EMC TEST REPORT

Project No.	LBE20120951	**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	February 3, 2012	
EUT	**Type of device**	Class B personal computers and peripherals	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSCHI509	
	Kind of product	Mobile Phone	
	Model No.	SCH-I509	
	Variant Model No.	Refer to clause 3.5	
	Manufacturer	SAMSUNG ELECTRONICS HUIZHOU CO., LTD. 516229 Chen Jiang Town Huizhou City Guangdong Province China	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
Test Period		February 4, 2012 ~ February 8, 2012	
Issue date		February 10, 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

SAMSUNG

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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 (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	SCH-I509	-	SAMSUNG	A3LSCHI509
Battery	EB454357VU	THaB719AS/4-B	SAMSUNG	-
Headset	EHS64ASFBE	-	SAMSUNG	-
Data Cable	ECC1DU0BBK	-	SAMSUNG	-
microSD Card	2GB	-	SANDISK	-
Desktop PC	DCME	8JBVSBX	DELL	DoC
LCD Monitor	GH15LS	N719HVELA11890L	SAMSUNG	DoC
USB Mouse	MOARUO	MS-S5-AR03-01	SAMSUNG	DoC
USB Keyboard	GP-K5000U	15000099	SAMSUNG	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 Desktop PC
Headset	1.2	NO	For Headset
USB Cable	1.6	Yes	For Keyboard
USB Cable	1.7	Yes	For Mouse
Power	1.7	NO	For Desktop PC
Power	1.7	NO	For Monitor
RGB Cable	1.1	Yes	From Monitor to PC
LAN cable	1.5	Yes	From Desktop PC to LAN Port

3.5 EUT Description

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

Item	Specification	
Frequency Range	CDMA	TX : 824 ~ 849MHz RX : 869 ~ 894 MHz
Size (Standard Battery)	104 (L) * 58 (W) * 11.6 (H) (mm)	
Weight (Standard Battery)	100.5g (±1 g)	
LCD Specification	Main 3.0 Inch, QVGA (240X 320)	
Operating Temperature (℃)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	
Bluetooth	TX/RX Frequency : 2 402 ~ 2 480 MHz Version : 3.0	
Wi-Fi	TX/RX Frequency : 2 412 ~ 2 472 MHz (801.11 b/g/n)	
Memory	Internal Memory : 256 MB External Memory: microSD (max 32 GB)	

2. The variant models

- None

3.6 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	**600**
USB 2.0	48

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 Pacific Power Source 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
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

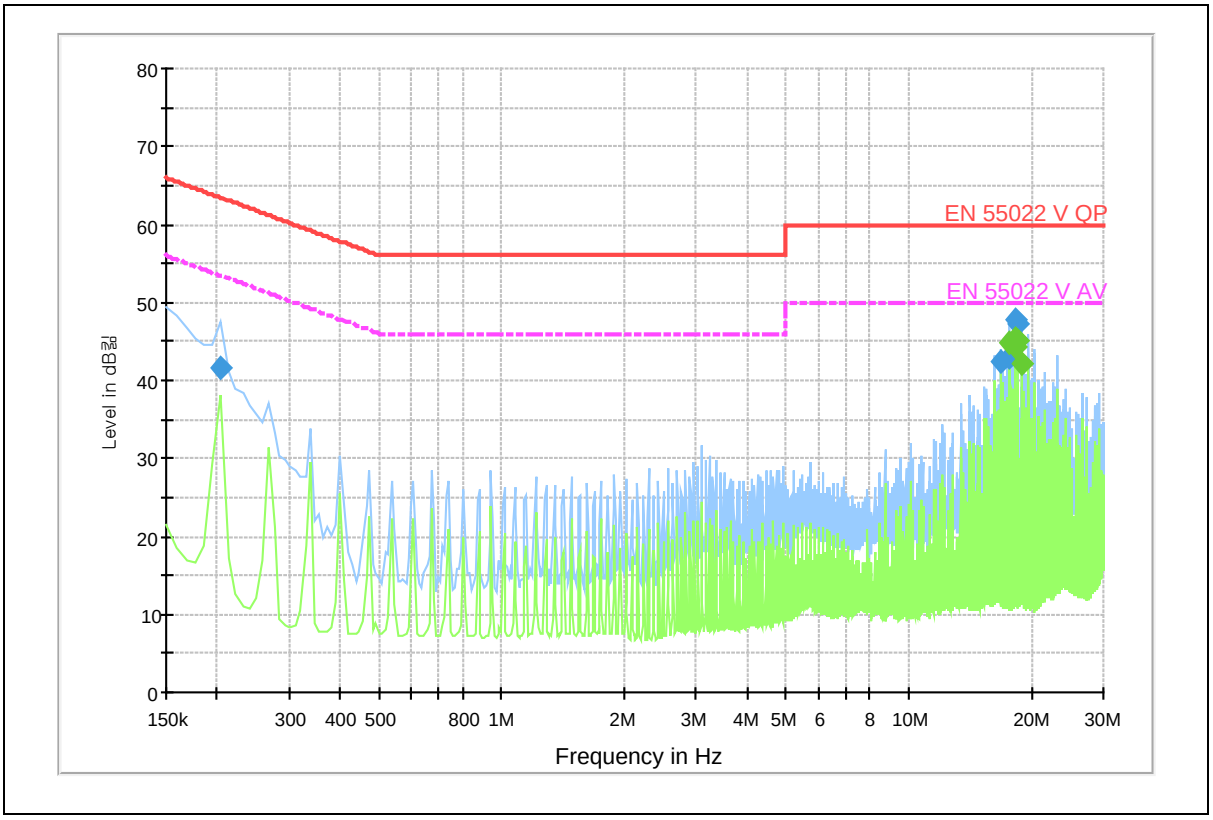
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-046	Test Receiver	ESCS30	R&S	830986/004	2011-02-11	12
E3I-259	LISN	ENV216	R&S	101369	2011-10-11	12
E3I-050	LISN	ESH3-Z5	R&S	100263	2011-10-12	12

4.1.2 Temperature and humidity condition

Test date	2012-02-08	**Test engineer**	Su-Young Son
Climate condition	Ambient temperature	21.5 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	49.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	102.3 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

4.1.3 Test results

- Operating Mode 1: AC Mains



Note 1) 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 (dBµV)	Corr. (dB)	Limit (dBµV)	Margin (dB)	Line
0.204	41.5	10.0	63.40	21.90	N
16.899	42.3	9.9	60.00	17.70	N
17.574	42.9	10.0	60.00	17.10	N
18.303	47.8	10.0	60.00	12.20	N
18.366	47.3	10.0	60.00	12.70	N

Average final measurement results table:

Frequency (MHz)	Level (dBµV)	Corr. (dB)	Limit (dBµV)	Margin (dB)	Line
17.691	44.8	10.0	50.00	5.20	N
18.240	44.2	10.0	50.00	5.80	N
18.303	45.4	10.0	50.00	4.60	N
18.366	45.0	10.0	50.00	5.00	N
18.915	42.2	10.0	50.00	7.80	N

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* - 20dB), 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	RBW	VBW	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.

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

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

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

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

Frequency range Limits [MHz]	Field Strength	
	µV/m	dB(µV/m)
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	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-173	Horn Antenna	3115	EMCO	9502-4441	2011-07-21	24
E3I-175	Preamplifier	310N	Sonoma	273121	2011-12-06	12
E3I-233	EMI Test Receiver	ESU26	R&S	100364	2011-10-24	12

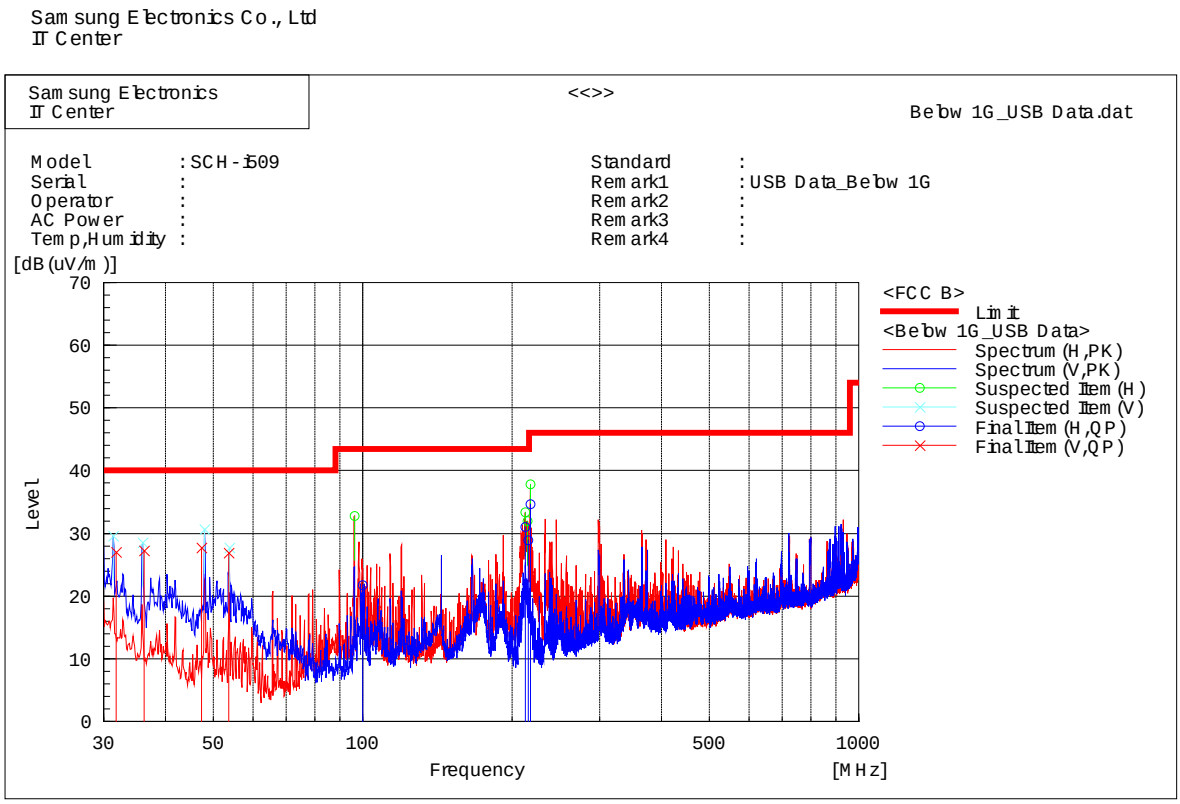
4.2.2 Temperature and humidity condition

Test date	2012-02-04	**Test engineer**	Su-Young Son
Climate condition	Ambient temperature	22.0 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	32.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	102.1 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



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	31.751	V	40.3	-13.3	27.0	40.0	13.0	132.0	120.0
2	36.147	V	42.8	-15.6	27.2	40.0	12.8	157.0	60.0
3	47.247	V	48.9	-21.2	27.7	40.0	12.3	164.0	120.0
4	53.677	V	50.3	-23.4	26.9	40.0	13.1	188.0	107.0
5	99.783	H	40.1	-18.4	21.7	43.5	21.8	188.0	124.0
6	212.724	H	50.9	-19.9	31.0	43.5	12.5	188.0	246.0
7	215.421	H	48.6	-19.7	28.9	43.5	14.6	199.0	226.0
8	217.547	H	54.2	-19.6	34.6	46.0	11.4	151.0	232.0

Note) Receiving antenna polarization : Horizontal, Vertical

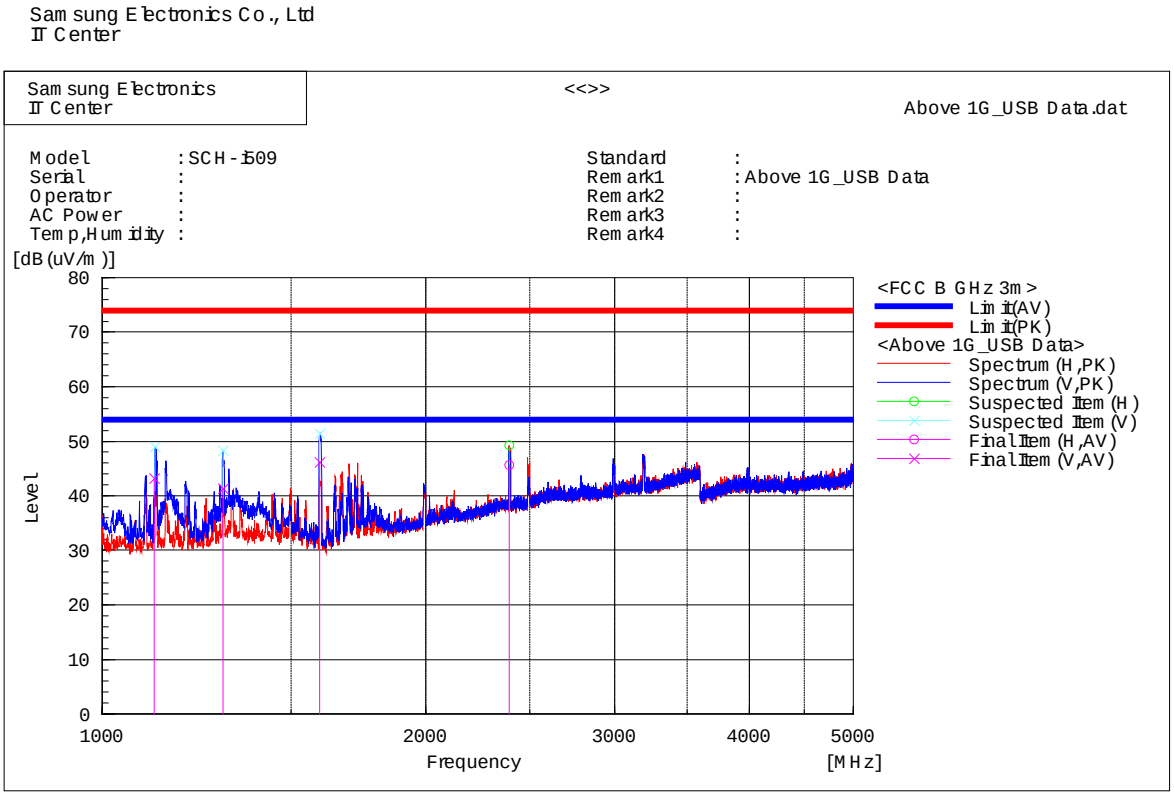
Test Distance : 3 m, Antenna Height : 1 to 4 meters

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

Margin (QP) = Limit – Level (QP)

QP = Quasi-Peak

- Frequency range: 1 000 ~ 5 000 MHz



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin AV [dB]	Height [cm]	Angle [deg]
1	1118.248	V	55.3	-12.1	43.2	54.0	10.8	108.0	55.0
2	1296.144	V	52.7	-11.3	41.4	54.0	12.6	108.0	55.0
3	1592.704	V	55.9	-9.7	46.2	54.0	7.8	108.0	62.0
4	2391.843	H	50.9	-5.2	45.7	54.0	8.3	117.0	86.0

Note1) Representative operating modes were selected by customer and any emissions that do NOT exceed Average limit were not tested with peak detector mode.

Note2) 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