

## FCC COMPLIANCE REPORT

**Test report No** : EMC-2012/057  
**Type of Equipment** : Uni-Pay  
**Model Name** : SAM-CRM-12  
**Applicant** : SAMSUNG SDS Co.,Ltd.  
707-19, Youksam 2-dong,  
Kangnam-gu, Seoul, Korea  
**Manufacturer** : SAMSUNG SDS Co.,Ltd.  
707-19, Youksam 2-dong,  
Kangnam-gu, Seoul, Korea  
**Test standards** : FCC part 15 subpart B, Class B  
**FCC ID** : P4YSAM-CRM-12  
**Test Procedure and Items**  
-AC Power Line Conducted Emissions Measurement: ANSI C63.4-2009  
-Radiated Emissions Measurement : ANSI C63.4-2009  
**Testing Laboratory** : EMC Compliance Ltd.  
**Test result** : Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC 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.

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Date of receipt: 2012. 11. 05

Date of testing: 2012. 11. 19 ~ 12. 18

Issued date: 2012. 12. 18

Tested by:

  
PARK, GUN-SU

Approved by:

  
YEOM, HAN-SEOK

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## Contents

<b>1. Applicant information .....</b>	<b>3</b>
<b>2. Laboratory information .....</b>	<b>4</b>
<b>3. Test system configuration.....</b>	<b>5</b>
3.1 Operation environment .....	5
3.2 Measurement Uncertainty .....	6
<b>4. Description of E.U.T. ....</b>	<b>7</b>
4.1 General information .....	7
4.2 Product description .....	8
4.3 Auxiliary equipments .....	8
4.4 Test configuration .....	9
4.5 Operating conditions .....	9
<b>5. Summary of test results .....</b>	<b>10</b>
5.1 Summary of EMI emission test results .....	10
<b>6. Test results .....</b>	<b>11</b>
6.1 Conducted Emission .....	11
6.2 Radiated Emission .....	16
<b>7. E.U.T. photographs .....</b>	<b>22</b>

## 1. Applicant information

**Applicant:** SAMSUNG SDS Co.,Ltd.  
**Address:** 707-19, Youksam 2-dong, Kangnam-gu, Seoul, Korea  
**Contact name:** Lee Myoung Kue

**Manufacturer:** SAMSUNG SDS Co.,Ltd.  
**Address:** 707-19, Youksam 2-dong, Kangnam-gu, Seoul, Korea  
**Contact name:** Lee Myoung Kue

## 2. Laboratory information

### Address

#### **EMC compliance Ltd.**

480-5 Sin-dong, Yeongtong-gu, Suwon-city, Gyeonggi-do, 443-390, Korea

Telephone Number: 82 31 336 9919

Facsimile Number: 82 505 299 8311

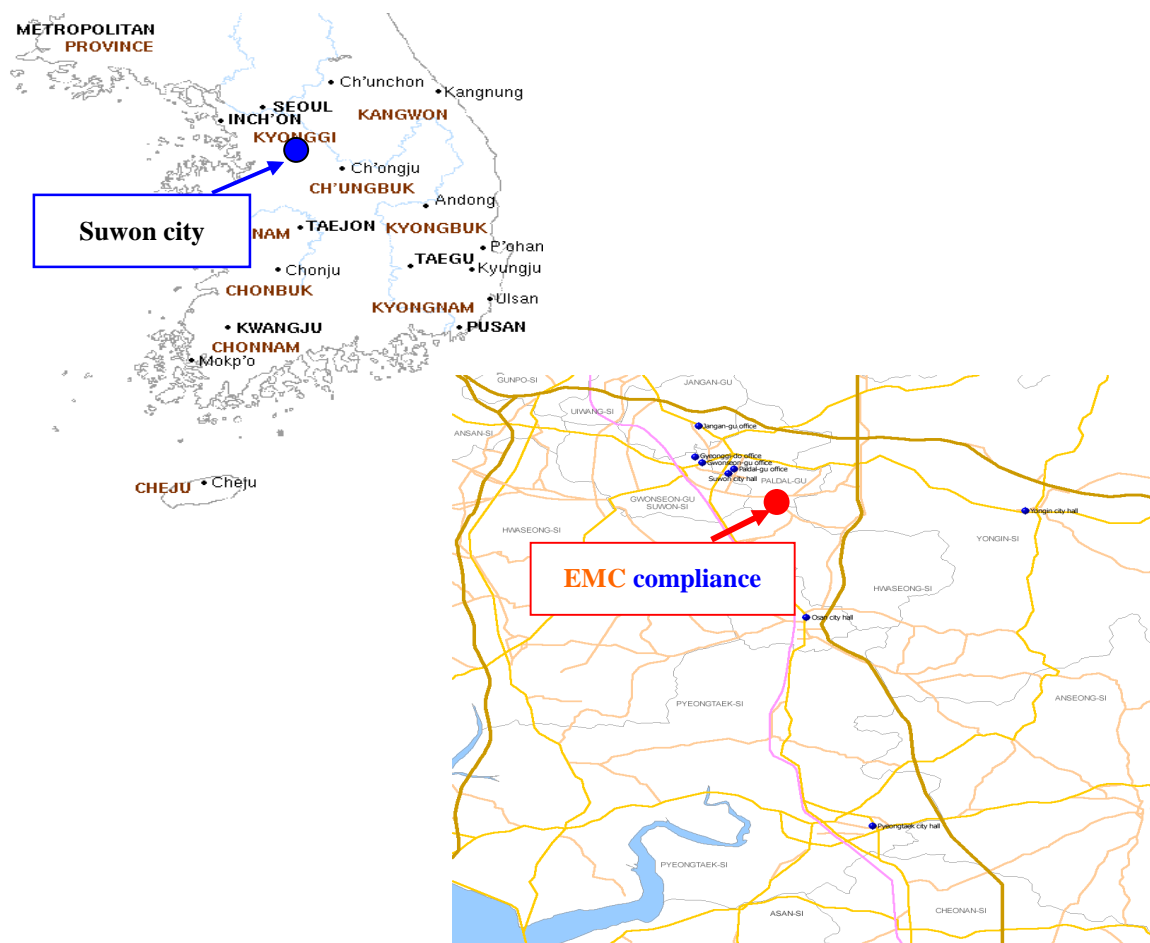
FCC CAB.: KR0040

VCCI Registration No.: R-3327, G-198, C-3706, T-1849

Industry Canada Registration No.: 8035A

KOLAS NO.: 231

### **SITE MAP**



### 3. Test system configuration

#### 3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 22 °C	31 % R.H.	-
Shielded room(CE)	: 23 °C	31 % 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

#### User Interface(LCD)

ITEM	Specification	Description
Processor	32Bits Microcontroller, ARM Cortex A8, 633MHz	Model No. : S5PC100
OS	Android 2.1	Linux 2.6.2.9 kernel
Memory	SDRAM 256MByte, NAND Flash 512Mbyte (Bios Area + Application Area)	
LCD	4.3 TFT Color LCD, 480*272 pixels	
IN/OUT Interface	RS232 1ch(internal Debug), RS232 1ch(RF Device) or RS485 1ch(External Device) USB2.0 1ch(Debug) I/O Ports for USIP communication	
Others	Audio Speaker, SD Card Slot	

#### PIN Input & Communication security (Touch sensor & Smart Card Control)

ITEM	Specification	Description
Processor	32Bits Secure Microcontroller, 96MHz	
OS	Linux	
Memory	SRAM 128KByte, Flash 256KByte, OTP 256Byte, ROM 128KByte external Flash 16Mbyte, external SDRAM 32Mbyte external SRAM 16Mbyte	
Touch	Touch Panel(SPI)	
Smart Card	Contact 1 Slot (UART)	
IN/OUT Interface	RS232 2ch(External Device) Ethernet SPI for TOUCH I/F	
MSR	Mag-Stripe Reader (UART)	
Battery	Lithium Manganese Dioxide Battery	For RTC and External Sensors
Others	Buzzer	

## 4.2 Product description

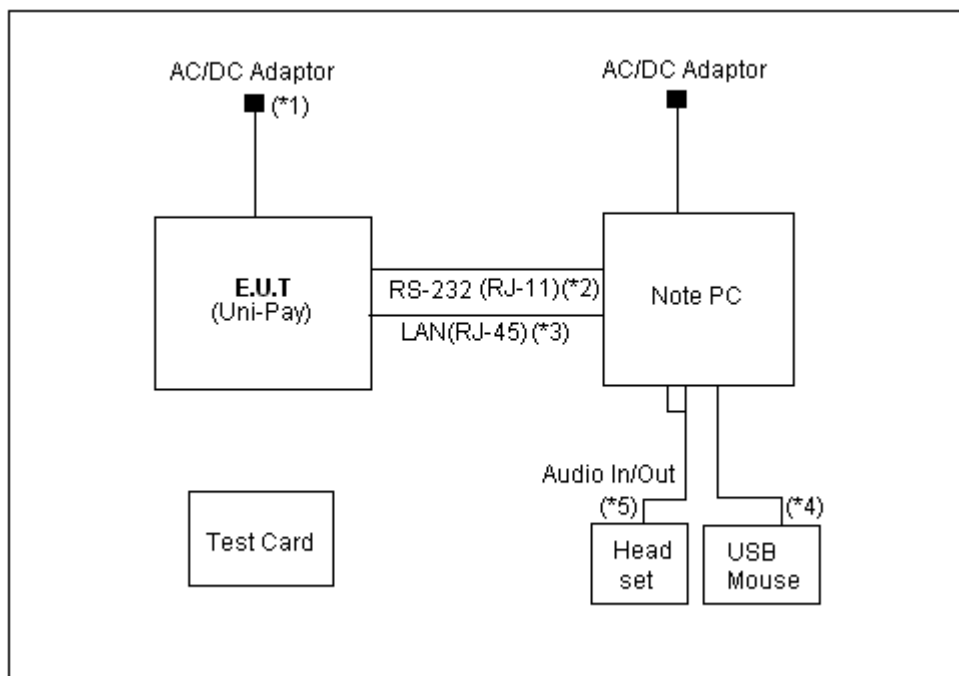
Type of product	Uni-Pay
Model name (Basic)	SAM-CRM-12
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	DC 12 V
Product rating	DC 12 V , 0.45 A
Internal clock frequency	200 MHz
Note	*AC/DC adaptor was not provided by the manufacturer.

## 4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer
Note PC	PSLQ0K-02N005	2A078516Q	TOSHIBA
Test Card	-	-	-
Headset	ES-303	-	Inkel
USB Mouse	1088	8165900106545	Microsoft
AC/DC Adaptor	PAA060F	10802002223	CWT



#### 4.4 Test configuration



Note	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Uni-Pay)	Power	AC/DC Adaptor	Power	1.7	Non-Shield
2		RS-232 (RJ-11)	Note PC	USB	2.0	Non-Shield
3		LAN(RJ-45)	Note PC	LAN(RJ-45)	3.0	Non-Shield
4	Note PC	USB	USB Mouse	USB	1.5	Shield
5		Audio In/Out	Headset	Audio In/Out	1.8	Non-Shield

#### 4.5 Operating conditions

The EUT was configured as normal intended use.

This test was done at worst case.

Test mode	Normal operating
1	RS-232 Port operating test.(Using the Hyper telecommunication)
	EUT operating test.(Using the Test Card)
	Ping test.

## 5. Summary of test results

**In the above configuration tested, The EUT complied with the requirement of the specification**

### 5.1 Summary of EMI emission test results

FCC Part 15 Subpart B (Class B)

ANSI C63.4 – 2009

Applied	Test items	Test method	Result
<input checked="" type="checkbox"/>	Conducted Emission	ANSI C63.4 – 2009	Complied
<input checked="" type="checkbox"/>	Radiated Emission	ANSI C63.4 – 2009	Complied

## 6. Test results

### 6.1 Conducted Emission

Test specification	FCC Part 15, Section 15.107(a), Class B		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#3)		
Date	2012. 12. 18		
Temperature (°C)	23 °C	Humidity (% R.H.)	31 % R.H.
Remarks	Complied		

#### 6.1.1 Limits of conducted emission measurement

Frequency [MHz]	Class A (dB( $\mu$ V))		Class B (dB( $\mu$ 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.

### 6.1.2 Measurement procedure

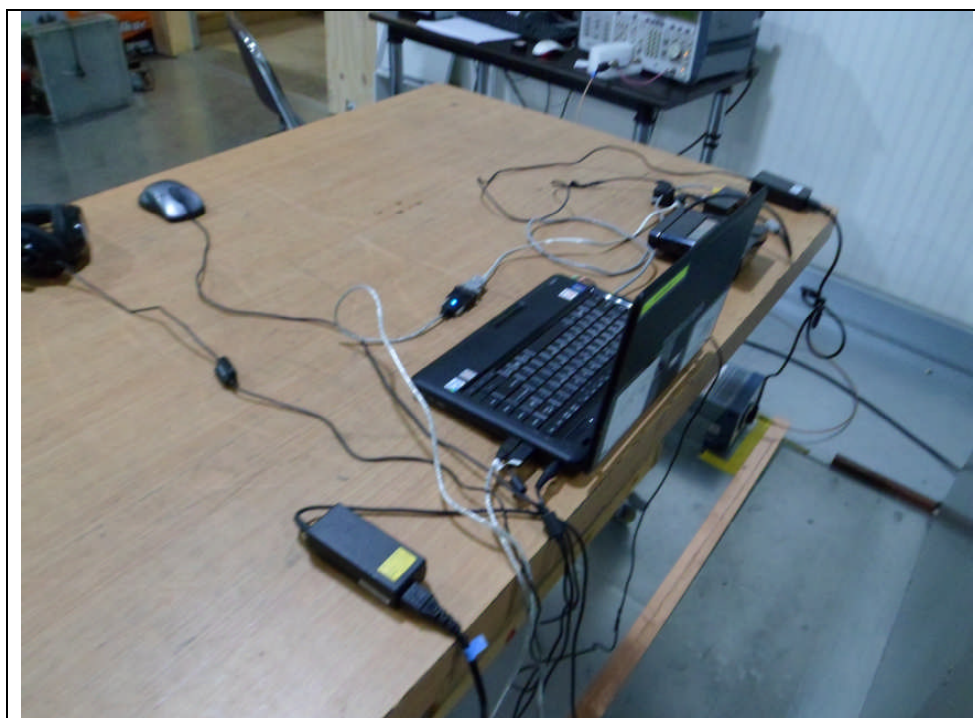
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground 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.

### 6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS10	843276/003	R&S	2013.06.15	<input checked="" type="checkbox"/>
LISN	ESH3-Z5	100267	R&S	2013.07.05	<input checked="" type="checkbox"/>
LISN	NNLK8121	8121-472	SCHWARZBECK	2013.07.13	<input checked="" type="checkbox"/>
PULSE LIMITER	ESH3-Z2	357881052	R&S	2013.07.03	<input checked="" type="checkbox"/>

#### 6.1.4 Photographs of test setup

\* AC Main

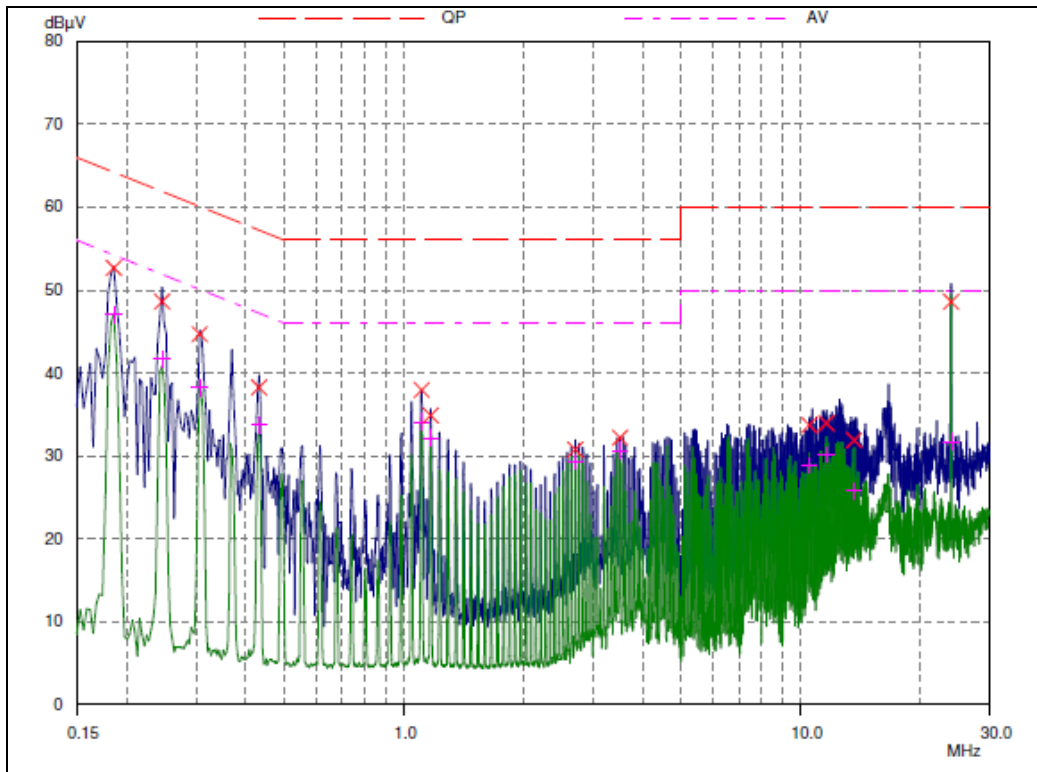


### 6.1.5 Conducted emission measurement result

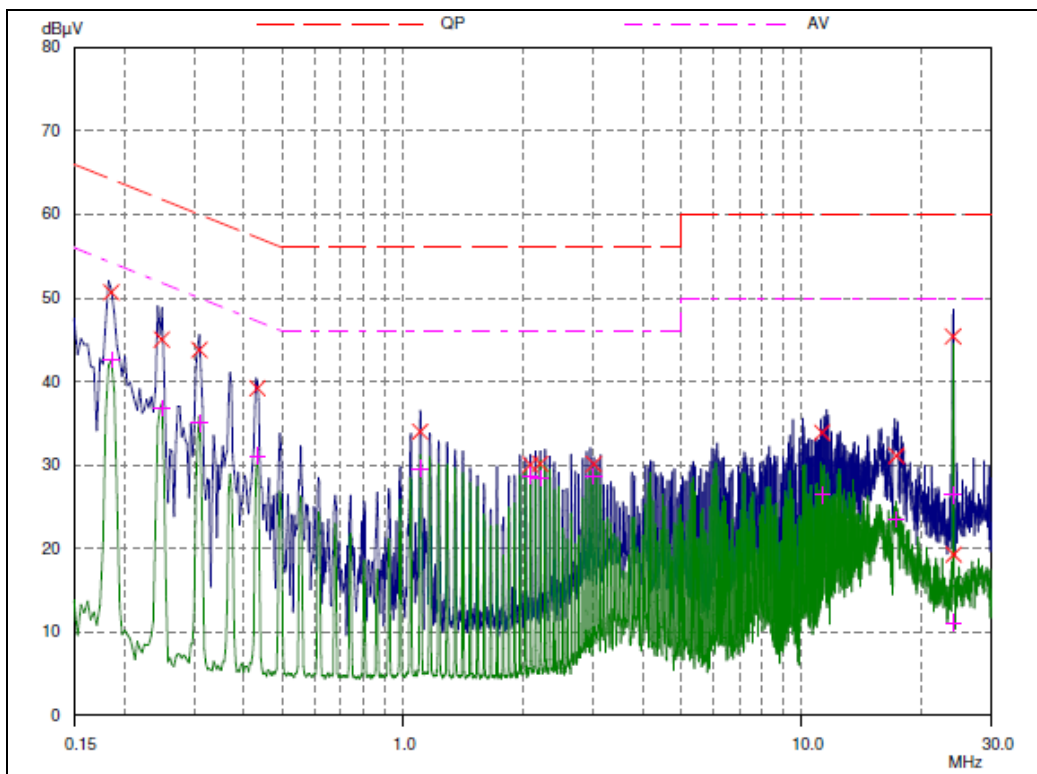
\* AC Main

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
	LISN	Cable		Limit [dB(μV)]	Reading [dB(μV)]	Result [dB(μV)]	Margin [dB]	Limit [dB(μV)]	Reading [dB(μV)]	Result [dB(μV)]	Margin [dB]
0.186	9.91	0.07	H	64.21	42.76	52.74	11.47	54.21	37.08	47.06	7.15
0.246	9.91	0.07	H	61.89	38.71	48.69	13.20	51.89	31.72	41.70	10.19
0.249	9.90	0.07	N	61.79	35.11	45.08	16.71	51.79	26.89	36.86	14.93
0.306	9.93	0.07	H	60.08	34.75	44.75	15.33	50.08	28.34	38.34	11.74
0.309	9.92	0.07	N	60.00	33.85	43.84	16.16	50.00	25.08	35.07	14.93
0.432	10.02	0.07	N	57.21	29.17	39.26	17.95	47.21	21.06	31.15	16.06
1.107	9.95	0.07	N	56.00	24.05	34.07	21.93	46.00	19.61	29.63	16.37
1.110	9.96	0.07	H		27.99	38.02	17.98		24.12	34.15	11.85
1.170	9.96	0.07	H		24.94	34.97	21.03		22.21	32.24	13.76
2.217	9.95	0.09	N		20.17	30.21	25.79		18.50	28.54	17.46
2.709	9.96	0.10	H		20.80	30.86	25.14		19.36	29.42	16.58
3.510	9.98	0.10	H		22.21	32.29	23.71		20.66	30.74	15.26
10.530	10.33	0.16	H	60.00	23.39	33.88	26.12	50.00	18.56	29.05	20.95
11.290	10.27	0.16	N		23.60	34.03	25.97		16.18	26.61	23.39
11.640	10.39	0.17	H		23.56	34.12	25.88		19.79	30.35	19.65
17.340	10.51	0.19	N		20.59	31.29	28.71		12.96	23.66	26.34
24.020	10.88	0.21	H		37.71	48.80	11.20		20.87	31.96	18.04
24.050	10.66	0.21	N		34.73	45.60	14.40		15.77	26.64	23.36

[Hot-Line]



[Neutral-Line]



## 6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109(g), Class B		
Testing voltage	DC 12 V		
Test facility	10 m Chamber (#F2)		
Test distance	10 m, 3 m		
Date	2012. 11. 19		
Temperature (°C)	22 °C	Humidity (% R.H.)	31 % R.H.
Remarks	Complied		

### 6.2.1 Limits of radiated emission measurement

Frequency [MHz]	Class A (dB( $\mu$ V/m)) @ 10 m	Class B (dB( $\mu$ V/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

\* Note- Alternative standard: CISPR, Pub. 22 \*

### 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	ESCI	100710	R&S	2013.11.06	<input checked="" type="checkbox"/>
Bi-Log Antenna	VULB 9168	9168-440	SCHWARZBECK	2013.10.04	<input checked="" type="checkbox"/>
Amplifier	310N	293004	SONOMA INSTRUMENT	2013.11.06	<input checked="" type="checkbox"/>
3 dB Attenuator	8491A	27444	HP	2013.11.06	<input checked="" type="checkbox"/>
Antenna Mast	MA4000-EP	303	Innco Systems	-	<input checked="" type="checkbox"/>
Turn Table	DT2000S-1t	079	Innco Systems	-	<input checked="" type="checkbox"/>
Horn ANT	3115	00086706	ETS	2013.11.21	<input checked="" type="checkbox"/>
Amplifier	8449B	3008A02343	AGILENT	2013.11.06	<input checked="" type="checkbox"/>
Spectrum Analyzer	FSP7	100289	R&S	2012.12.19	<input checked="" type="checkbox"/>

### 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

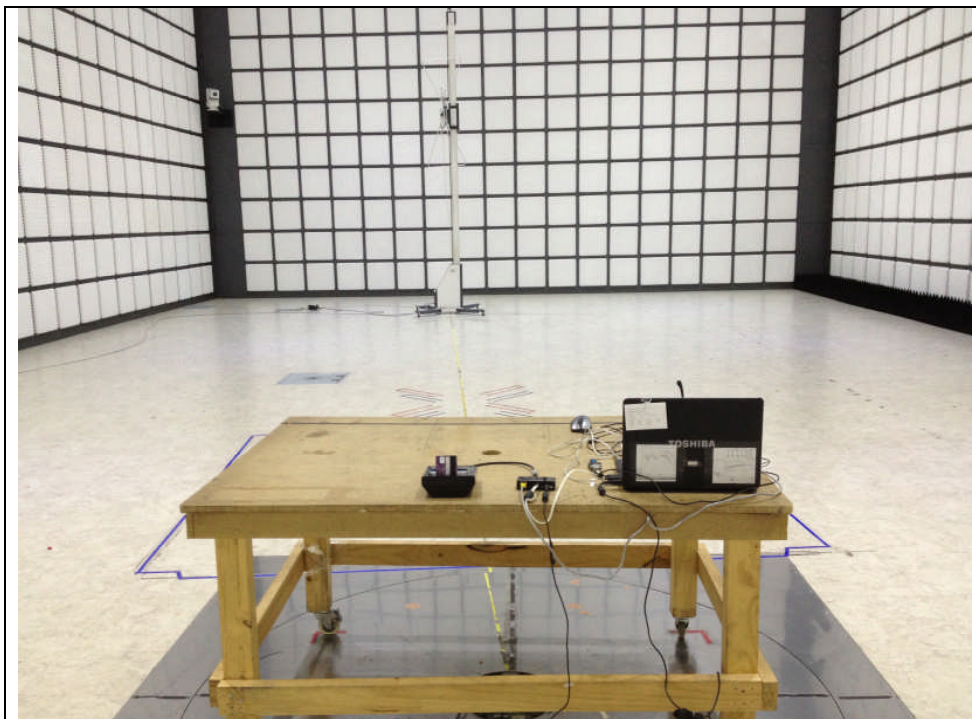
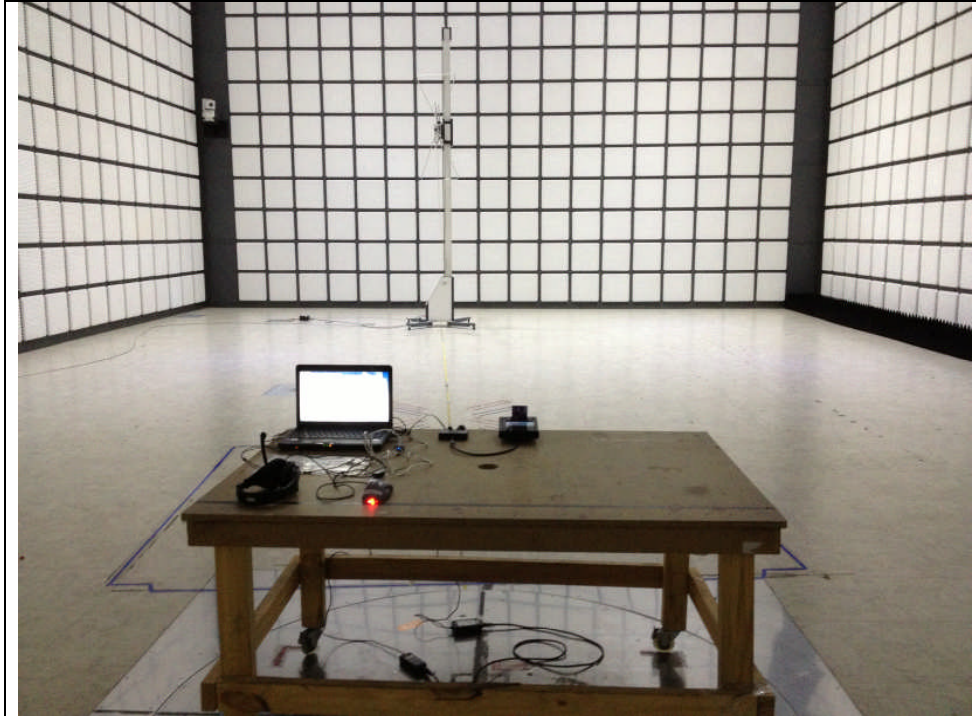
3 dB Att = 3 dB Attenuator

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

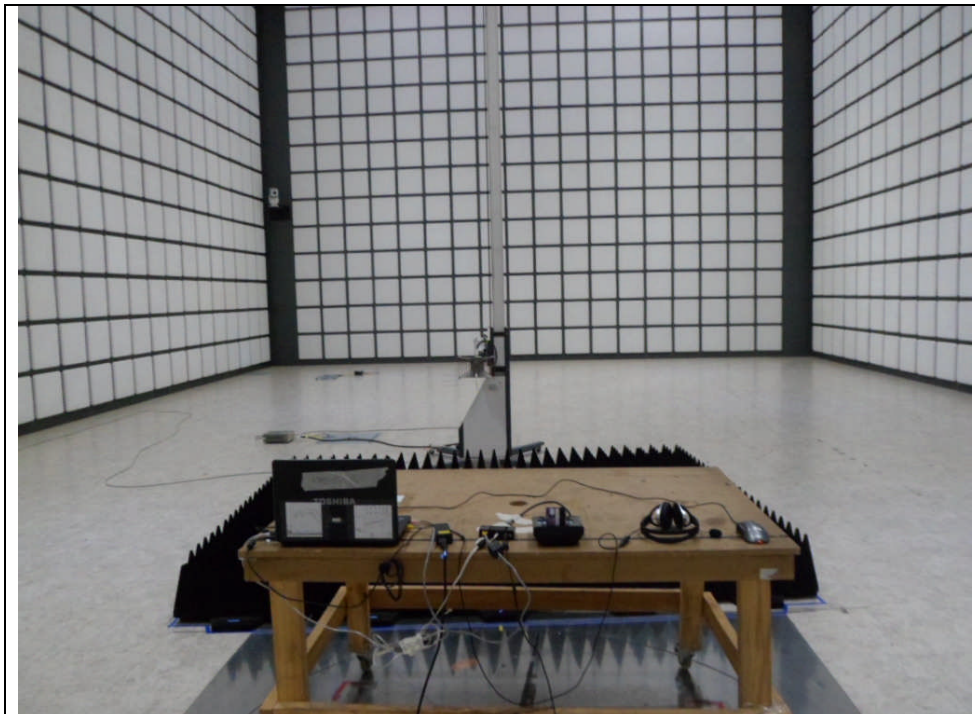
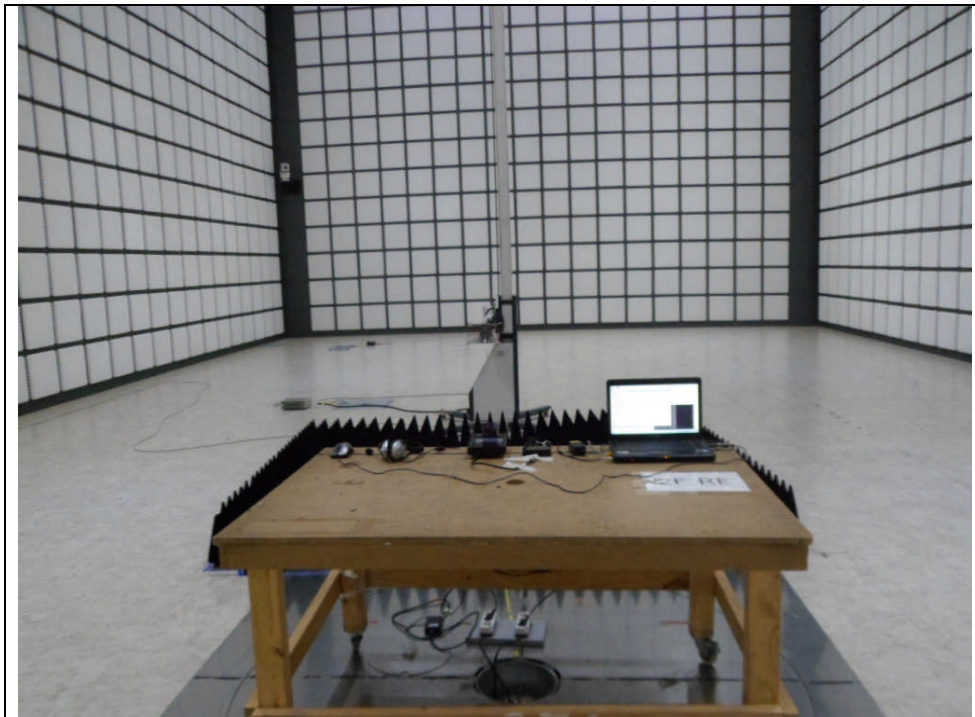
The result is  $30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$

### 6.2.5 Photographs of test setup

\* 30 MHz ~ 1 GHz



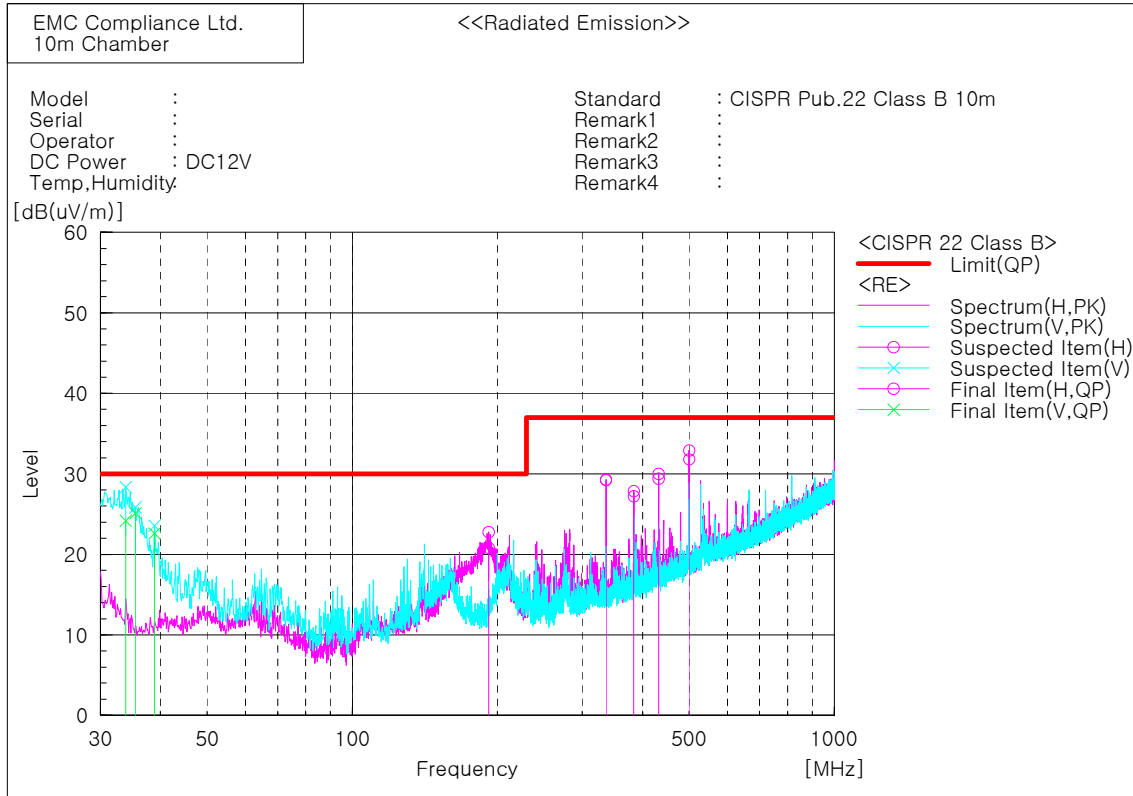
\* 1 GHz ~ 6 GHz



6.2.6 Radiated emission measurement result

\* Graph and Data

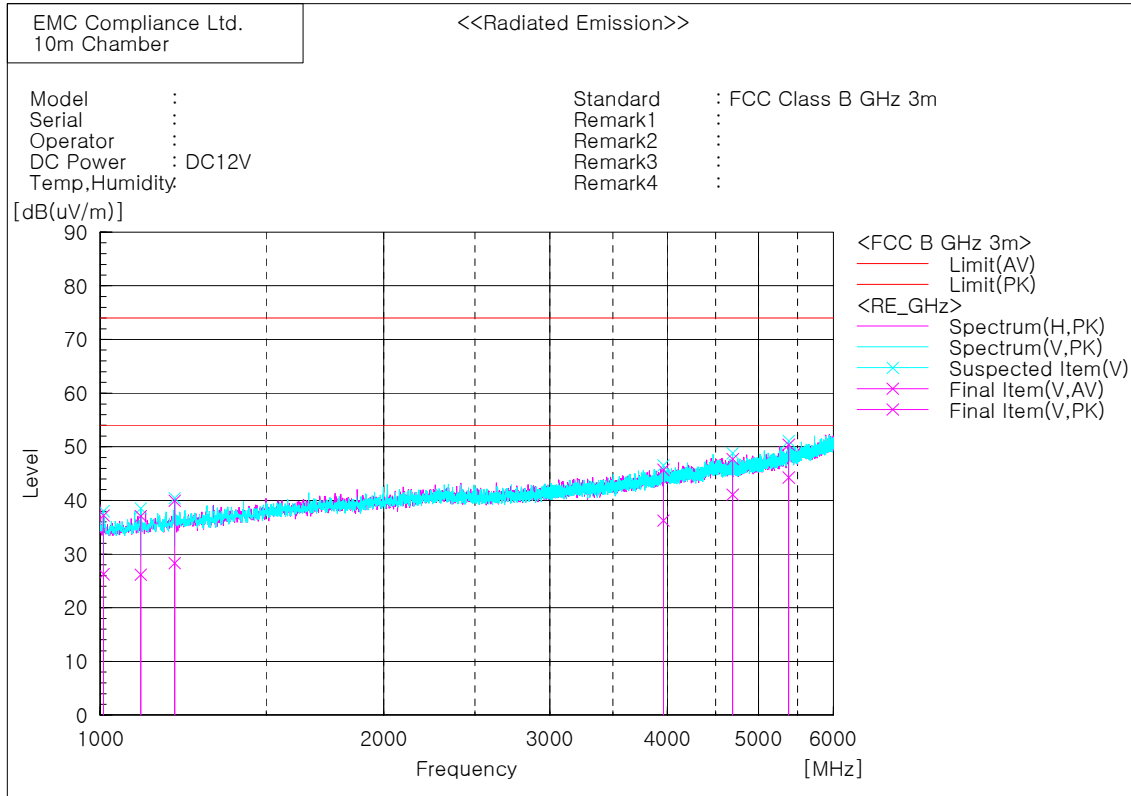
\* 30 MHz ~ 1 GHz(SAM-CRM-12)



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]
1	33.880	V	39.5	-15.3	24.2	30.0	5.8	300.0	124.0
2	35.456	V	40.3	-15.2	25.1	30.0	4.9	400.0	106.7
3	38.851	V	37.4	-14.8	22.6	30.0	7.4	300.0	145.2
4	191.869	H	36.5	-15.7	20.8	30.0	9.2	400.0	201.8
5	335.914	H	40.0	-10.8	29.2	37.0	7.8	400.0	310.5
6	383.929	H	36.8	-9.6	27.2	37.0	9.8	201.0	268.5
7	432.065	H	37.6	-8.2	29.4	37.0	7.6	201.0	75.6
8	499.965	H	38.2	-6.4	31.8	37.0	5.2	201.0	350.7

\* 1 GHz ~ 6 GHz (SAM-CRM-12)

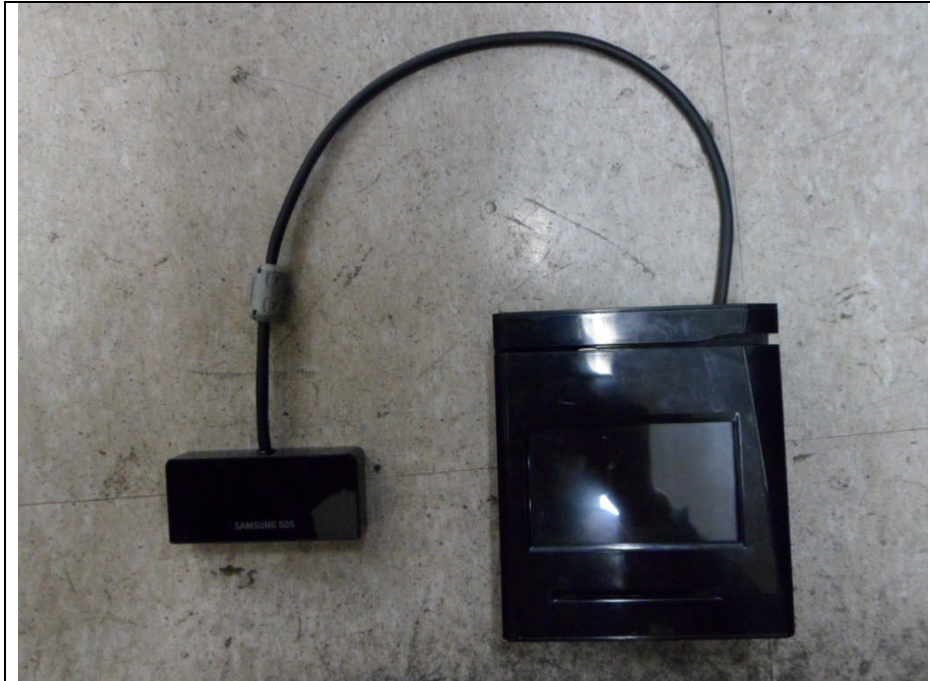


Final Result

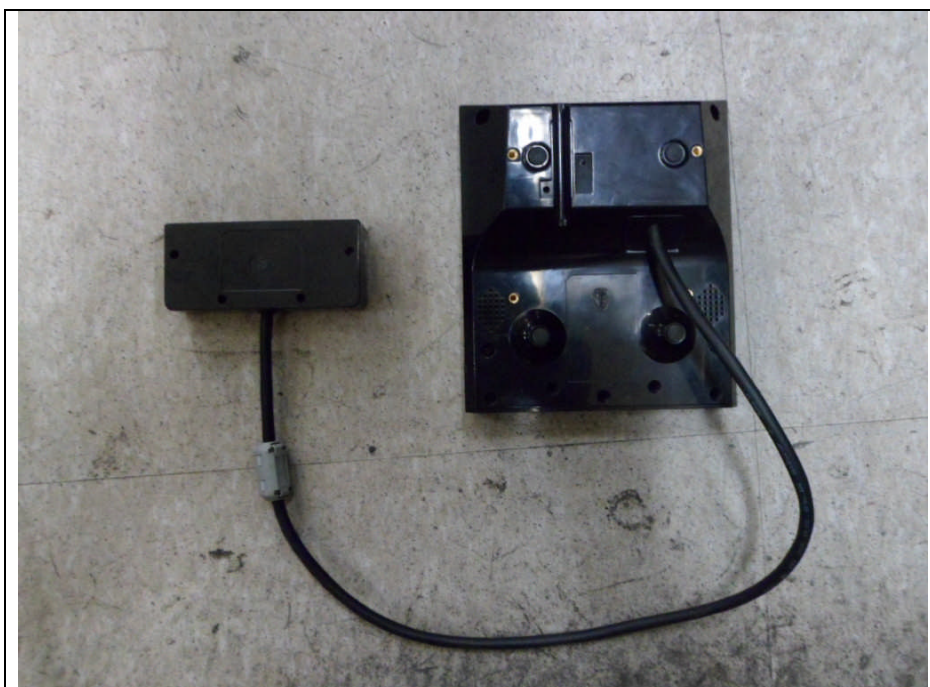
No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1008.125	V	35.8	46.7	-9.5	26.3	37.2	54.0	74.0	27.7	36.8	100.0	72.8
2	1103.750	V	34.8	45.7	-8.6	26.2	37.1	54.0	74.0	27.8	36.9	201.0	329.3
3	1199.375	V	35.8	47.5	-7.5	28.3	40.0	54.0	74.0	25.7	34.0	201.0	0.1
4	3961.250	V	32.4	41.8	3.9	36.3	45.7	54.0	74.0	17.7	28.3	201.0	188.4
5	4689.375	V	35.1	41.7	6.0	41.1	47.7	54.0	74.0	12.9	26.3	100.0	170.3
6	5378.750	V	35.8	41.9	8.5	44.3	50.4	54.0	74.0	9.7	23.6	100.0	41.4

## 7. E.U.T. photographs

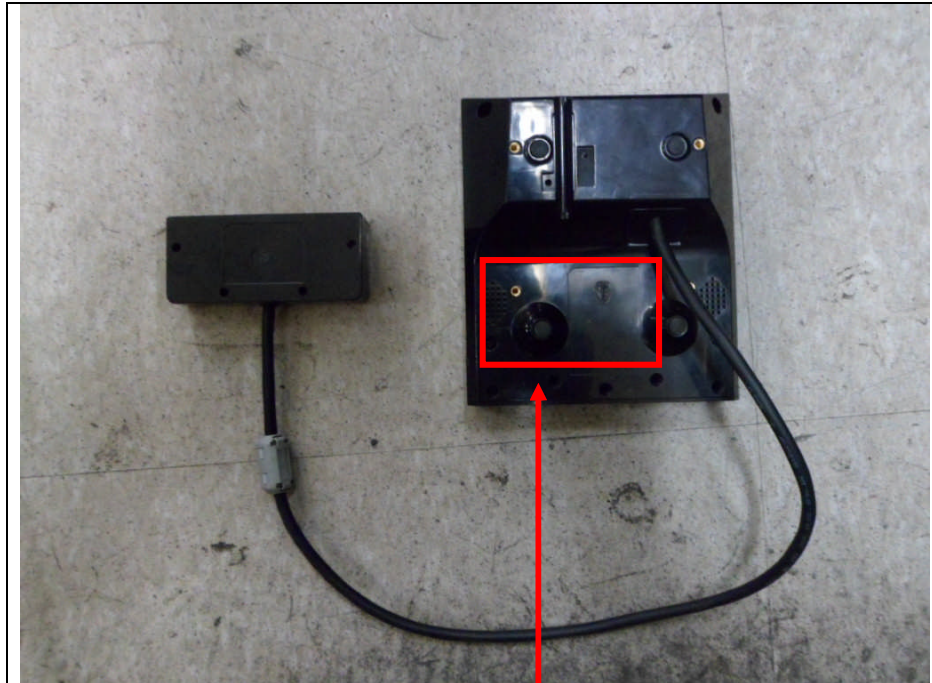
### Front View



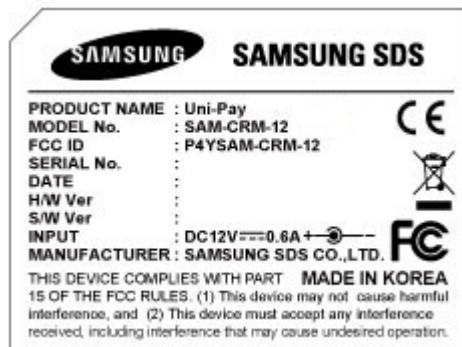
### Rear View



Label



**FCC Label Location**



Port

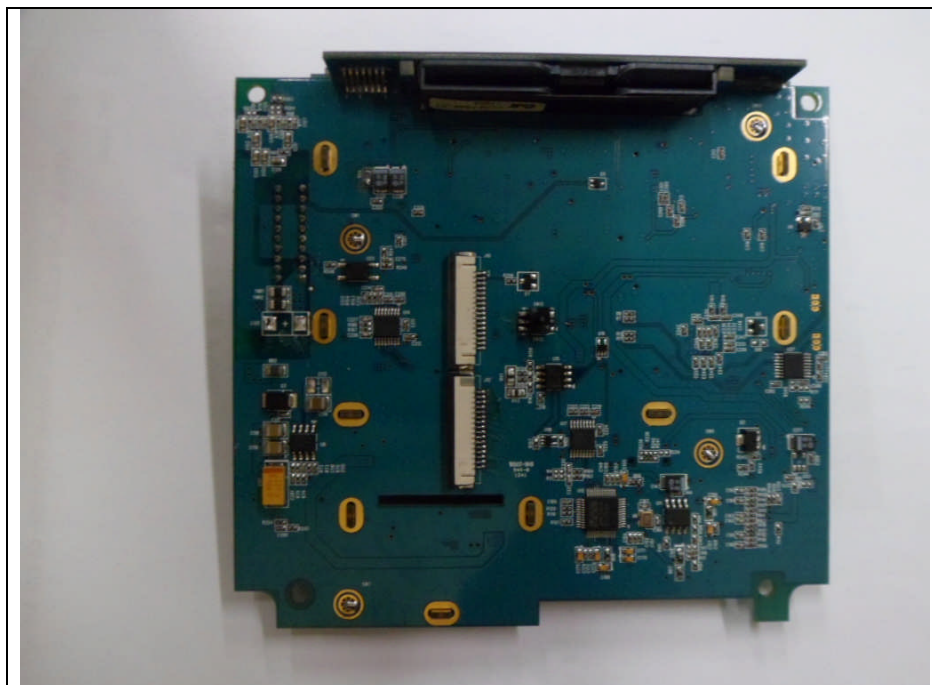
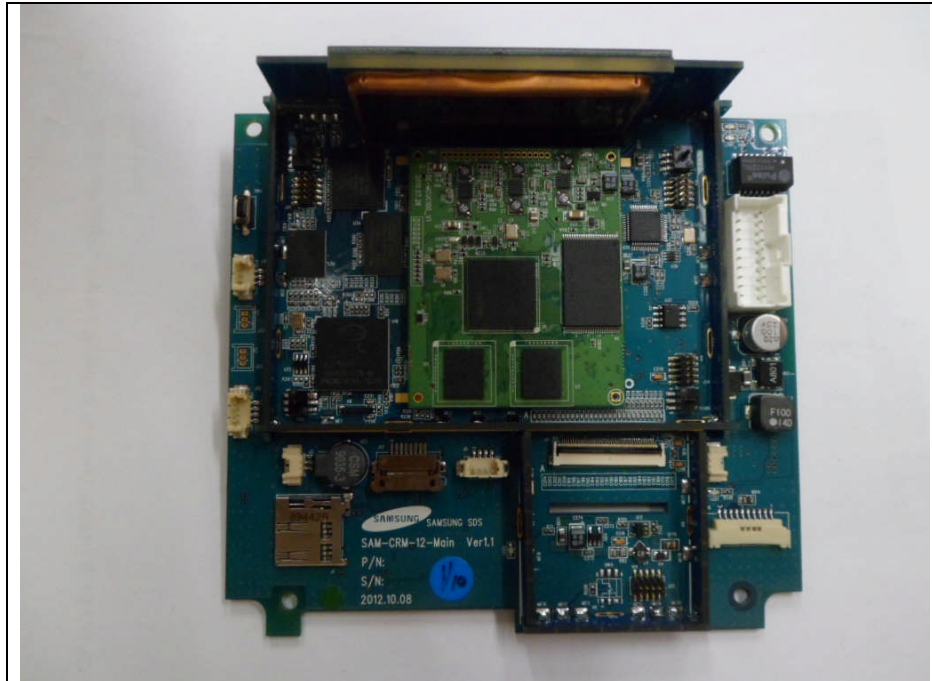




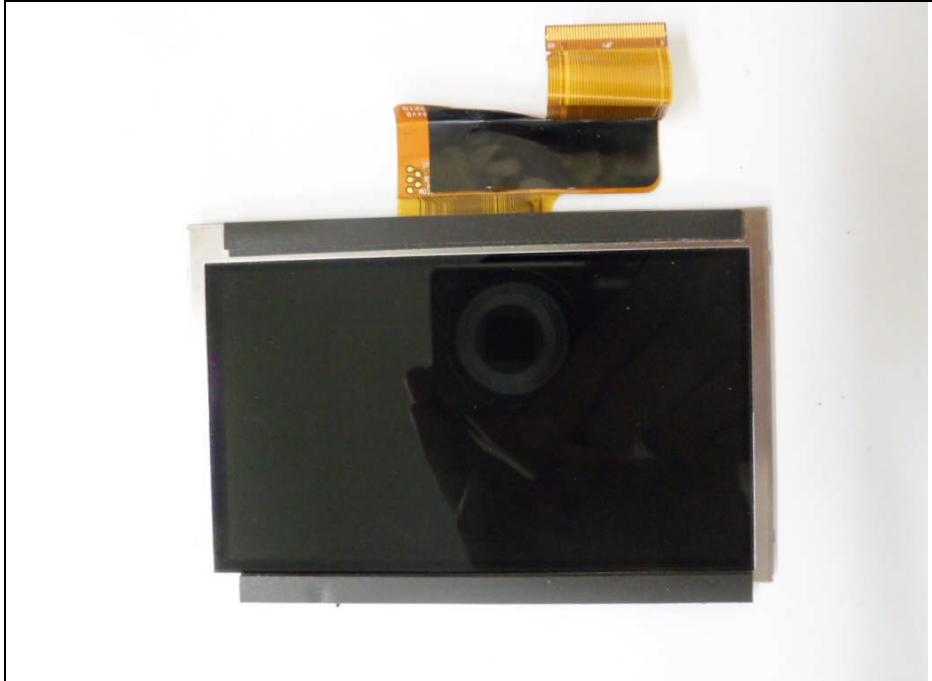
Inside



Main Board

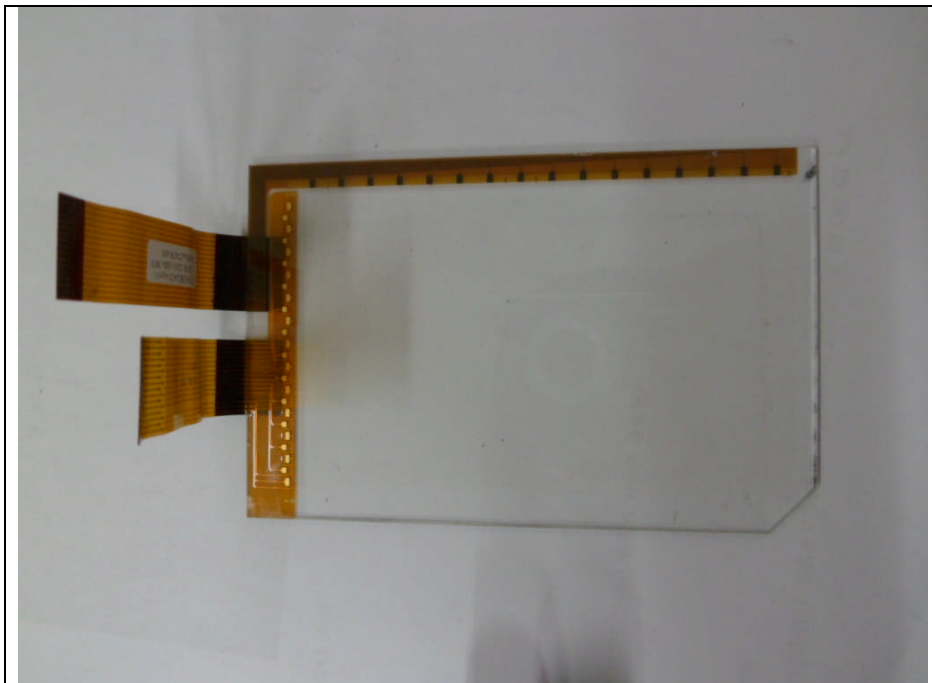
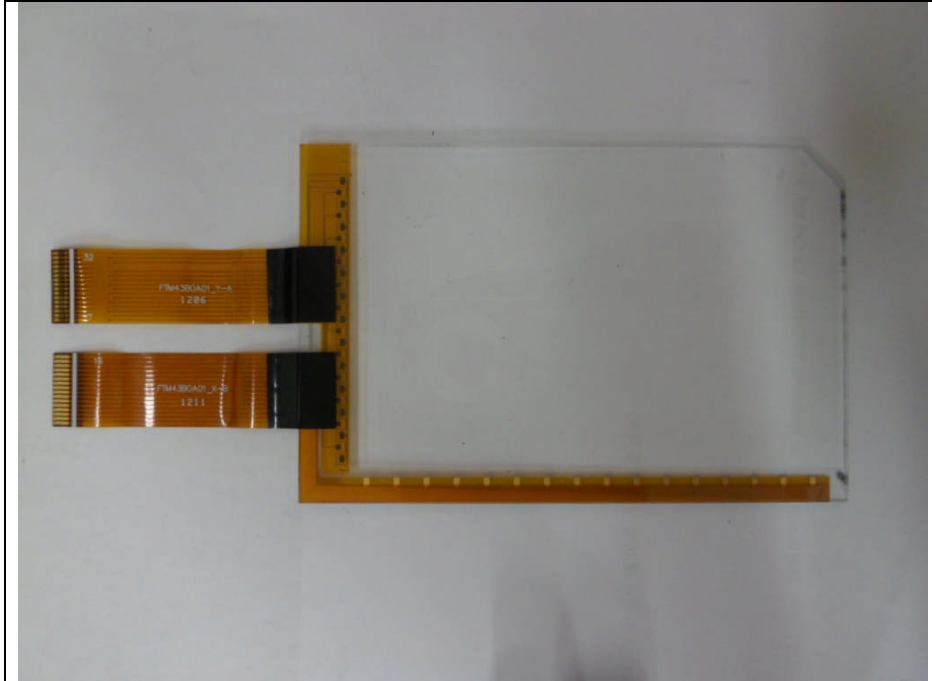


LCD

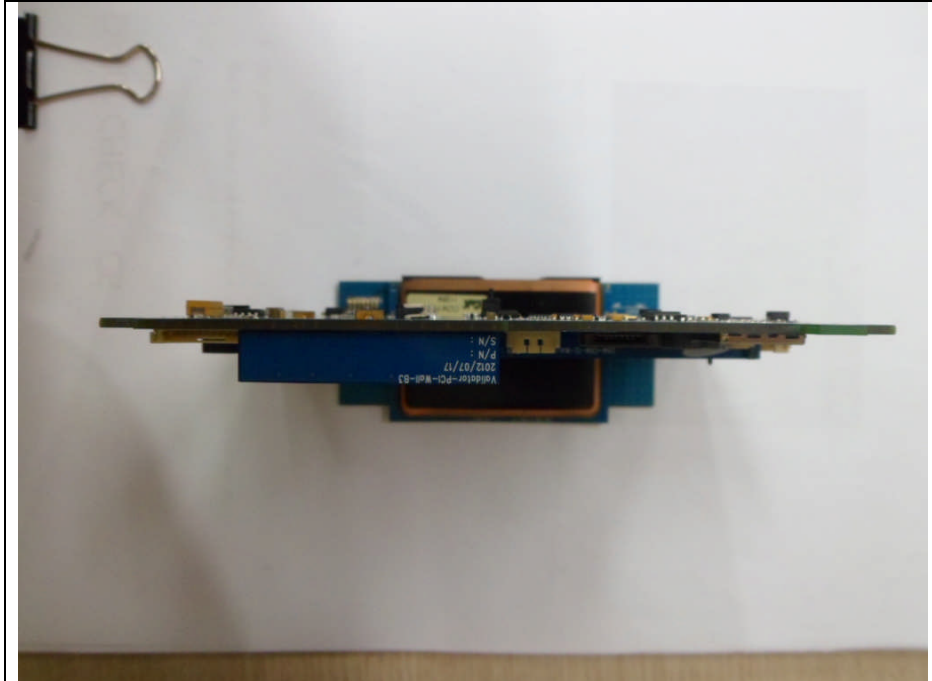




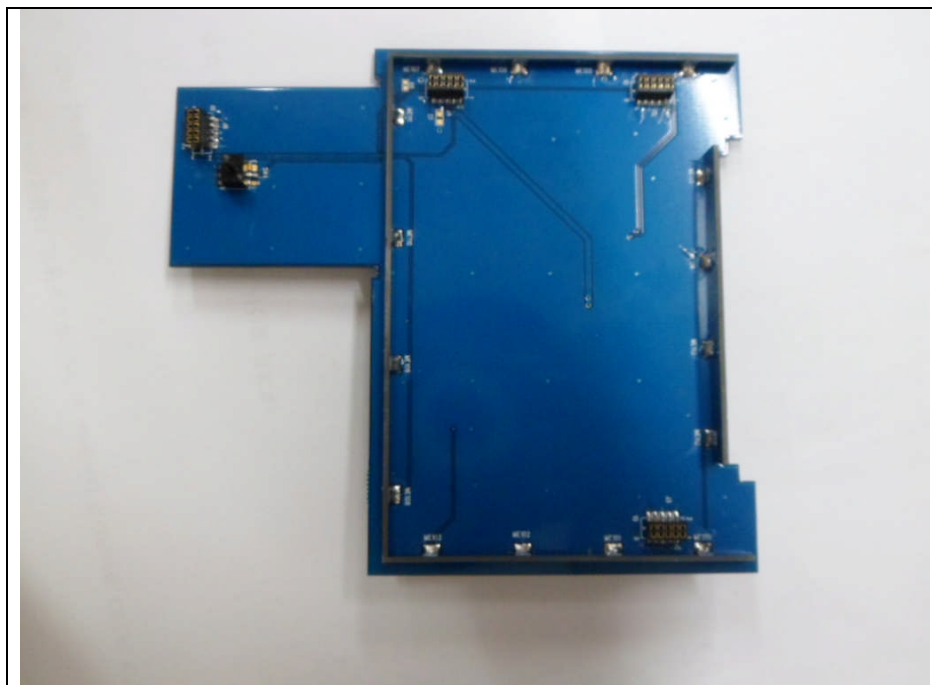
Touch Board



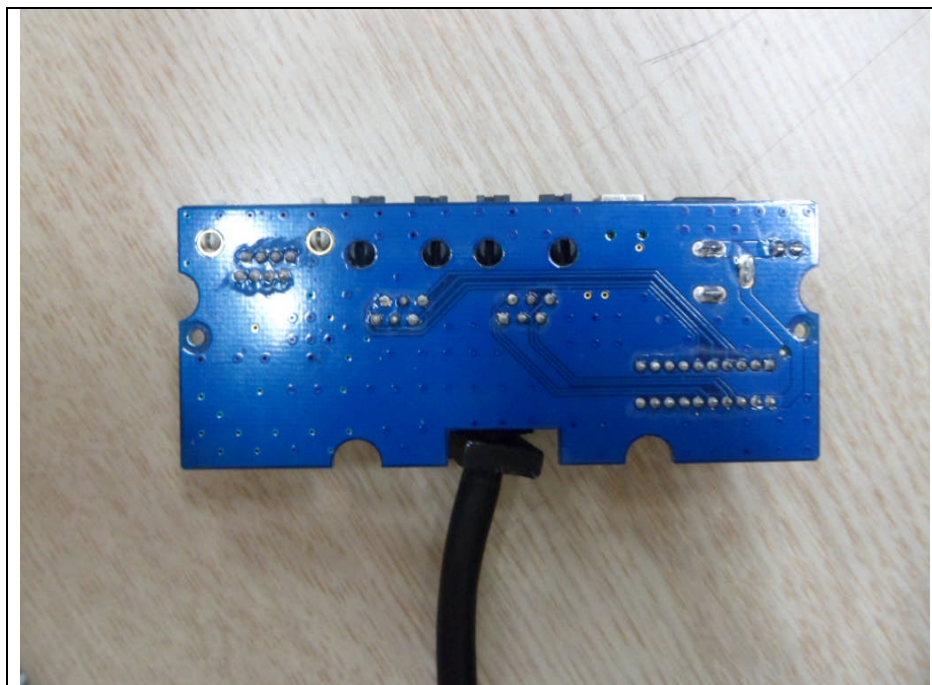
SUB Board#1



SUB Board#2



Connector Board





Cable#1



Cable#2

