

EMC TEST REPORT

Project No.	LBE2013369	Issue No.	1
Applicant	Name of organization	Samsung Electronics Co., Ltd.	
	Address	(Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	Date of application	June 4, 2013	
EUT	Type of device	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSCHR960	
	Kind of product	Mobile Phone	
	Model No.	SCH-R960	
	Variant Model No.	Refer to clause 4.6	
	Manufacturer	SAMSUNG ELECTRONICS CO., LTD. 94-1, Imsu-dong, Gumi-si, Gyengsangbuk-do, 730-722, Republic of Korea SAMSUNG ELECTRONICS HUIZHOU CO.,LTD. 516229, Chenjiang Town, HuiZhou City, Guangdong Province, China	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
Test Period		June 6, 2013 ~ June 11, 2013	
Issue date		June 26, 2013	

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 : Ho-Jin Choi



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.



(Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea
 Tel: 82 31 279 1750, Fax: 82 31 279 1745

Table of contents

1. Report Information

1.1 Revision history	3
----------------------------	---

2. Summary of test results

2.1 Emission	3
--------------------	---

3. General Information

3.1 Test facility	3
-------------------------	---

4. Test Configuration

4.1 Test Peripherals	4
4.2 EUT operating mode	4
4.3 Details of Sampling	4
4.4 Used cable description	5
4.5 Test arrangement	5
4.6 EUT Description	6
4.7 Clock Frequencies	6
4.8 Test configuration and condition	6
4.9 Measurement uncertainty	7

5. Result of individual tests

5.1 Conducted disturbance	8
5.2 Radiated disturbance	10

1. Report Information

1.1 Revision history

No.	Revised detailed information
Issue 0	- LBE2013369 (SAMSUNG)

2. Summary of test results

1.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result
☒	Conducted Disturbance (Mains port)	FCC Part 15 Subpart B / ANSI C63.4-2003 (Class B)	Complied
☒	Radiated Disturbance		Complied

3. General Information

3.1 Test facility

The CS & Environment center is located on Samsung Electronics Co., Ltd. at (Maetan-dong) 129, Samsung-ro, 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.

4. Test Setup configuration

4.1 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:

Mark	Description	Model No.	Serial No.	Manufacturer / Trademark	FCC ID / DoC
A	Mobile Phone	SCH-R960	-	SAMSUNG	A3LSCHR960
B	Battery	B700BU	AAaD511YS/2-B	SAMSUNG	-
C	Headset	EO-HS3303WE	-	SAMSUNG	-
D	Data Cable	ECB-DU4AWE	-	SAMSUNG	-
E	microSD Card	16GB	-	SANDISK	-
F	Desk-Top Computer	HP Compaq dx2200	CNG7060LW0	HP	DoC
G	Monitor	933HDPLUS	CF19H1LS700048Y	SAMSUNG	DoC
H	Mouse	N3+Optical	K034729902	HP	DoC
I	Keyboard	SDM8500P	8M000131	SAMSUNG	DoC
J	Gigabit Switch 8	3CGSU08	AB/9XRQAC0024825	3COM	DoC
K	Power Supply	PW150	KA1203N03	AULT	DoC

4.2 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)
-------------------------	-------------------------------

4.3 Details of Sampling

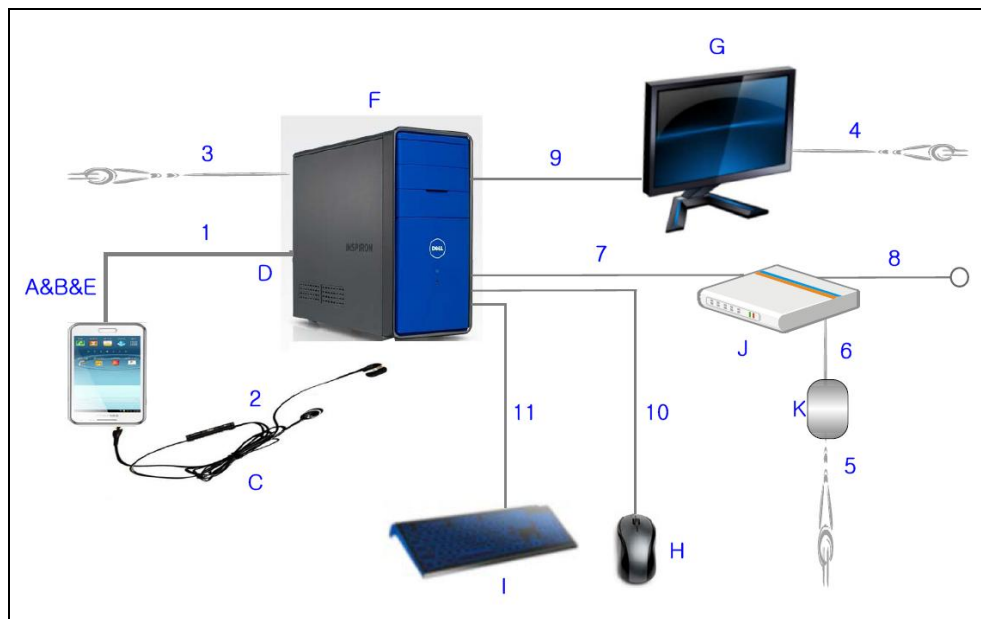
Customer selected, single unit.

4.4 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:

No.	Connected cable	Length [m]	Shielded [Y/N]	Note
1	Data Cable	1.0	Yes	From EUT to Desk-Top Computer
2	Headset	1.25	No	For EUT
3	Power	1.8	No	For Desk-Top Computer
4	Power	1.8	No	For Monitor
5	Power	1.8	No	For Power Supply
6	Power	1.8	No	From Router to Power Supply
7	RJ45	1.5	No	From Desk-Top Computer to Gigabit Switch 8
8	RJ45	1.5	No	From Desk-Top Computer to Local Area Network
9	D-sub	1.8	Yes	From Desk-Top Computer to Monitor
10	USB	1.8	Yes	From Desk-Top Computer to Mouse
11	USB	1.5	Yes	From Desk-Top Computer to Keyboard

4.5 Test arrangement



4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	US Cellular	TX : 824.7 ~ 848.31 MHz RX : 869.64 ~ 893.37 MHz
	US PCS	TX : 1851.25 ~ 1908.75 MHz RX : 1931.25 ~ 1988.75 MHz
	LTE BAND2	TX : 1850.0 ~ 1910.0 MHz RX : 1930.0 ~ 1990.0 MHz
	LTE BAND4	TX : 1710.0 ~ 1755.0 MHz RX : 2110.0 ~ 2155.0 MHz
	LTE BAND5	TX : 824.0 ~ 849.0MHz RX : 869.0 ~ 894.0MHz
	LTE BAND12	TX : 699.0 ~ 716.0MHz RX : 729.0 ~ 746.0MHz
	LTE BAND17	TX : 704.0 ~ 716.0MHz RX : 734.0 ~ 746.0MHz
	LTE BAND25	TX : 1850.0 ~ 1915.0 MHz RX : 1930.0 ~ 1995.0 MHz
Operating Temperature (°C)	-20 ~ +60	
Operating Humidity (%)	0 ~ 95	

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]	Kind of Clocks	Frequency [MHz]
CPU	1 700	USB 2.0	48

4.8 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 EUT was exercised during the testing by data read and write cycles repeated with internal storage devices. At the end of the test, the copied back data was compared with original.
- ☒ The EUT was connected to the PC by using USB data cable to charge.
- ☒ 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

4.9 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.)

4.9.1 Emission

Test type		Measurement uncertainty (C.L. 95 %, k = 2)
Conducted disturbance	AC Mains	± 3.31 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	± 4.59 dB
	Vertical	± 4.75 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	± 4.52 dB
	Vertical	± 4.51 dB

5. Results of individual test

5.1 Conducted disturbance

The EUT was connected to the Desk-Top Computer which was powered from one LISN for the measurements. The support equipment power cables were connected to a second LISN.

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 of Class B ITE

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

NOTE 1 The lower limit shall apply at the transition frequency.
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.1.1 Test instrumentation

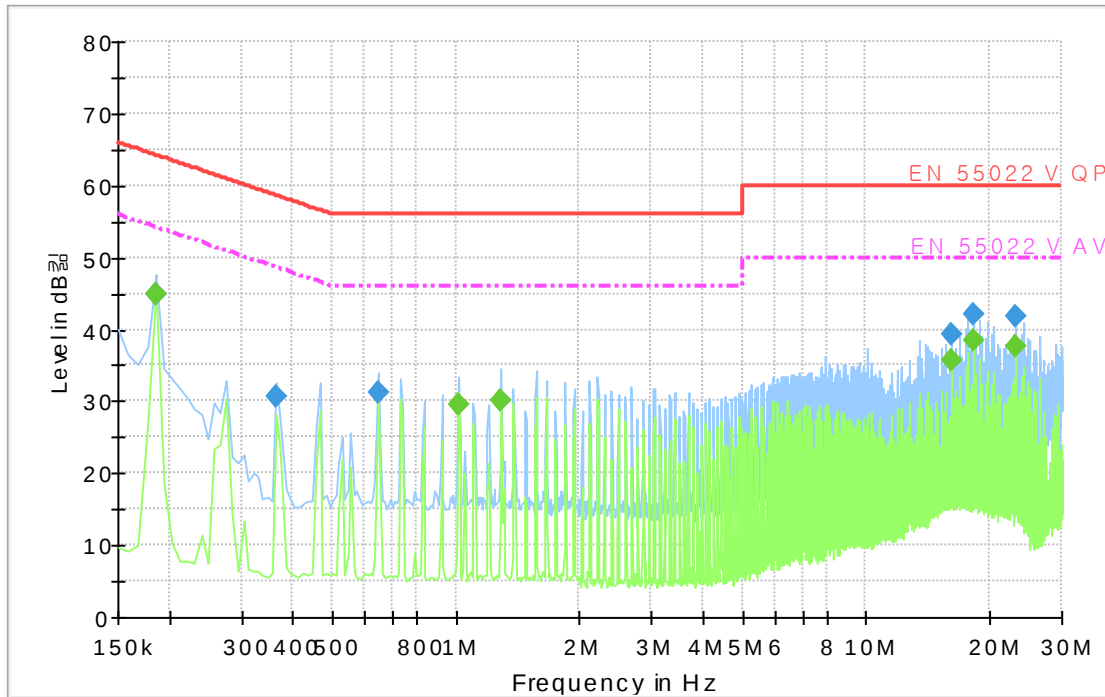
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Date of Calibration	
					Date	Interval (Month)
E3I-259	Two-Line V-Network	ENV216	R&S	101369	2012-12-07	12
E3I-049	Two-Line V-Network	ESH3-Z5	R&S	100260	2013-01-08	12
E3I-132	EMI TEST RECEIVER	ESIB-26	R&S	100291	2012-11-27	12

5.1.2 Temperature and humidity condition

Test date	2013-6-8	Test engineer	Ho-Jin Choi
Climate condition	Ambient temperature	23.6 °C	Limit (15.0 to 35.0) °C
	Relative humidity	32.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.7 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

5.1.3 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
0.186	44.9	10.1	64.2	19.3	L1
0.366	30.7	10.0	58.6	27.9	N
0.645	31.3	10.0	56.0	24.7	N
16.170	39.2	9.9	60.0	20.8	N
18.366	42.1	10.0	60.0	17.9	N
23.127	41.9	10.1	60.0	18.1	N

Average final measurement results table:

Frequency (MHz)	Level (dBμV)	Corr. (dB)	Limit (dBμV)	Margin (dB)	Line
0.186	44.7	10.1	54.2	9.5	L1
1.014	29.5	9.8	46.0	16.5	N
1.293	30.2	9.8	46.0	15.8	L1
16.170	35.6	9.9	50.0	14.4	N
18.366	38.4	10.0	50.0	11.6	N
23.127	37.7	10.1	50.0	12.3	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

5.2 Radiated disturbance

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 10 m for the following antenna and turntable arrangements:

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

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using quasi-peak detector.

Peak/RMS-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	Resolution Bandwidth [MHz]	Video Bandwidth [MHz]	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	1	3	Continuous

Measurements within 6 dB of the limit were then maximized by adjusting turntable position. Final measurements were made using peak and rms-average detector.

Limits for radiated disturbance of Class B ITE at a measuring distance of 3 m and 10 m

Frequency range Limits [MHz]	Field Strength		
	3 m [$\mu\text{V/m}$]	3 m [dB($\mu\text{V/m}$)]	10 m [dB($\mu\text{V/m}$)]
30 to 88	100	40.0	29.5
88 to 216	150	43.5	3.0
216 to 960	200	46.0	35.5
Above 960	500	54.0	43.5

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

5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Date of Calibration	
					Date	Interval (Month)
E3I-003	BILOG Antenna	CBL6112B	Schaffner	2805	2012-04-19	24
E3I-130	BILOG Antenna	CBL6112D	TESEQ	25513	2012-11-27	24
E3I-213	Preamplifier	317	SONOMA	282424	2012-11-14	12
E3I-214	Preamplifier	317	SONOMA	282425	2012-11-14	12
E3I-268	Horn Antenna	HF906	R&S	100291	2012-12-27	24
E3I-233	EMI TEST RECEIVER	ESU-26	R&S	100364	2012-10-26	12
E3I-228	EMI TEST RECEIVER	ESU-08	R&S	100084	2012-10-18	12

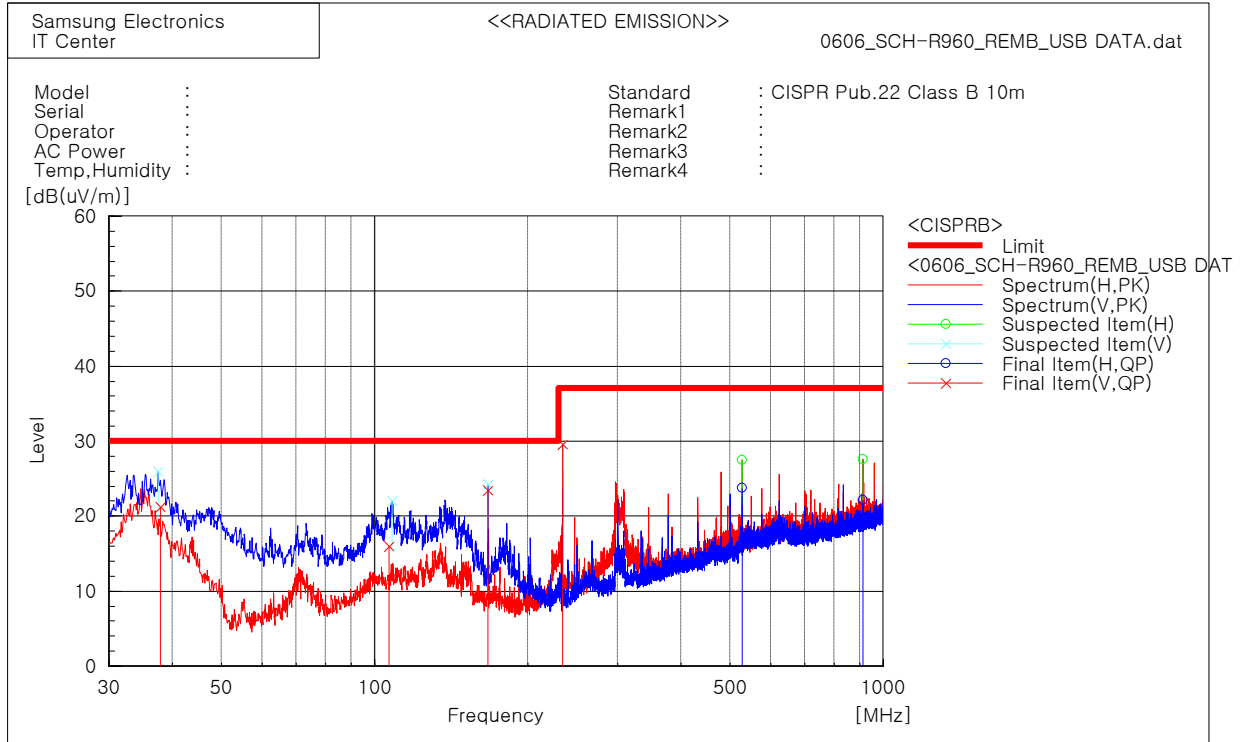
5.2.2 Temperature and humidity condition

Test date	2013-6-6 ~ 2013-6-11	Test engineer	Ho-Jin Choi
Climate condition	Ambient temperature	23.1 °C	Limit (15.0 to 35.0) °C
	Relative humidity	41.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	102.5 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC7)		

5.2.3 Test results

☐ Operating Mode 1

- Frequency range: 30 ~ 1 000 MHz



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]	System
1	528.042	37.6	-13.8	23.8	37.0	13.2	200.0	240.0	1
2	912.050	31.5	-9.3	22.2	37.0	14.8	300.0	240.0	1

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]	System
1	37.868	41.8	-20.5	21.3	30.0	8.7	198.0	48.0	2
2	106.628	39.7	-23.7	16.0	30.0	14.0	197.0	319.0	2
3	167.051	48.9	-25.5	23.4	30.0	6.6	100.0	324.0	2
4	233.866	53.8	-24.2	29.6	37.0	7.4	100.0	277.0	2

Note) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 10 m, Antenna Height : 1 to 4 meters

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

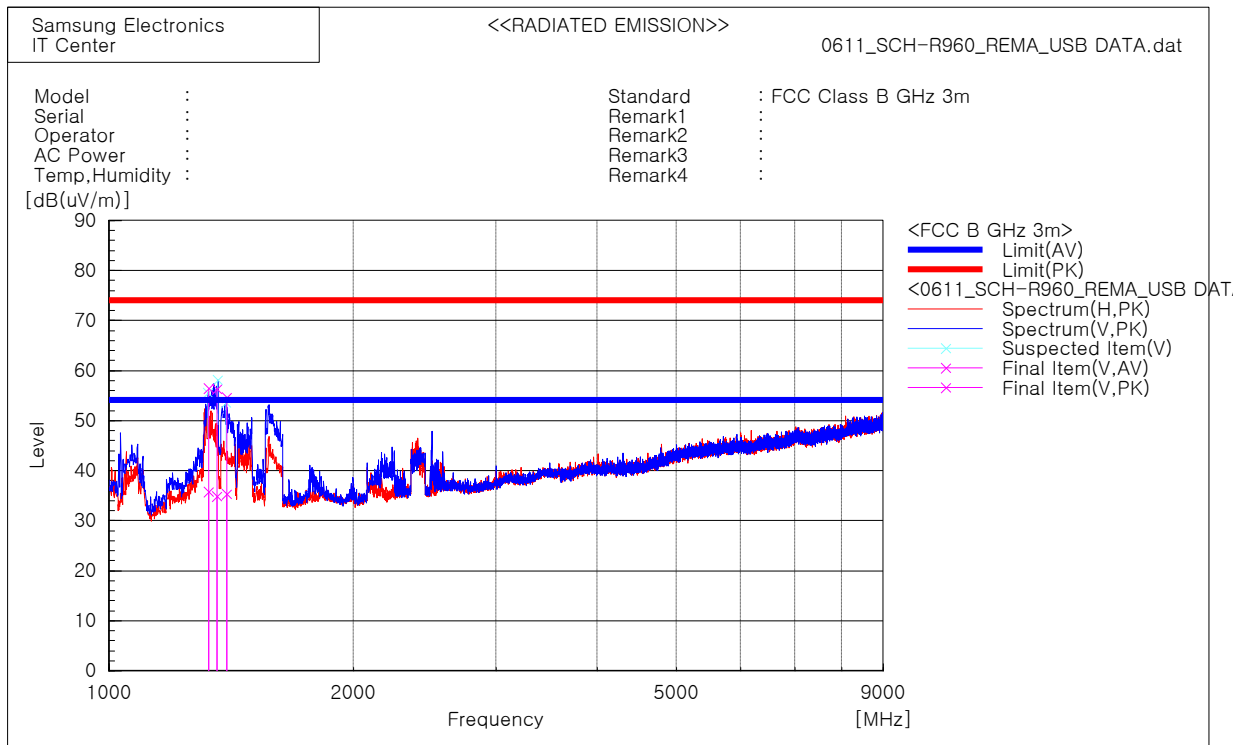
Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak

5.2.3 Test results

☐ Operating Mode 1

- Frequency range: 1 000 ~ 9 000 MHz



Final Result

--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]
1	1325.340	46.0	-10.2	35.8	54.0	18.2	100.0	283.0
2	1358.250	44.9	-10.0	34.9	54.0	19.1	100.0	252.0
3	1397.580	45.1	-9.7	35.4	54.0	18.6	100.0	252.0

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Height [cm]	Angle [deg]
1	1325.340	66.7	-10.2	56.5	74.0	17.5	100.0	283.0
2	1358.250	66.4	-10.0	56.4	74.0	17.6	100.0	252.0
3	1397.580	64.3	-9.7	54.6	74.0	19.4	100.0	252.0

Note 1) 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) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)

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

PK = Peak, AV = Average