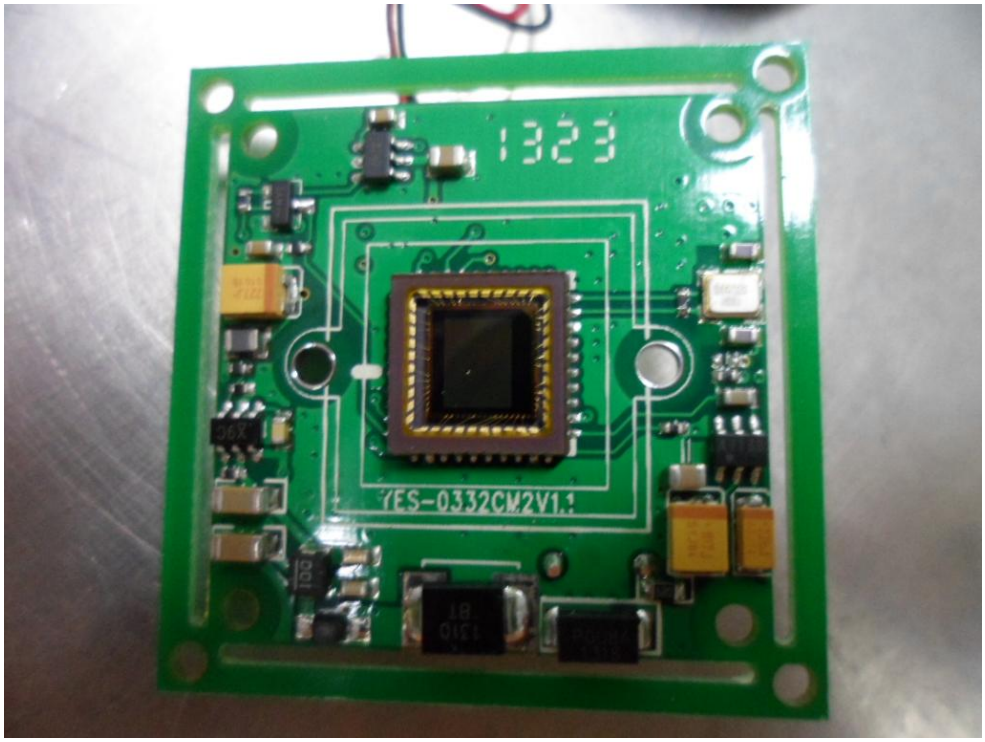
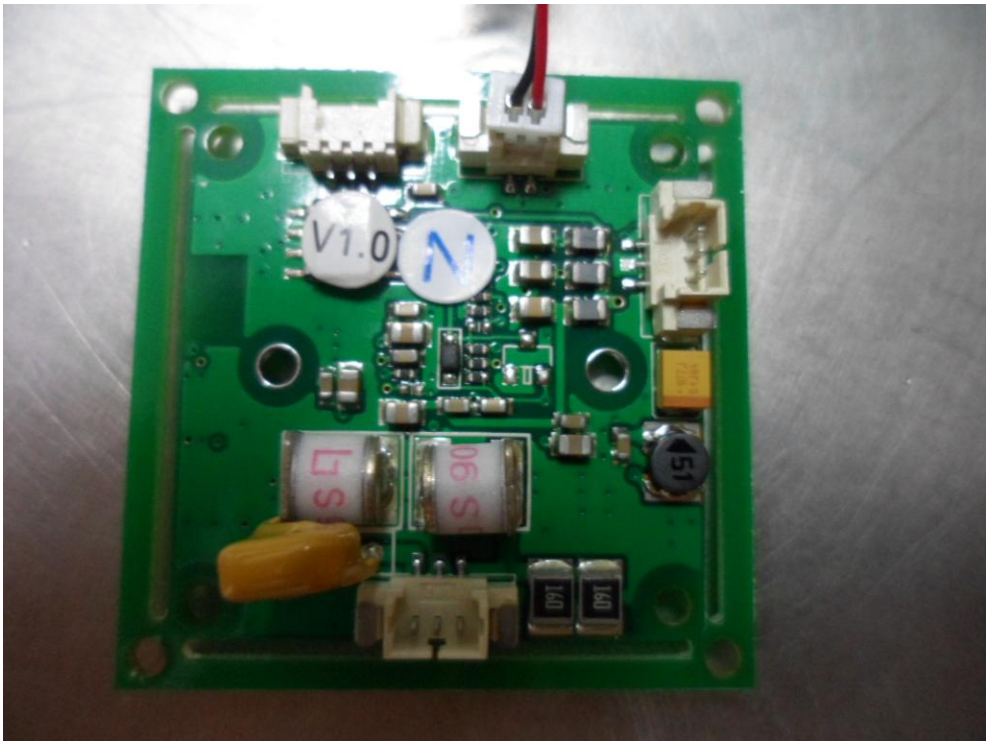
（Main Board）





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