

EMC TEST REPORT

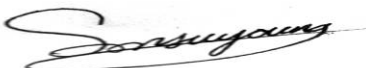
Project No.	LBE20122140	Issue No.	1
Applicant	Name of organization	Samsung Electronics Co., Ltd.	
	Address	416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	Date of application	April 4, 2012	
EUT	Type of device	Class B computing devices peripheral	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSHWA350K	
	Kind of product	Mobile Phone	
	Model No.	SHW-A350K	
	Variant Model No.	Refer to clause 3.5	
	Manufacturer	416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
Test Period		April 5, 2012 ~ April 5, 2012	
Issue date		April 18, 2012	
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 : Su-Young Son 		Reviewed by : Tae-Young Jang 	
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 CS & Environment center.			
 416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-so, 443-742, Republic of Korea Tel: 82 31 279 1750, Fax: 82 31 279 1745			

Table of contents

Summary of test results

1.1 Emission	3
--------------------	---

General Information

2.1 Test facility	3
-------------------------	---

Test Configuration

3.1 Test Peripherals	3
3.2 EUT operating mode	4
3.3 Details of Sampling	4
3.4 Used cable description	4
3.5 EUT Description	5
3.6 Clock Frequencies	5
3.7 Test configuration and condition	6
3.8 Measurement uncertainty	6

Result of individual tests

4.1 Conducted disturbance	7
4.2 Radiated disturbance	9

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 (Mains port)	FCC Part 15 Subpart B / ANSI C63.4-2003	Complied	Meets Class B Limit
☒	Radiated Disturbance		Complied	Meets Class B Limit

2. General Information

2.1 Test facility

The CS & Environment center is located on Samsung Electronics Co., Ltd. at 416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea.

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.

The CS & Environment center is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

3. Test Setup configuration

3.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Model No.	Serial No.	Manufacturer/ Trademark	FCC ID / DoC
Mobile Phone	SHW-A350K	-	SAMSUNG	A3LSHWA350K
Battery	EB424255VK	YS1C2267S/4-B	SAMSUNG	-
Data Cable	ECC1DU0BBK	KD1C103DS E	SAMSUNG	-
microSD Card	2GB	-	SANDISK	-
Desk-Top Computer	DCME	8JBVSBX	DELL	DoC
LCD Monitor	GH15LS	N719HVELA11890L	SAMSUNG	DoC
Mouse	MOARUO	MS-S5-AR03-01	SAMSUNG	DoC
Keyboard	GP-K5000U	15000099	SAMSUNG	DoC
Gigabit Switch 8	3CGSU08	AB/9XRQAC0024825	3COM	DoC
Power Supply	PW150	KA1203N03	AULT	DoC

3.2 EUT operating mode

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

Operating Mode 1	USB Mode (Data Communication)
-------------------------	-------------------------------

3.3 Details of Sampling

Customer selected, single unit.

3.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected;

Connected cable	Length [m]	Shielded [Y/N]	Note
Data Cable	0.8	Yes	From EUT to Desk-Top Computer
Power	1.8	No	For Desk-Top Computer
Power	1.8	No	For LCD Monitor
Power	1.8	No	For Power Supply
LAN	1.5	No	From Desk-Top Computer to Router
LAN	1.5	No	From Router to Local Area Network
RGB	1.8	Yes	From Desk-Top Computer to LCD Monitor
USB	1.6	Yes	From Desk-Top Computer to Mouse
USB	1.7	Yes	From Desk-Top Computer to Keyboard

3.5 EUT Description

1. The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	PCS1900	TX : 1850.2 ~ 1909.8 MHz RX : 1930.2 ~ 1989.8 MHz
Operating Temperature (°C)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	

2. The variant models

- None

3.6 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	184
USB 2.0	480

3.7 Test configuration and condition

The EUT could be only powered from USB port of PC.

This EUT have no interface from PC.

For the emission test, the EUT operated as standby and powered from PC.

The system was configured for testing in a typical fashion that a customer would normally use, and was tested while in an automated non-attendant mode.

Power source for the EUT operating was supplied by CVCF made by the Pacific.

- Test Voltage : AC 120 V, 60 Hz

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	AC Mains	± 3.03 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	± 4.61 dB
	Vertical	± 4.60 dB
Radiated Disturbance (1 GHz ~ 6 GHz)		± 4.09 dB

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

Frequency range Limits MHz	Resolution Bandwidth	Limits dB(μV)	
		Quasi-peak	Average
0,15 to 0,50	9 kHz	66 to 56	56 to 46
0,50 to 5	9 kHz	56	46
5 to 30	9 kHz	60	50

4.1.1 Test instrumentation

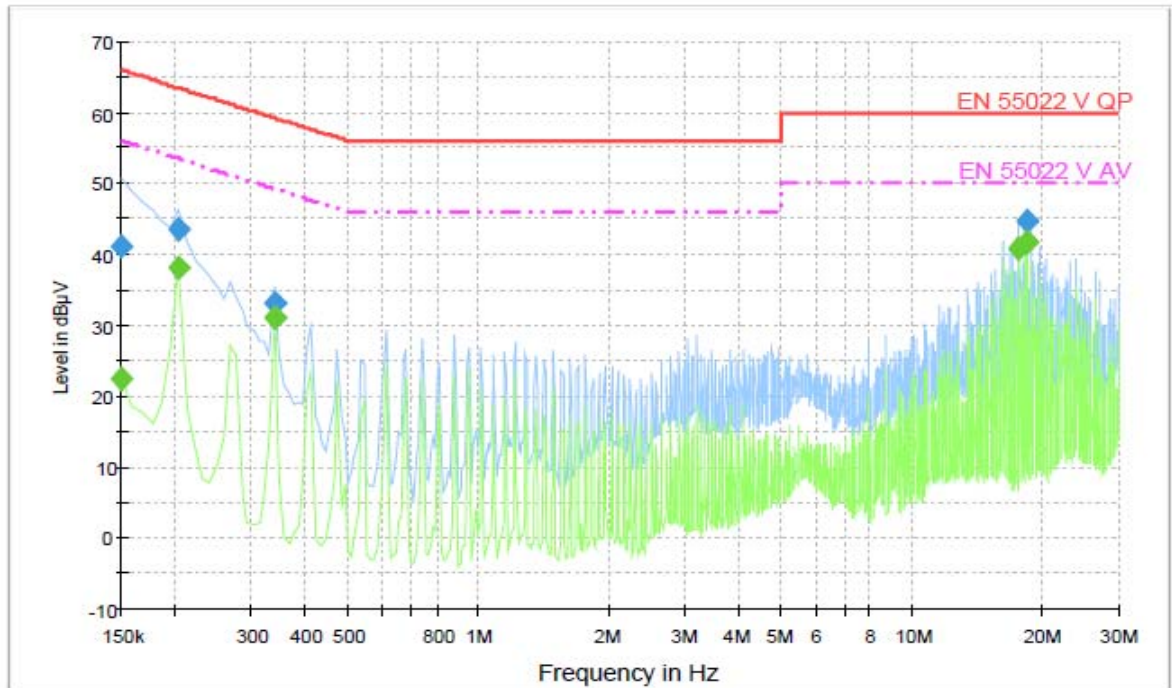
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E4I-093	Test Receiver	ESCI	R&S	100086	2011-11-11	12
E3I-050	LISN	ESH3-Z5	R&S	100263	2011-10-12	12
E3I-259	LISN	ENV216	R&S	101369	2011-10-11	12

4.1.2 Temperature and humidity condition

Test date	2012-04-05	Test engineer	Su-Young Son
Climate condition	Ambient temperature	21.0 °C	Limit (15.0 to 35.0) °C
	Relative humidity	40.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	102.0 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

4.1.3 Test results

- Operating Mode 1: AC Mains



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	41.0	15000.0	9.000	On	N	9.9	25.00	66.00	
0.204000	43.4	15000.0	9.000	On	L1	10.0	20.00	63.40	
0.339000	33.2	15000.0	9.000	On	N	10.0	26.00	59.20	
18.366000	44.6	15000.0	9.000	On	N	10.0	15.40	60.00	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	22.4	15000.0	9.000	On	N	9.9	33.60	56.00	
0.204000	38.1	15000.0	9.000	On	L1	10.0	15.40	53.40	
0.339000	31.0	15000.0	9.000	On	N	10.0	18.20	49.20	
17.691000	40.8	15000.0	9.000	On	N	10.0	9.20	50.00	
18.366000	41.9	15000.0	9.000	On	N	10.0	8.10	50.00	

Note 1) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.
 'Final Result 1' is Quasi-peak final measurement results table and 'Final Result 2' is Average final measurement results table.

Note 2) Level (QP and/or AV) = Meter Reading (QP and/or AV) + Corr. (LISN Insertion Loss + Cable Loss)
 Margin (QP and/or AV) = Limit – Level (QP and/or AV)
 QP = Quasi-Peak, AV = Average

4.2 Radiated disturbance

Of those disturbances above ($L - 20\text{dB}$), 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.

Peak measurements were made over the changeable frequency range 30 MHz to 1 GHz at a measurement distance of 3 m for the following antenna and turntable arrangements:

Antenna Height [cm]	Antenna Polarisation	Resolution bandwidth	Video bandwidth	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	120 kHz	300 kHz	Continuous

Measurements within 20 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using quasi-peak detectors.

Limits for radiated disturbance of ITE at a measuring distance of 3 m

Frequency range Limits [MHz]	Field Strength	
	$\mu\text{V/m}$	$\text{dB}(\mu\text{V/m})$
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

Peak/Average measurements were made over the changeable frequency range 1GHz to 40GHz or 5th in accordance with internal maximum operating frequency at a measurement distance of 3m for the following antenna and turntable arrangements:

Antenna Height [cm]	Antenna Polarisation	Resolution bandwidth	Video bandwidth	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	1 MHz (PK / AV)	3 MHz (PK) 10 Hz (AV)	Continuous

Limits for radiated disturbance of ITE at a measurement distance of 3 m

Class	Limits [$\text{dB}(\mu\text{V/m})$]	
	Peak	Average
A	80	60
B	74	54
Average limit 500, $20 \log 500 = 53.979 \text{ dB} \approx 54 \text{ dB}$		

Measurements within 20 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using peak and average detectors.

Results checked manually; and points close to the limit line were re-measured.

4.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-190	BILOG Antenna	CBL6112B	Schaffner	2804	2011-06-22	24
E3I-231	Horn Antenna	3115	ETS Lindgren	00101620	2012-01-12	24
E3I-175	Preamplifier	SONOMA	310N	273121	2011-12-06	12
E3I-165	EMI TEST RECEIVER	R&S	ESI-26	100010	2011-11-22	12

4.2.2 Temperature and humidity condition

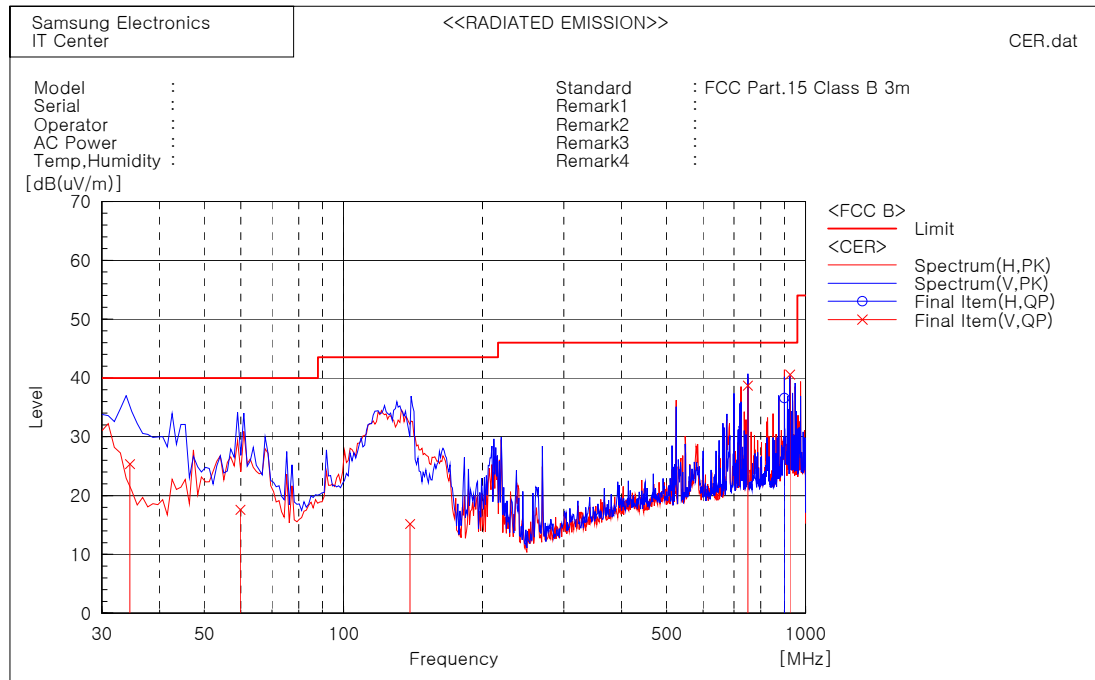
Test date	2012-04-05	Test engineer	Su-Young Son
Climate condition	Ambient temperature	21.5 °C	Limit (15.0 to 35.0) °C
	Relative humidity	32.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.5 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

4.2.3 Test results

☐ Operating Mode 1

- Frequency range: 30 ~ 1 000 MHz

Samsung Electronics Co., Ltd
IT Center



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	34.496	V	35.7	-10.3	25.4	40.0	14.6	106.0	102.0
2	59.813	V	38.1	-20.5	17.6	40.0	22.4	106.0	334.0
3	139.348	V	32.9	-17.7	15.2	43.5	28.3	201.0	318.0
4	749.981	V	46.6	-7.9	38.7	46.0	7.3	106.0	339.0
5	899.989	H	42.8	-6.2	36.6	46.0	9.4	107.0	7.0
6	924.937	V	46.2	-5.6	40.6	46.0	5.4	107.0	162.0

Note 1) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 3 m, Antenna Height : 1 to 4 meters

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

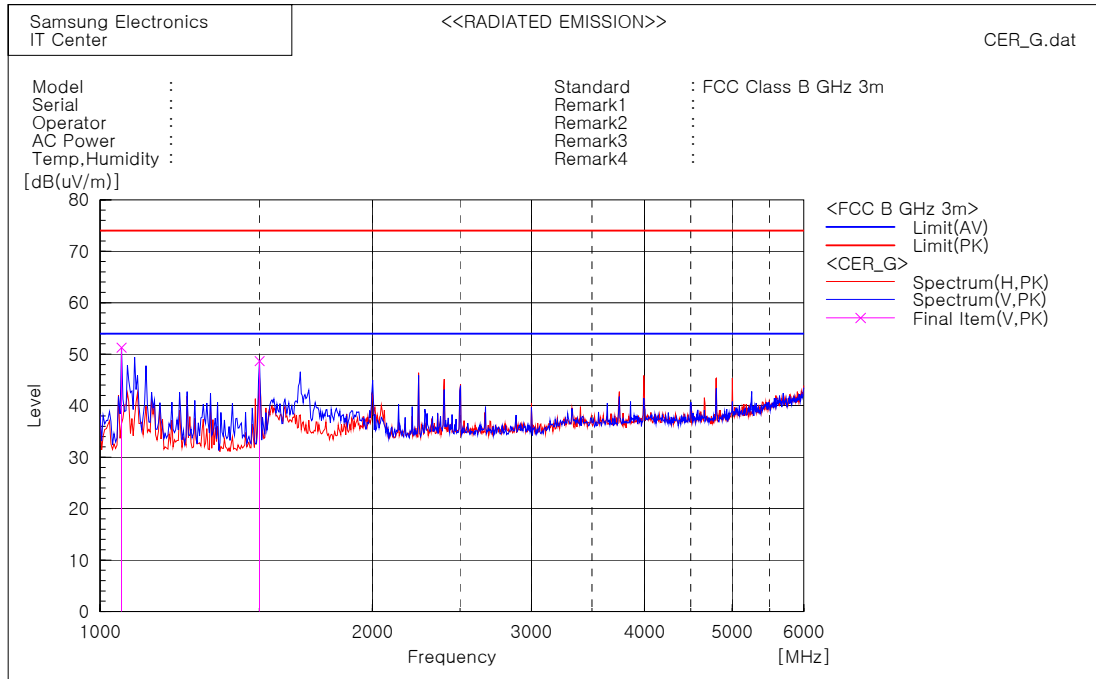
Margin (QP) = Limit - Result (QP)

QP = Quasi-Peak

□ Operating Mode 1

- Frequency range: 1 000 ~ 6 000 MHz

Samsung Electronics Co., Ltd
IT Center



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin PK [dB]	Height [cm]	Angle [deg]
1	1056.112	V	70.0	-18.7	51.3	74.0	22.7	100.0	172.0
2	1501.002	V	65.0	-16.3	48.7	74.0	25.3	100.0	334.0

Note 1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with peak detector mode.

Note 2) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 3 m, Antenna Height : 1 to 4 meters

Level (PK and/or AV) = Reading (PK and/or AV) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (PK and/or AV) = Limit – Level (PK and/or AV)

PK = Peak, AV = Average