

EMC TEST REPORT

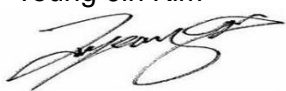
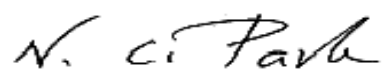

Project No.	LBE20113521	Issue No.	1
Applicant	Name of organization	Samsung Electronics Co., Ltd.	
	Address	416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	Date of application	July 04, 2011	
EUT	Type of device	Class B personal computers and peripherals	
	Equipment authorization	<input type="checkbox"/> Declaration of Conformity <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Verification	
	FCC ID	A3LSHWA310S	
	Kind of product	Mobile Phone	
	Model No.	SHW-A310S	
	Variant Model No.	Refer to clause 3.5	
	Manufacturer	SAMSUNG ELECTRONICS CO., LTD. 94-1, Imsu-dong, Gumi-si, Gyengsangbuk-do, 730-722, Republic of Korea	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
Test Period		July 7, 2011 ~ July 10, 2011	
Issue date		July 11, 2011	
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 : Young-Jin Kim		Reviewed by : No-Cheon Park	
			
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.			
			
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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
<input checked="" type="checkbox"/>	Conducted Disturbance (Mains port)	FCC Part 15 Subpart B / ANSI C63.4-2003	Complied	Meets Class B Limit
<input checked="" type="checkbox"/>	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	FCC ID / DoC
Mobile Phone	SHW-A310S	-	SAMSUNG	A3LSHWA310S
Battery	EB424255VK	TH1B616CS/4-B	SAMSUNG	-
USB Cable	ECC2DK0BBK	-	SAMSUNG	-
Micro SD Card	2GB	-	SANDISK	-
LCD Monitor	CX502N	N719HVELA11890L	SAMSUNG	DoC
D/T PC	DCSCMF	BHDLKBX	DELL	DoC
USB mouse	MOARUO	0933008588	SAMSUNG	DoC
USB Keyboard	SEM-DT-35US	KB3V082SUAAB-REV2. 092000824	GPE	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)
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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 D/T PC
D-Sub	1.5	Yes	From EUT to Monitor
Power	1.8	No	For D/T PC
Power	1.8	No	For Monitor
USB	1.8	Yes	From D/T PC to Mouse
USB	1.5	Yes	From D/T PC to Keyboard

3.5 EUT Description

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

Item	Specification	
Frequency Range	WCDMA	TX : 1 922.8 ~ 1 977.2 MHz RX : 2 112.8 ~ 2 167.2 MHz Max. Power : 300 mW
	GSM	TX : 880.2 ~ 914.8 MHz RX : 925.2 ~ 959.8 MHz Max. Power : 2 W
	DCS	TX : 1 710.2 ~ 1 784.8 MHz RX : 1 805.2 ~ 1 879.8 MHz Max. Power : 1 W
	US PCS	TX : 1 850.2 ~ 1 909.8 MHz RX : 1 930.2 ~ 1 989.8 MHz Max. Power : 1 W
Size (Standard Battery)	106.9 (L) X 51 (W) X 14.1 (H) (mm)	
Weight (Standard Battery)	105 g (±1 g)	
LCD Specification	Main 3.0 Inch, TFT (240 X 400)	
Operating Temperature (°C)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	
Bluetooth	TX/RX Frequency : 2 402 ~ 2 480 MHz Max. Power : 0.0318 mW Version : 2.1 + EDR	
Memory	External Memory : microSD (Max. 16 GB)	

2. The variant models

- None

3.6 Clock Frequencies

Kind of Clocks	Frequency [MHz]
USB 2.0	24 MHz

3.7 Test configuration and condition

The EUT exercise program which is the samsung standardized emission test program for windows was used during all EMC measurements were tested.

This program was contained on the PC hard disk drive.

Once loaded, the program sequentially exercises each system component in turn.

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 Voltech Corp.

- 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

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(μ V)	
		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

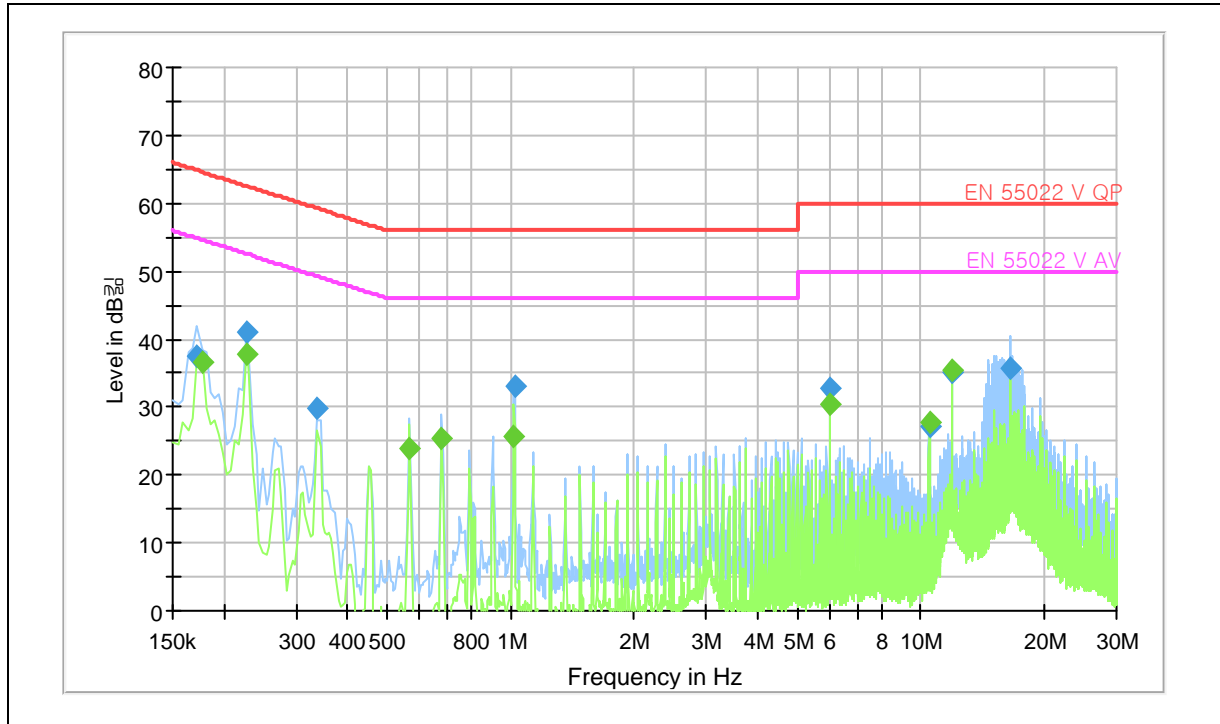
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-046	Test Receiver	ESCS30	R&S	830986/004	2011-02-11	12
E3I-049	LISN	ESH3-Z5	R&S	100263	2010-10-19	12
E3I-050	LISN	ESH3-Z5	R&S	100260	2011-01-13	12

4.1.2 Temperature and humidity condition

Test date	2011-07-10	Test engineer	Young-Jin Kim
Climate condition	Ambient temperature	22.0 °C	Limit (15.0 to 35.0) °C
	Relative humidity	35.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.4 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

4.1.3 Test results

- Operating Mode 1: AC Mains



Note) Two graphs measured for both Live(L1) and Neutral(N) of the LISN are combined into one graph.

Quasi-peak final measurement results table:

Frequency (MHz)	Level (dB μ V)	Transd	Limit (dB μ V)	Margin (dB)	Line
0.174	37.5	0.2	64.8	27.3	L1
0.227	41.1	0.2	62.6	21.5	L1
0.339	29.9	0.2	59.2	29.3	N
1.023	33.2	0.2	56.0	22.8	N
5.991	32.7	0.4	60.0	27.3	N
10.482	27.1	0.5	60.0	32.9	L1
11.981	35.2	0.5	60.0	24.8	L1
16.467	35.7	0.7	60.0	24.3	N

Average final measurement results table:

Frequency (MHz)	Level (dB μ V)	Transd	Limit (dB μ V)	Margin (dB)	Line
0.177	36.6	0.2	54.60	18.00	N
0.227	37.9	0.2	52.60	14.70	L1
0.569	24.0	0.2	46.00	22.00	L1
0.681	25.4	0.2	46.00	20.60	L1
1.019	25.7	0.2	46.00	20.30	N
5.987	30.3	0.4	50.00	19.70	N
10.482	27.6	0.5	50.00	22.40	N
11.981	35.4	0.5	50.00	14.60	N

Note) Level (QP and/or AV) = Meter Reading (QP and/or AV) + Transd (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	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	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]	Resolution Bandwidth	Field Strength	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V/m})$
30 to 88	120 kHz	100	40.0
88 to 216	120 kHz	150	43.5
216 to 960	120 kHz	200	46.0
Above 960	120 kHz	500	54.0

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-130	BILOG Antenna	CBL6112D	TESEQ	25513	2010-11-12	24
E3I-165	EMI Test Receiver	ESI-26	R&S	100010	2011-02-22	12
E3I-213	Preamplifier	317	Sonoma	282424	2010-12-01	12

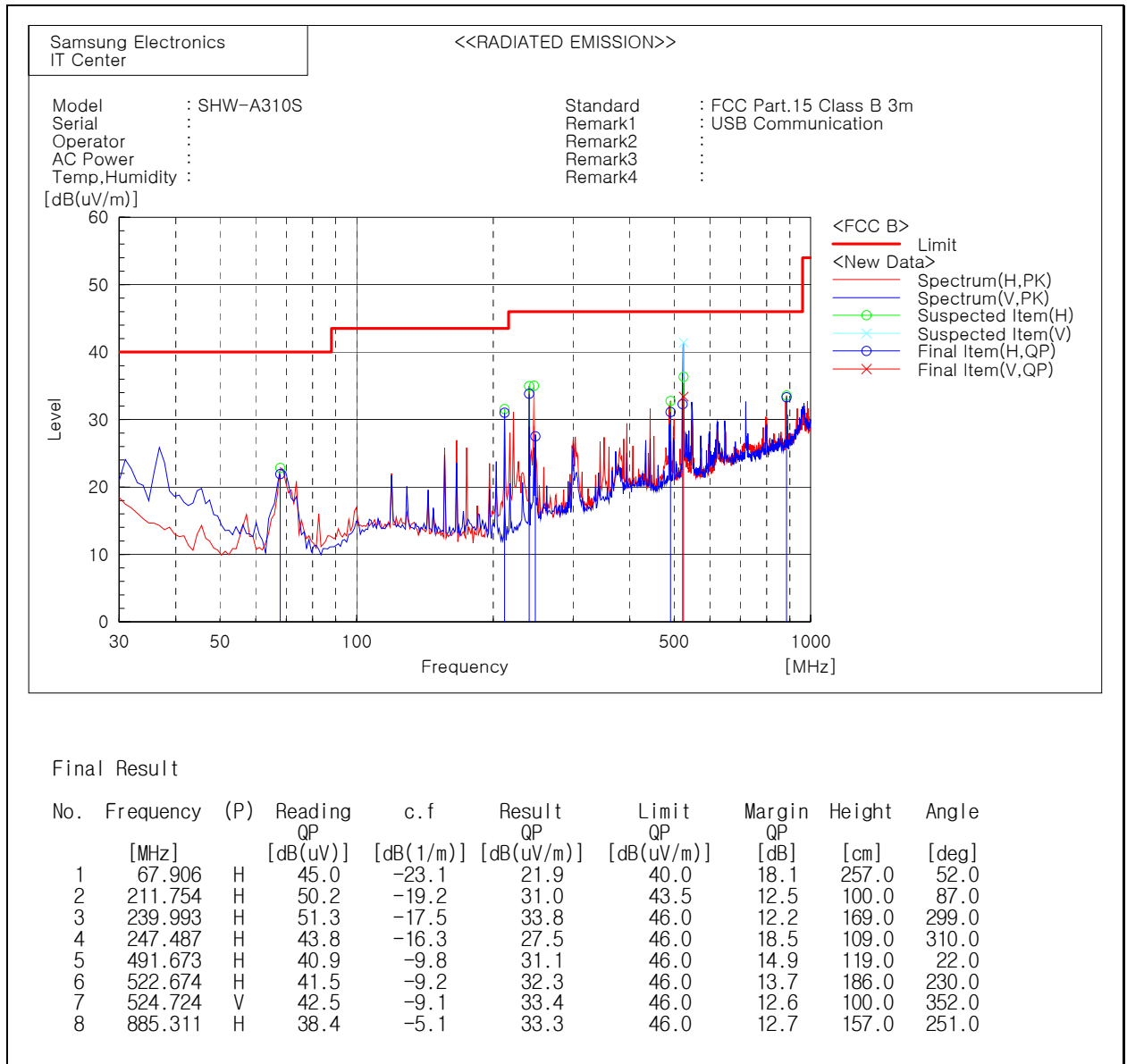
4.2.2 Temperature and humidity condition

Test date	2011-07-07	Test engineer	Young Jin Kim
Climate condition	Ambient temperature	23.0 $^{\circ}\text{C}$	Limit (15.0 to 35.0) $^{\circ}\text{C}$
	Relative humidity	31.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.0 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



Note) Receiving antenna polarization : Horizontal, Vertical

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

Level (QP) = Reading (QP) + Factor (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak