

EMC TEST REPORT

Test report No : EMC-VCCI-0314
Type of Equipment : CCTV Camera
Model Name : SCP-2373HN
Variant Model Name : SCP-2273HN
Applicant : Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Manufacturer#1 : Samsung Techwin Co., Ltd.
#42 Seongju-Dong, Changwon-Shi,
Kyungsangnam-Do, Korea
Manufacturer#2 : TIANJIN SAMSUNG TECHWIN
OPTO-ELECTRONIC CO., LTD
No.11 Weiliu Road. Micro-Electronic Industrial
Park Jingang Road Tianjin 300385, China
Test standards : VCCI V-3 / 2012.04, Class A
Testing Laboratory : EMC Compliance Ltd.
Test result : Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of VCCI Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of receipt: 2013. 07. 18

Date of testing: 2013. 07. 26

Issued date: 2013. 08. 02

Tested by:



HWANG, SUN-BIN

Approved by:



BEAK, JEONG-SOO

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1. Applicant information

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Manufacturer#2: TIANJIN SAMSUNG TECHWIN OPTO-ELECTRONIC CO., LTD
Address: No.11 Weiliu Road, Micro-Electronic Industrial Park
Jingang Road Tianjin 300385, China

3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 25 °C	51 % R.H.	-
Shielded room(CE)	: 25 °C	53 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Conducted Emission	Shielded Room
Radiated Emission	10 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted emission measurement (C.L: Approx 95 %, k = 2)		
Shielded Room (CE#1)	9 kHz ~ 150 kHz: ± 3.82 dB 150 kHz ~ 30 MHz: ± 3.43 dB	
Shielded Room (CE#2)	9 kHz ~ 150 kHz: ± 3.82 dB 150 kHz ~ 30 MHz: ± 3.43 dB	
Shielded Room (CE#3)	9 kHz ~ 150 kHz: ± 4.00 dB 150 kHz ~ 30 MHz: ± 3.63 dB	
Radiated Emission measurement (C.L: Approx 95 %, k = 2)		
10 m Chamber (#F4)	30 MHz ~ 300 MHz	3 m: + 4.56 dB, - 4.58 dB 10 m: + 4.56 dB, - 4.56 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.84 dB, - 4.85 dB 10 m: + 4.71 dB, - 4.72 dB
	1 GHz ~ 6 GHz	3 m: + 6.19 dB, - 6.20 dB
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB
10 m Chamber (#F2)	30 MHz ~ 300 MHz	3 m: + 4.86 dB, - 4.88 dB 10 m: + 4.86 dB, - 4.86 dB
	300 MHz ~ 1 000 MHz	3 m: + 4.98 dB, - 4.99 dB 10 m: + 4.85 dB, - 4.87 dB
	1 GHz ~ 6 GHz	3 m: + 6.19 dB, - 6.20 dB
	6 GHz ~ 18 GHz	3 m: + 6.41 dB, - 6.53 dB

4. Description of E.U.T.

4.1 General information

Video	SCP-2378HN	SCP-2378HP
Imaging Device	1/4" Sony 980H Exview HAD II color CCD	
Total Pixels	1020(H) x 508(V) 520K	1020(H) x 598(V) 610K
Effective Pixels	978(H) x 494(V) 480K	978(H) x 582(V) 570K
Scanning System	2 : 1 Interlace	
Synchronization	Internal / Line Lock	
Frequency	H : 15.734KHz / V : 59.94Hz	H : 15.625KHz / V : 60Hz
Horizontal Resolution	Color : 650 TV lines, B/W : 680 TV lines	
Min. Illumination	Color : 0.2Lux @ F1.8 (50IRE), 0.0004 Lux (Sens-up, 512x) B/W : 0.01 Lux @ F1.8 (50IRE), 0.00002 Lux (Sens-up, 512x)	
S / N Ratio	52dB (AGC off, Weight on)	
Video Output	CVBS : 1.0 Vp-p / 75Ω composite	
Lens Type		
Focal Length (Zoom Ratio)	3.6~129.5mm (Optical 37x)	
Max. Aperture Ratio	1:1.8 (Wide) ~ 8.9 (Tele)	
Angular Field of View	H : 58.28°(Wide) ~ 1.82°(Tele) / V : 43.28°(Wide) ~ 1.22°(Tele)	
Min. Object Distance	1.5m	
Gain Control	Off / Low / Medium / High / Manual	
Zoom Movement Speed	3.1 sec (Fast speed mode)	
Pan / Tilt		
Pan Range	360° Endless	
Pan Speed	Preset : 600°/sec / Manual : 0.024°/sec ~ 120°/sec (Proportional zoom ratio)	
Tilt Range	-5° ~ 185° (Manual Setup : -15° ~ 195°)	
Tilt Speed	Preset : 600°/sec / Manual : 0.024°/sec ~ 120°/sec (Proportional zoom ratio)	
Preset	255	
Preset Accuracy	±0.1°	
Operational		
On Screen Display	English, Japanese, Spanish, French, Portuguese, Korean	English, French, German, Spanish, Italian, Chinese, Russian, Polish, Czech, Turkish, Portuguese
Camera Title	Off / On (Displayed 12 characters)	
Day & Night	Auto / Color / B/W	
Backlight Compensation	BLC / HLC / Off	
Wide Dynamic Range	128x	
Contrast Enhancement	3SDR (Off/On)	
Digital Noise Reduction	35NR III (Off/On)	
Digital Image Stabilization	Off / On	
Motion Detection	Built-in	
Privacy Masking	Off / On (8 programmable zones)	
Sens-up (Frame Integration)	2x ~ 512x	
Gain Control	Off / Low / Medium / High / Manual	
White Balance	ATW / ATW(OUT) / ATW(IN) / Manual / AWC / MERCURY	

Electronic Shutter Speed	1/260 ~ 1/120,000 sec
Digital Zoom	Off / On (2x ~ 16x)
Digital Flip	Off / On
Schedule	Day / Time
Alarm	8 In 8 Out
Communication	Coaxial Control (8PC-800 Compatible), RS-485/422
Protocol	Coax : Pelco-C (Coaxitron) RS-485/422: Samsung-T, Samsung-E, Pelco-D, Pelco-P, Vicon, Honeywell, Panasonic, Bosch, AD, GE
Environmental	
Operating Temperature / Humidity	-50°C ~ +55°C (-58°F ~ +131°F) / Less than 90% RH
Ingress Protection	IP66
Electrical	
Input Voltage/Current	24VAC±10%
Power Consumption	Max. 15W / 60W (Fan & Heater)
Mechanical	
Color / Material	Ivory, Aluminum, Plastic (Dome Cover : Clear)
Dimension (WxHxD)	Φ220 x 293.6mm
Weight	3.1Kg

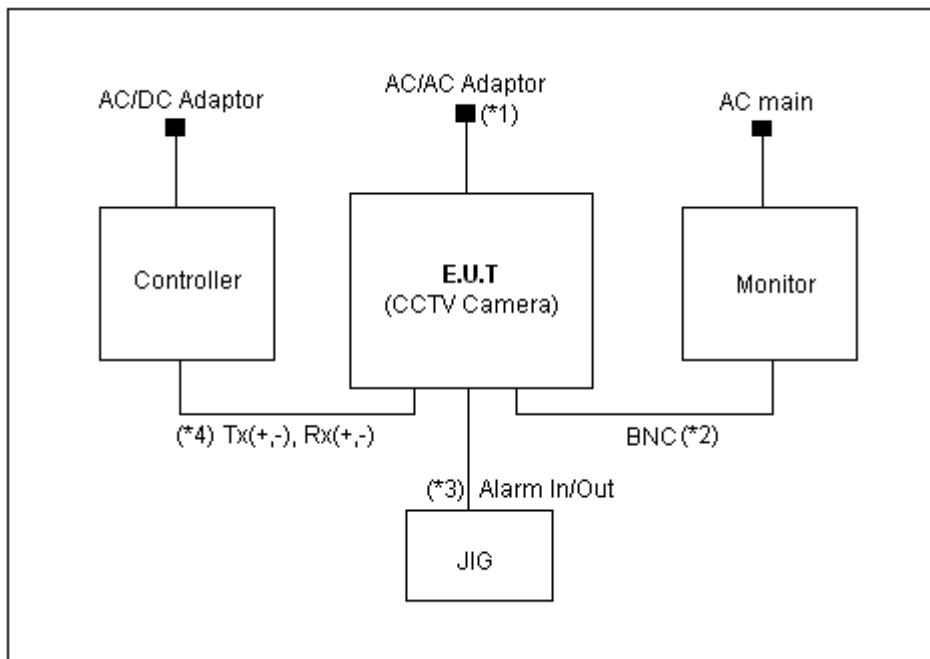
4.2 Product description

Type of product	CCTV Camera
Model name (Basic)	SCP-2373HN
Model name (Variant)	SCP-2273HN
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	100 V, 50 Hz
Product rating	* AC/AC Adaptor (STA-100) Input: AC 100 V~, 50/60 Hz, 960 mA Output: AC 24 V, 2.5 A
Internal clock frequency	Above 108 MHz
Note	AC/AC adaptor was provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Monitor	PM24KO	YER8HVDBA00057E	SAMSUNG
Controller	SCC-1000	EW089028913	SAMSUNG
JIG	-	-	-

4.4 Test configuration



Note	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (CCTV Camera)	Power	AC/AC Adaptor	Power	1.5	Non-Shield
2		BNC	Monitor	BNC	3.0	Shield
3		Alarm In/Out	JIG	Alarm In/Out	3.0	Non-Shield
4		Tx(+,-), Rx(+,-)	Controller	Tx(+,-), Rx(+,-)	3.0	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1	Camera monitoring test.
	Alarm In/Out test
	Controller test.

5. Summary of test results

5.1 Summary of EMI emission test results

Applied	Test items	Test method	Result
☒	Conducted Emission	VCCI V-3 / 2012.04, Class A	Complied
☒	Radiated Emission	VCCI V-3 / 2012.04, Class A	Complied

6. Test results

6.1 Conducted Emission

Test specification	VCCI V-3 / 2012.04, Class A		
Testing voltage	100 V, 50 Hz		
Test facility	Shielded room (CE#1)		
Date	2013. 07. 26		
Temperature (°C)	25 °C	Humidity (% R.H.)	53 % R.H.
Remarks	Complied		

6.1.1 Limits of conducted emission measurement

☒ AC main

Frequency [MHz]	Class A (dB μ V)		Class B (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56*	56 ~ 46*
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

*The limit decreases linearly with the logarithm of frequency.

☐ Telecommunication

Frequency [MHz]	Class A Voltage Limits (dB(μ V))		Current Limits (dB(μ A))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 ~ 30	87	74	43	30
Frequency [MHz]	Class B Limits (dB(μ V))		Current Limits (dB(μ A))	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 ~ 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 ~ 30	74	64	30	20

* The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz

* The current and voltage disturbance limits are derived for use with an impedance stabilization Network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150/I = 44$ dB).

6.1.2 Measurement procedure

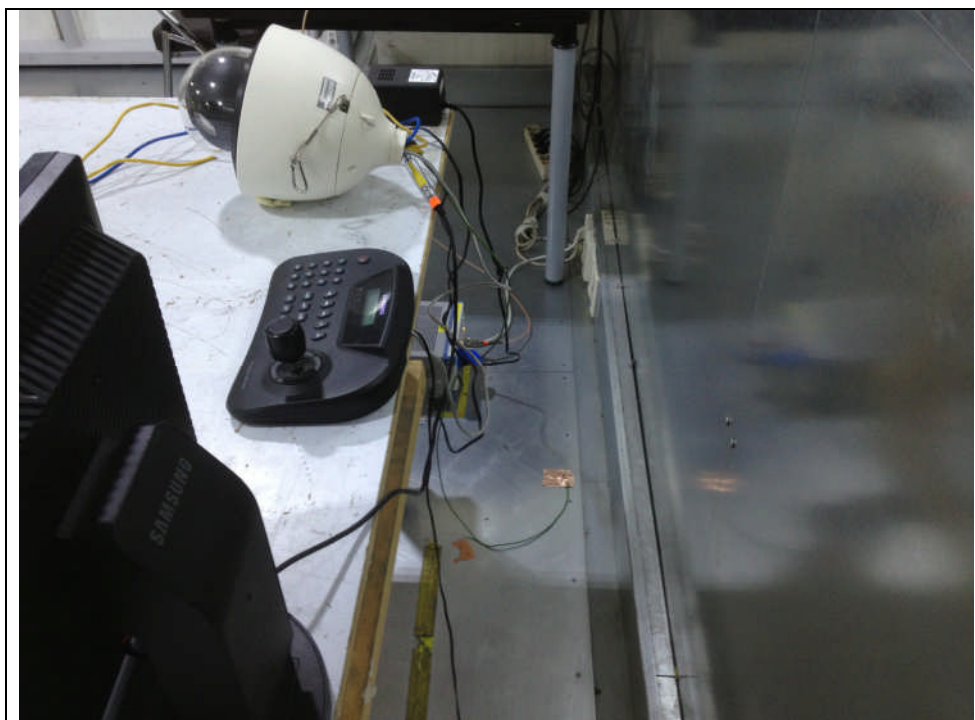
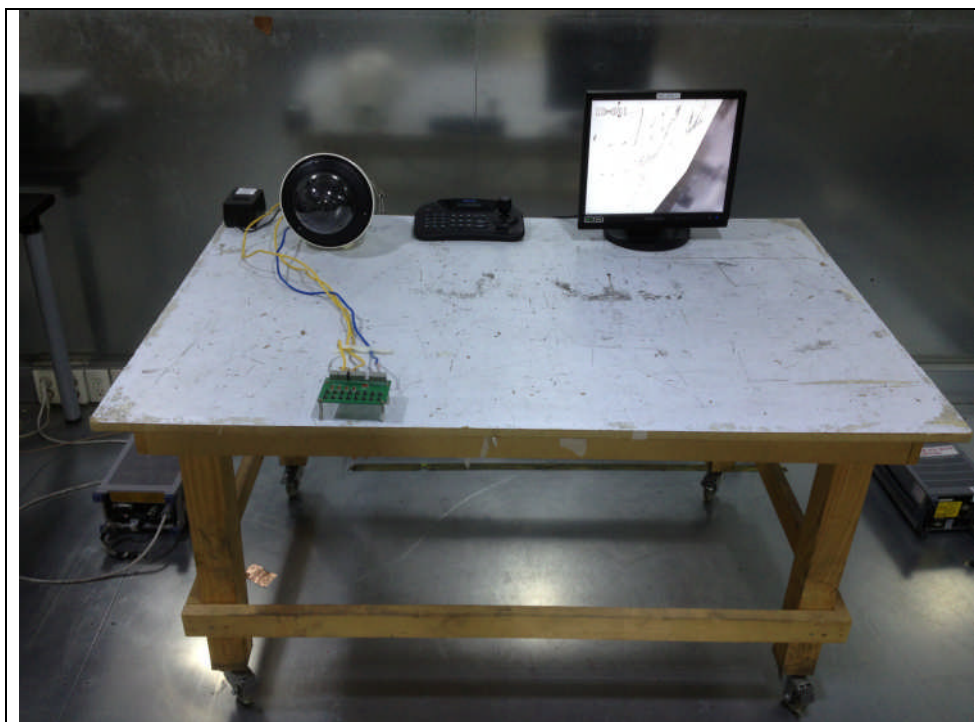
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS30	828765/009	R&S	2013.10.22	☐
Test Receiver	ESCI7	100732	R&S	2014.02.18	☐
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2013.11.06	☒
LISN	ENV216	101358	R&S	2013.10.22	☒
LISN	ESH3-Z5	100267	R&S	2014.07.08	☒
8-WIRE ISN	NTFM 8158 CAT5	CAT5-8158-0028	SCHWARZBECK	2014.04.13	☐
8-WIRE ISN	NTFM 8158 CAT3	CAT3-8158-0020	SCHWARZBECK	2014.04.13	☐
ISN	ST08	24342	TESEQ	2014.06.21	☐
ISN	ENY81	101545	R&S	2013.08.29	☐

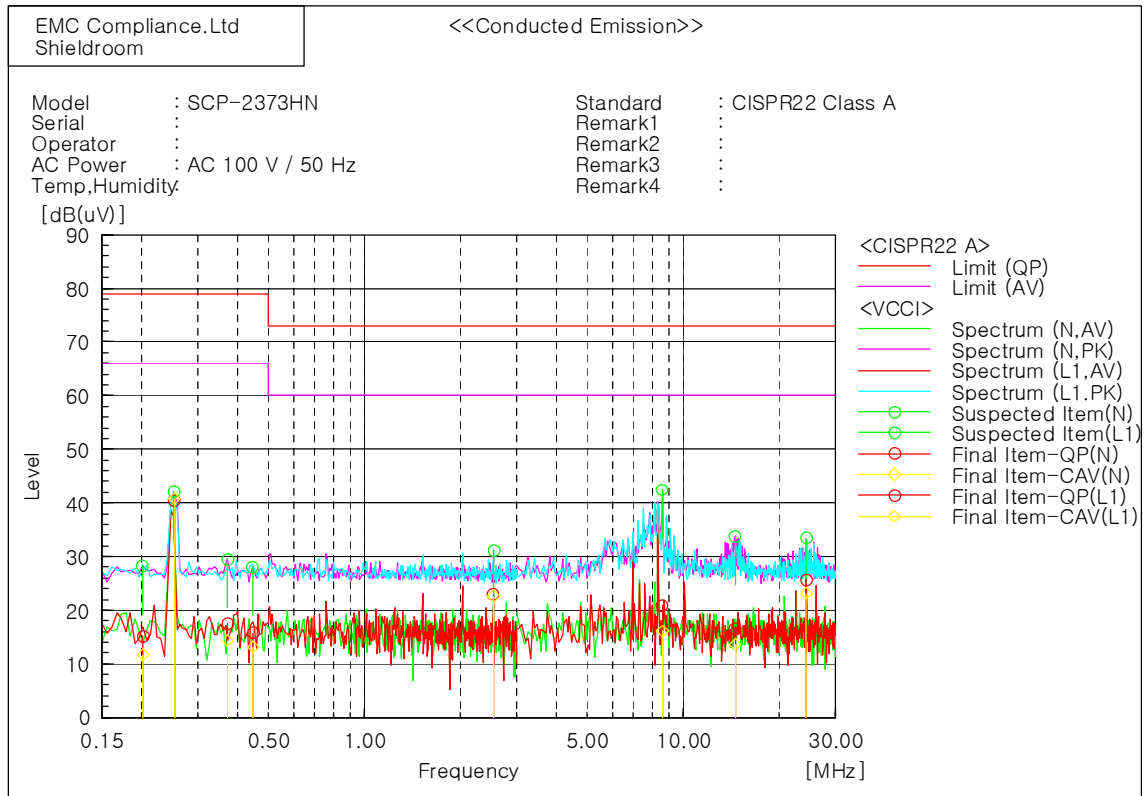
6.1.4 Photographs of test setup

* AC Main



6.1.5 Conducted emission measurement result

* AC Main (SCP-2373HN)



Final Result

--- N Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.20208	5.3	1.8	9.9	15.2	11.7	79.0	66.0	63.8	54.3
2	0.37246	7.6	4.3	10.0	17.6	14.3	79.0	66.0	61.4	51.7
3	0.44858	5.8	3.1	10.0	15.8	13.1	79.0	66.0	63.2	52.9
4	8.62012	11.2	6.4	9.7	20.9	16.1	73.0	60.0	52.1	43.9
5	14.55392	6.7	3.8	9.8	16.5	13.6	73.0	60.0	56.5	46.4
--- L1 Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.25362	30.6	31.0	9.9	40.5	40.9	79.0	66.0	38.5	25.1
2	2.5402	13.3	12.9	9.7	23.0	22.6	73.0	60.0	50.0	37.4
3	24.38866	15.9	13.3	9.8	25.7	23.1	73.0	60.0	47.3	36.9

6.2 Radiated Emission

Test specification	VCCI V-3 / 2012.04, Class A		
Testing voltage	100 V, 50 Hz		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2013. 07. 26		
Temperature (°C)	25 °C	Humidity (% R.H.)	51 % R.H.
Remarks	Complied		

6.2.1 Limits of radiated emission measurement

☒ Limits below 1 GHz

Frequency [MHz]	Class A (dB(μV/m)) @10 m	Class B (dB(μV/m)) @10 m
30 ~ 230	40	30
230 ~ 1000	47	37

☒ Limits above 1 GHz

Frequency [GHz]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB(μV/m))	Peak limit (dB(μV/m))	Average limit (dB(μV/m))	Peak limit (dB(μV/m))
1 ~ 3	56	76	50	70
3 ~ 6	60	80	54	74

Note - The lower limit applies at the transition frequency.

6.2.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. 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 to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI7	100732	R&S	2014.02.18	☒
Test Receiver	ESCI	100001	R&S	2014.07.25	☐
Test Receiver	ESCI	100710	R&S	2013.11.06	☐
Bi-Log Antenna	VULB 9168	440	SCHWARZBECK	2013.10.04	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	2013.11.06	☒
3 dB Attenuator	8491B	22981	HP	2014.03.19	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Amplifier	8449B	3008A02343	AGILENT	2013.11.06	☒
Horn ANT	3115	00086706	ETS	2013.11.21	☒
Spectrum Analyzer	FSP7	100289	R&S	2013.12.14	☐

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 3 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

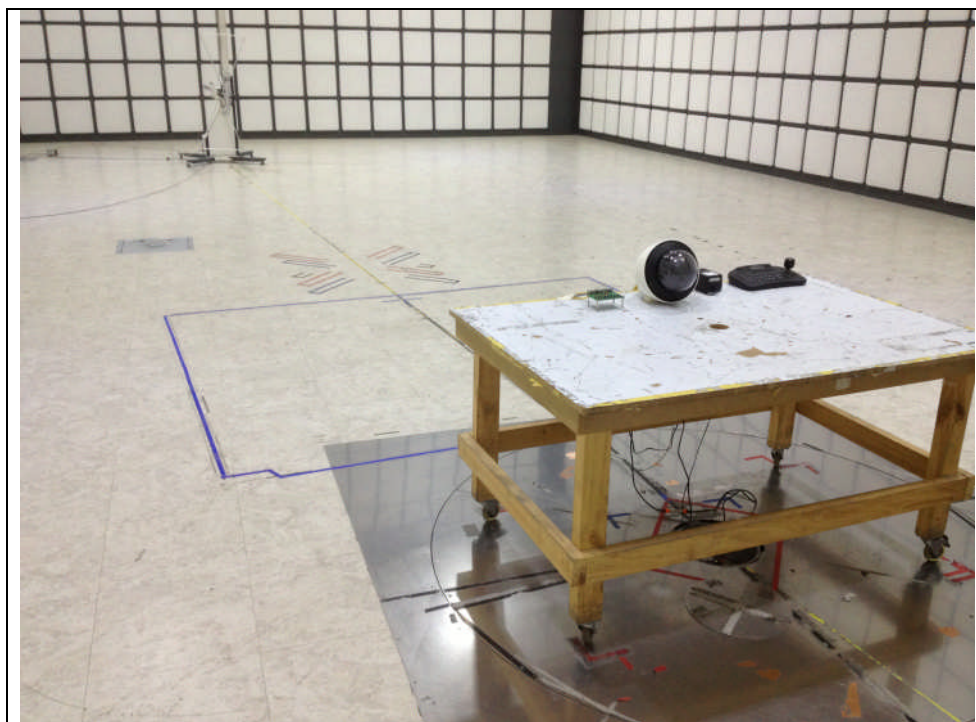
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is

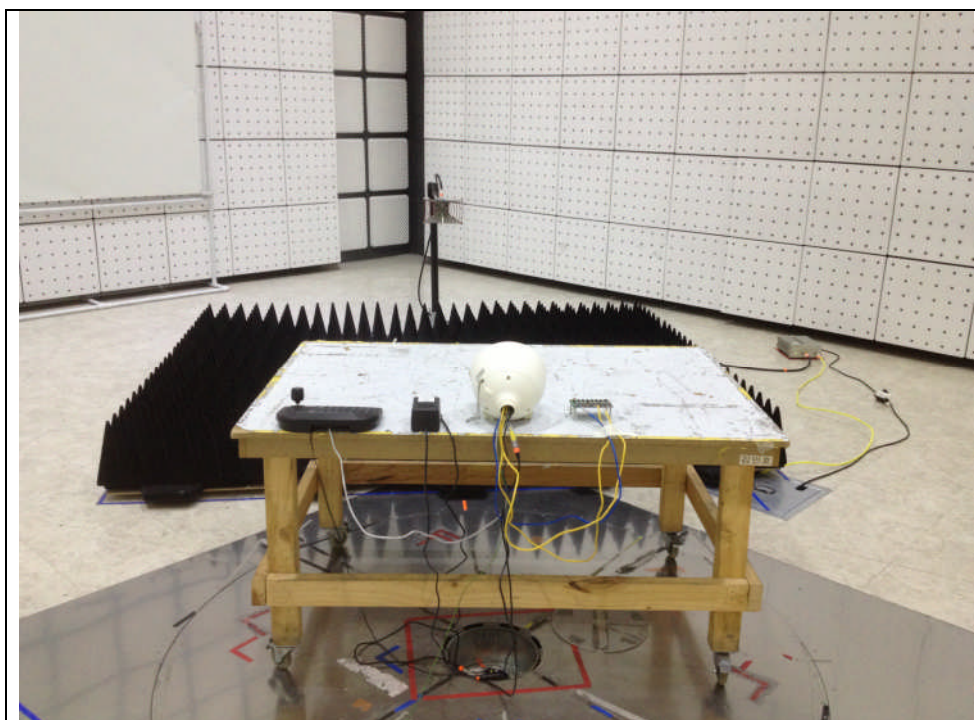
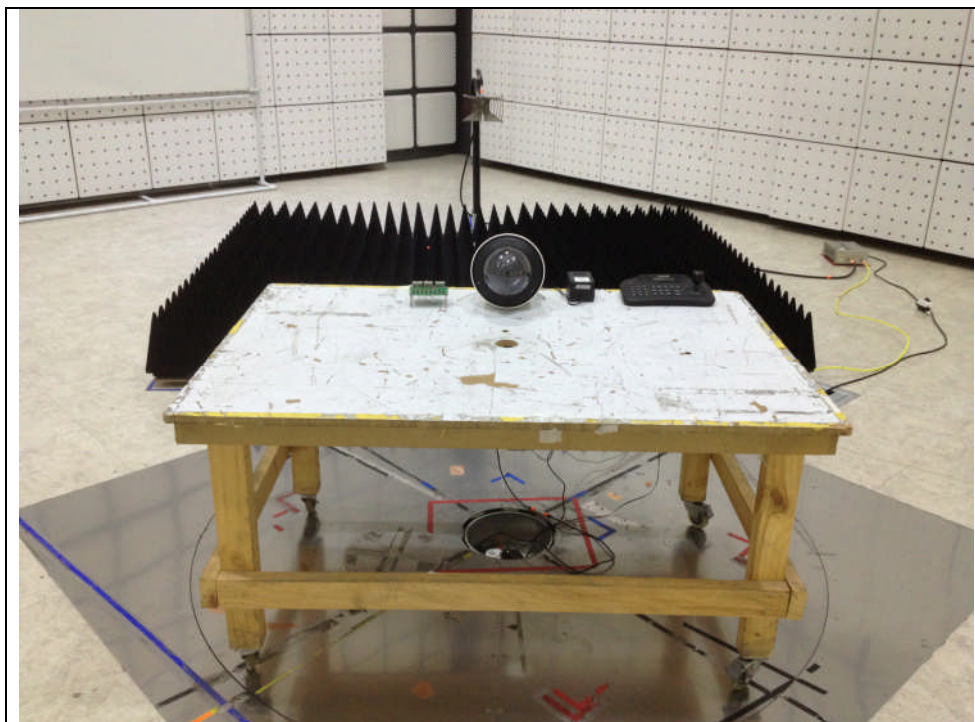
$$30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$$

6.2.5 Photographs of test setup

* 30 MHz ~ 1 GHz



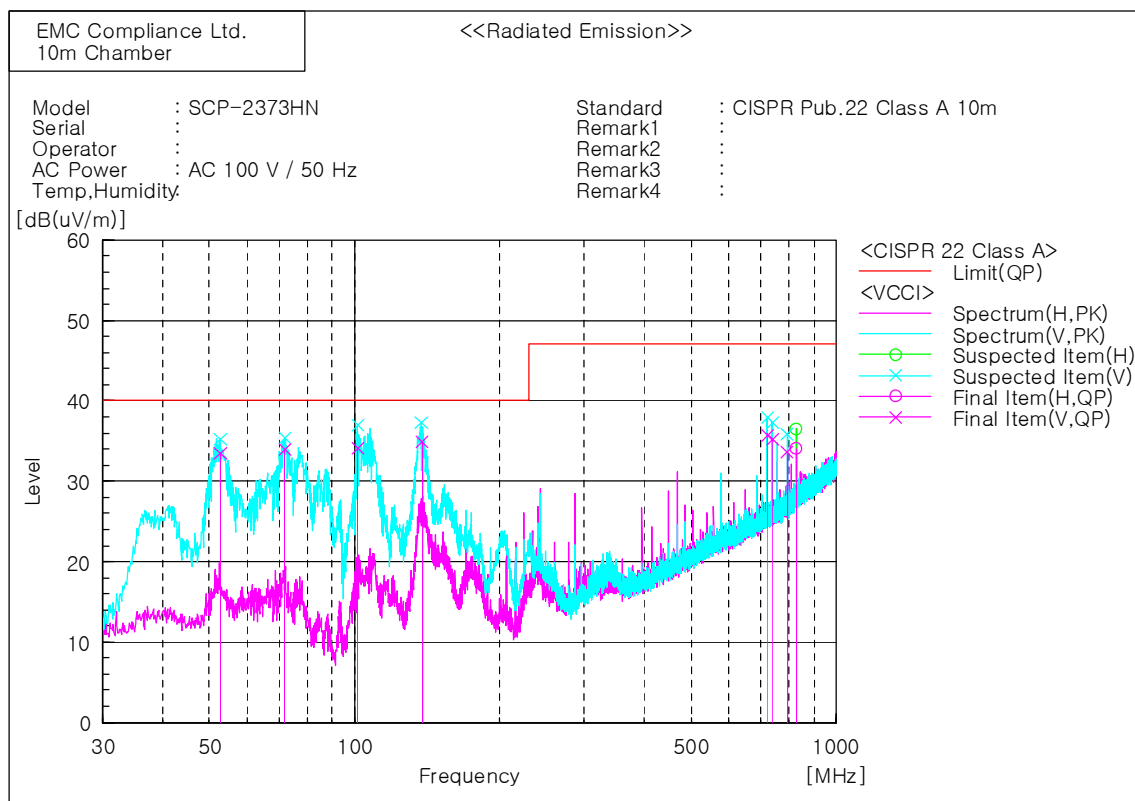
* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

* Graph and Data

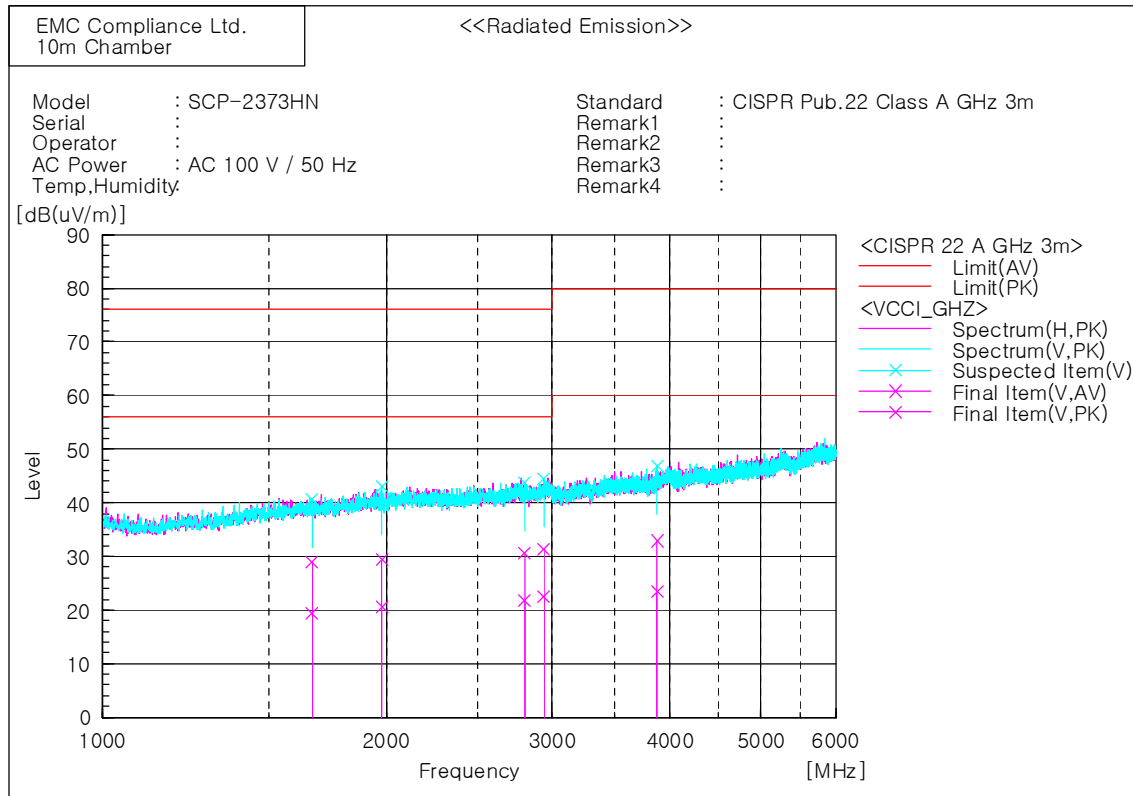
* 30 MHz ~ 1 GHz (SCP-2373HN)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c. f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	52.674	V	46.7	-13.2	33.5	40.0	6.5	100.0	96.5	
2	71.710	V	49.0	-15.1	33.9	40.0	6.1	200.0	247.1	
3	101.780	V	51.3	-17.2	34.1	40.0	5.9	200.0	221.5	
4	138.411	V	48.0	-13.1	34.9	40.0	5.1	100.0	276.7	
5	720.034	V	35.4	0.3	35.7	47.0	11.3	200.0	359.3	
6	738.100	V	34.6	0.7	35.3	47.0	11.7	200.0	352.2	
7	792.056	V	31.8	1.9	33.7	47.0	13.3	200.0	340.2	
8	828.068	H	31.3	2.8	34.1	47.0	12.9	100.0	324.0	

* 1 GHz ~ 6 GHz (SCP-2373HN)



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]	Remark
1	1668.125	V	22.8	32.3	-3.4	19.4	28.9	56.0	76.0	36.6	47.1	100.0	263.2	
2	1978.125	V	22.0	30.9	-1.5	20.5	29.4	56.0	76.0	35.5	46.6	100.0	284.2	
3	2803.750	V	21.6	30.5	0.1	21.7	30.6	56.0	76.0	34.3	45.4	100.0	329.3	
4	2940.625	V	22.6	31.4	0.0	22.6	31.4	56.0	76.0	33.4	44.6	100.0	184.9	
5	3878.750	V	19.6	29.1	3.8	23.4	32.9	60.0	80.0	36.6	47.1	100.0	329.3	

7. E.U.T. photographs

Front View



Rear View



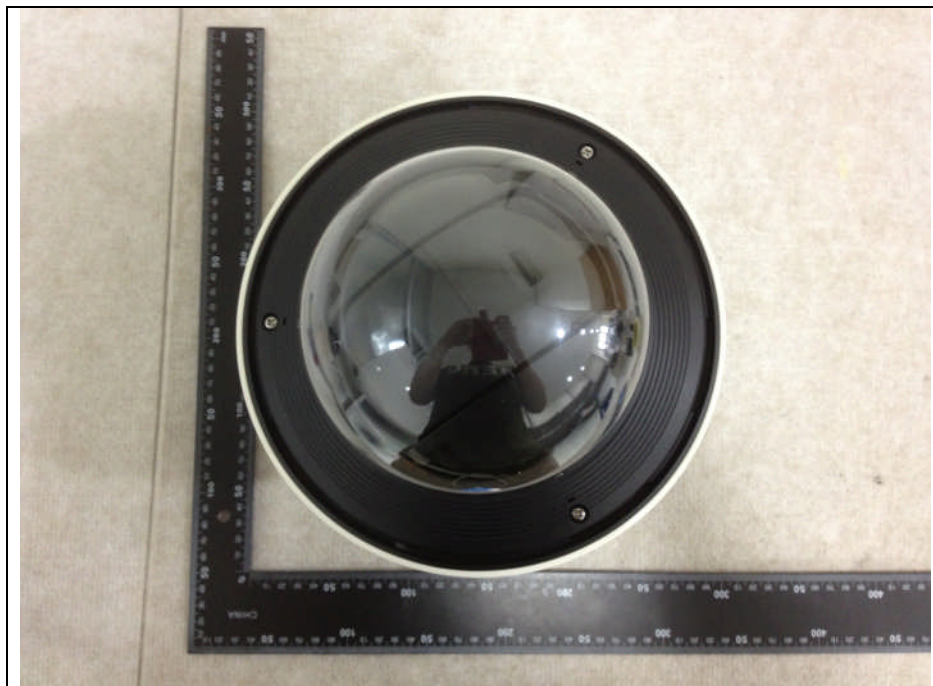
Left View



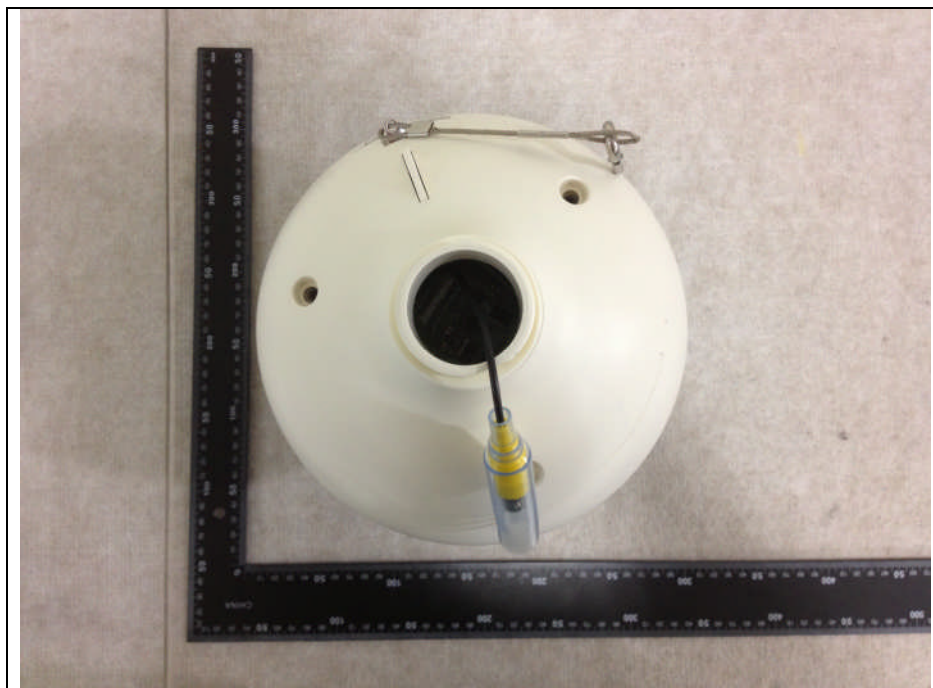
Right View



Top View



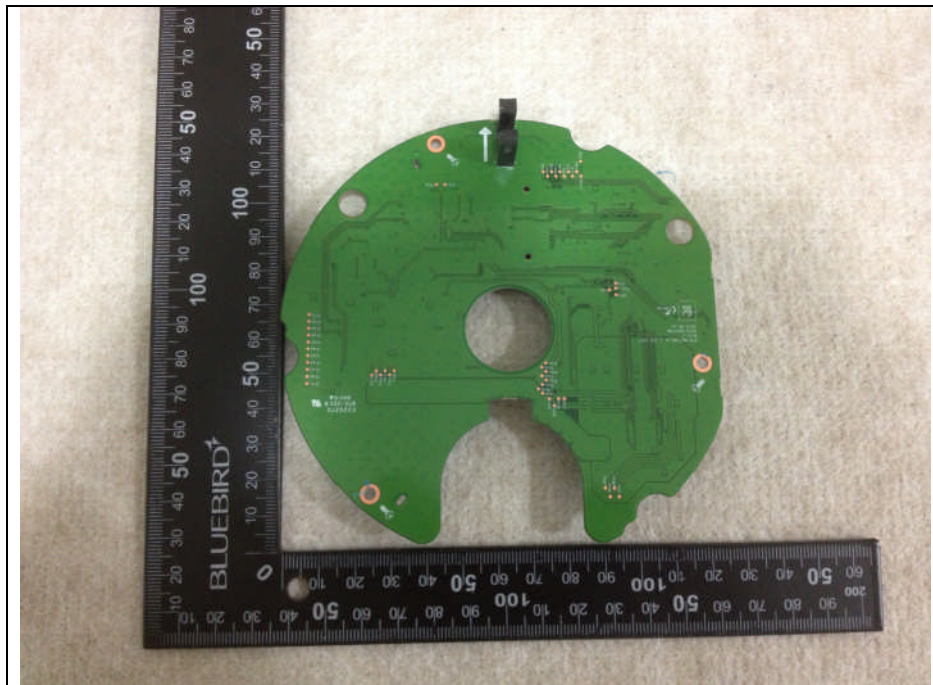
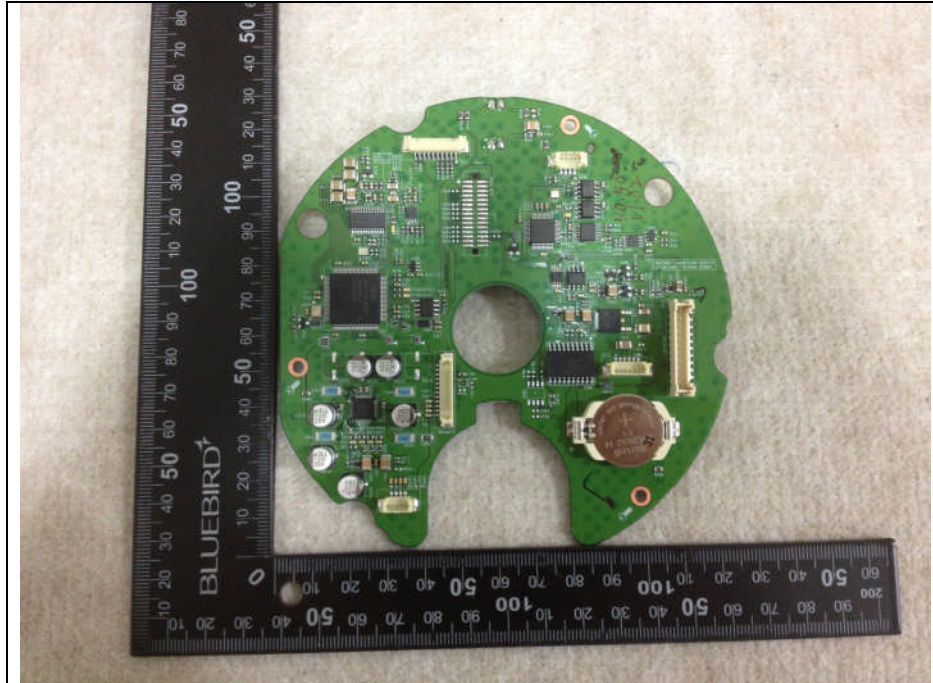
Bottom View



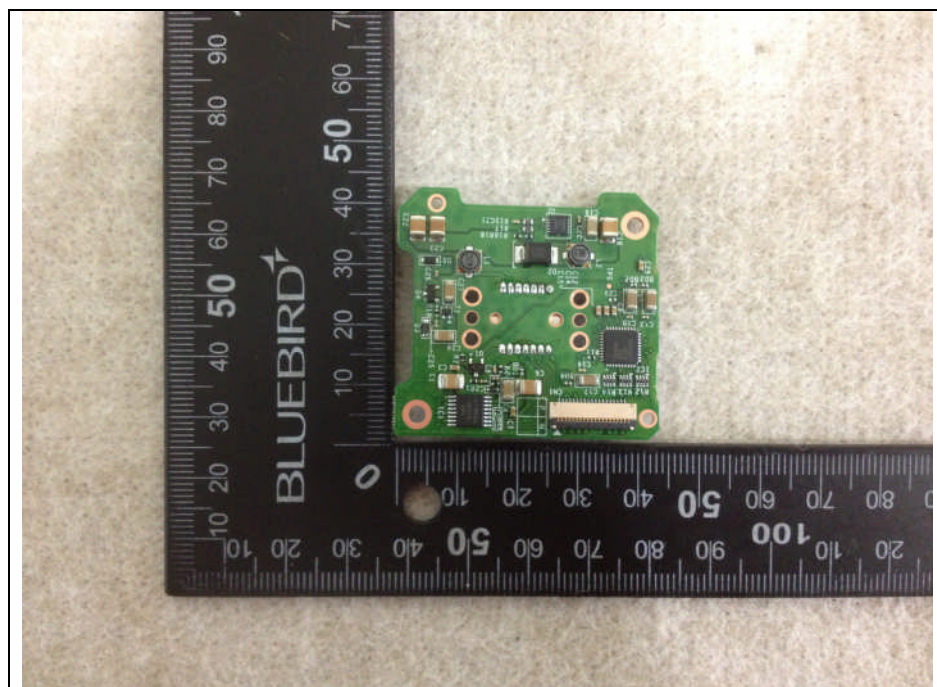
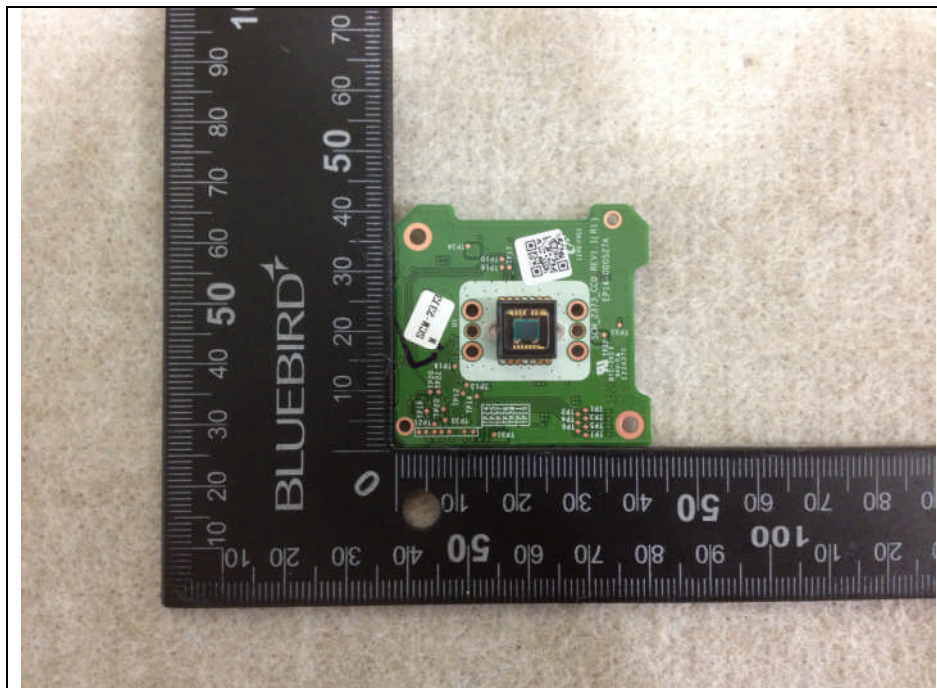
Inside



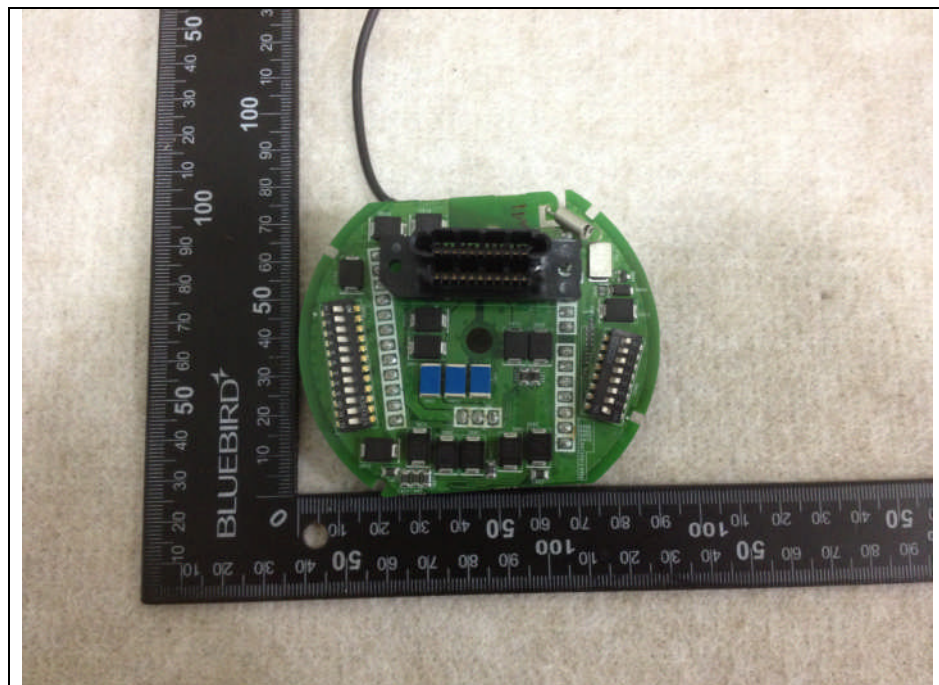
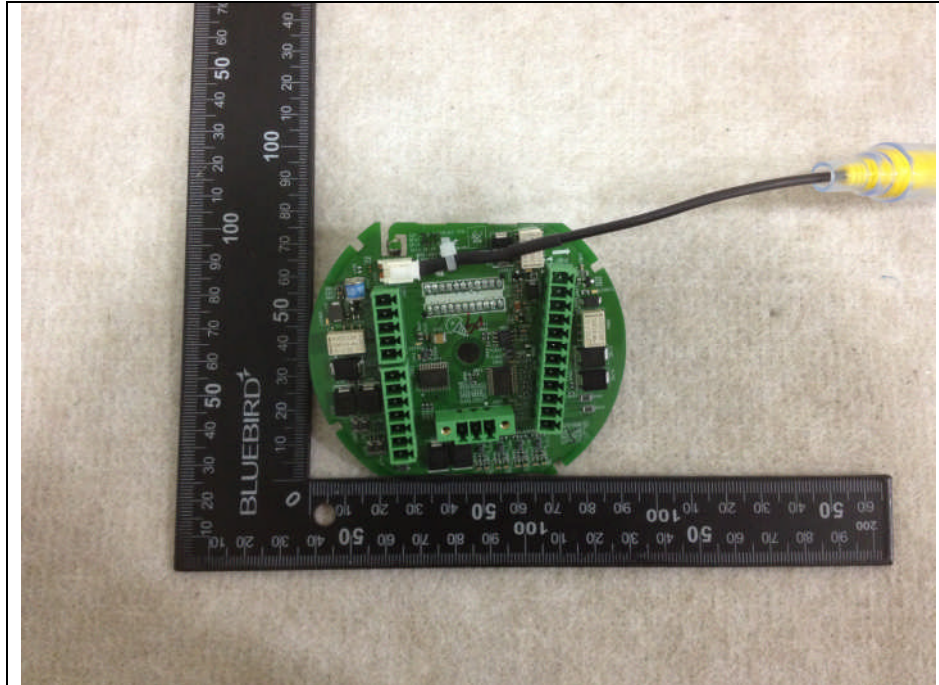
Main Board



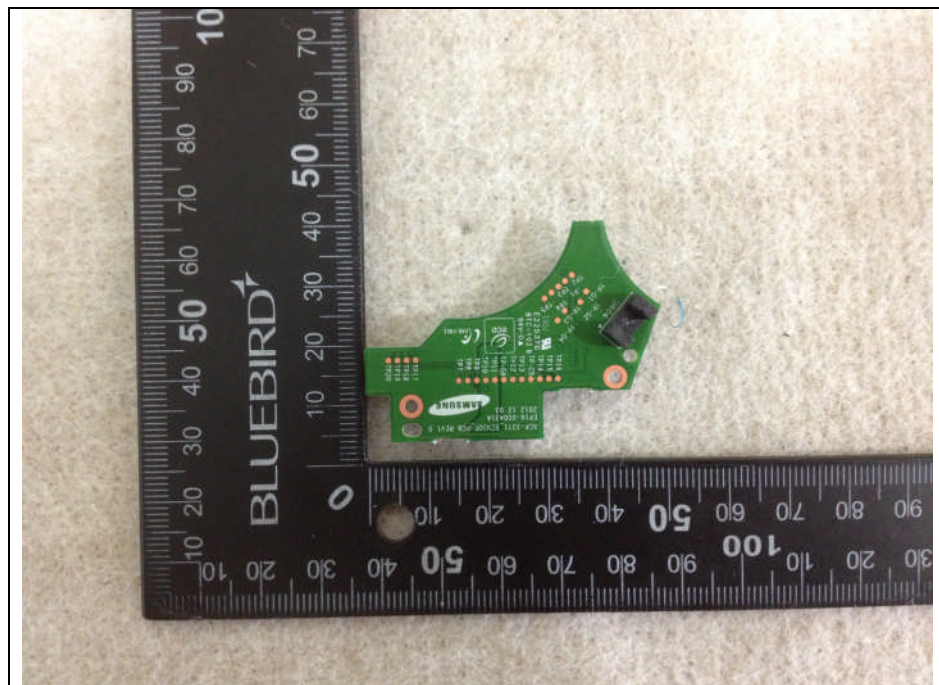
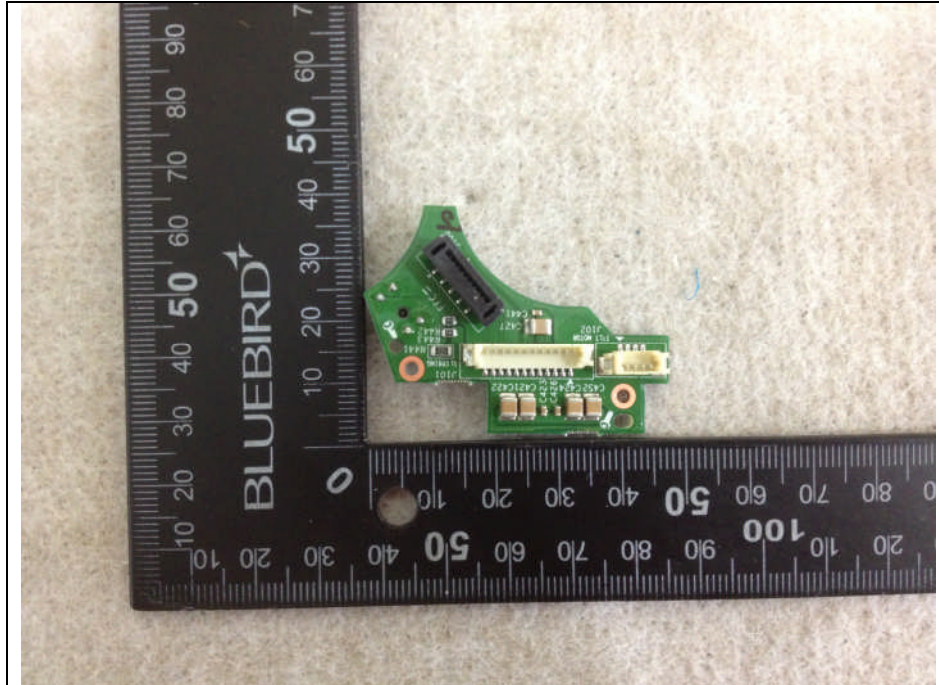
CCD Board



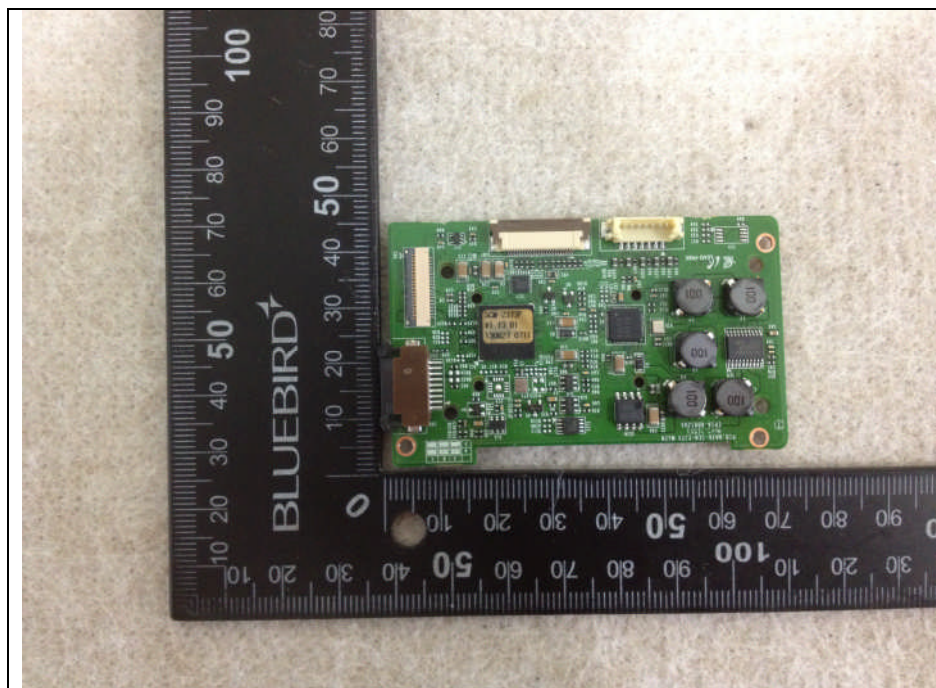
Connect Board



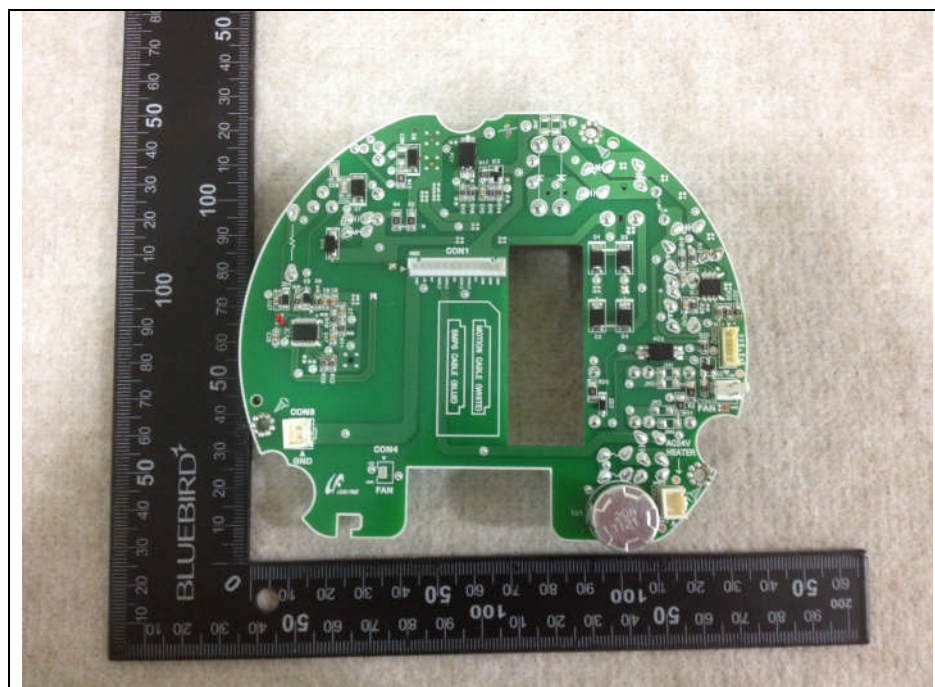
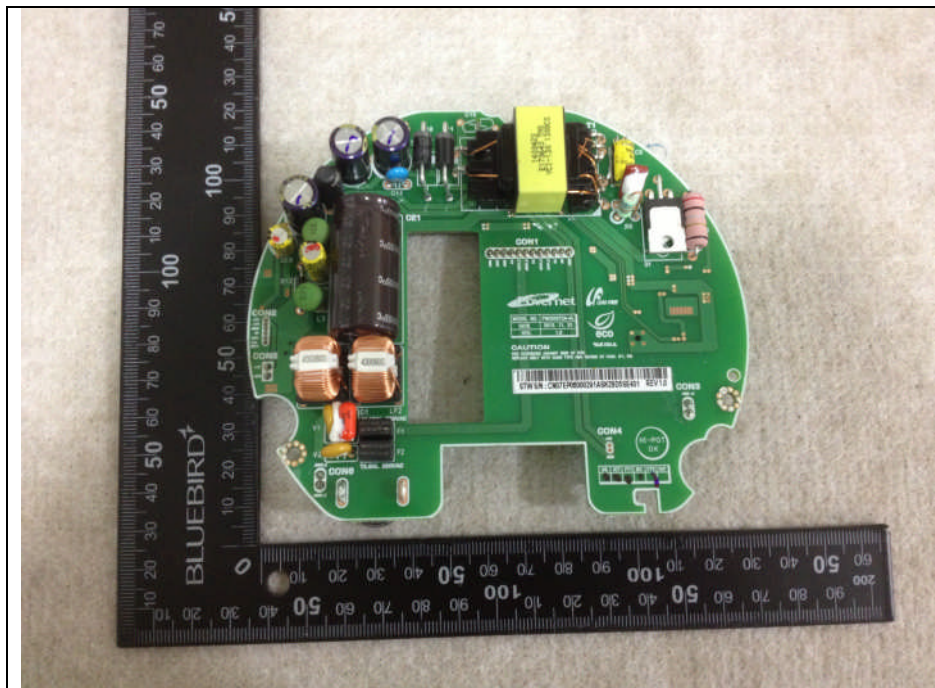
SUB Board#1



SUB Board#2



Power Board



AC/AC Adaptor

