EMC TEST REPORT

Project No.	LBE20124738	**Issue No.**	0
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	September 24, 2012	
EUT	**Type of device**	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSCHI930	
	Kind of product	Mobile Phone	
	Model No.	SCH-I930	
	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	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
Test Period		September 26, 2012 ~ September 27, 2012	
Issue date		October 5, 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 : Young-Jin Kim	**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.

SAMSUNG

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1. Report Information

1.1 Revision history

No.	Revised detailed information
Issue 0	- LBE20124738 (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, 443-742, 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.

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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-I930	-	SAMSUNG	A3LSCHI930
B	Battery	EB-L1G5HVA	NA1C628SS/4-B	SAMSUNG	-
C	Headset	EHS64AVFWE	-	SAMSUNG	-
D	Data Cable	ECC1DU6BBE	-	SAMSUNG	-
E	Micro SD Card	4GB	-	SANDISK	-
F	Desk-Top Computer	DCME	8JBVSBX	DELL	DoC
G	LCD Monitor	GH15LS	N719HVELA11890L	SAMSUNG	DoC
H	Mouse	MOARUO	MS-S5-AR03-01	SAMSUNG	DoC
I	Keyboard	GP-K5000U	15000099	SAMSUNG	DoC
J	Router	3CGS U08	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.

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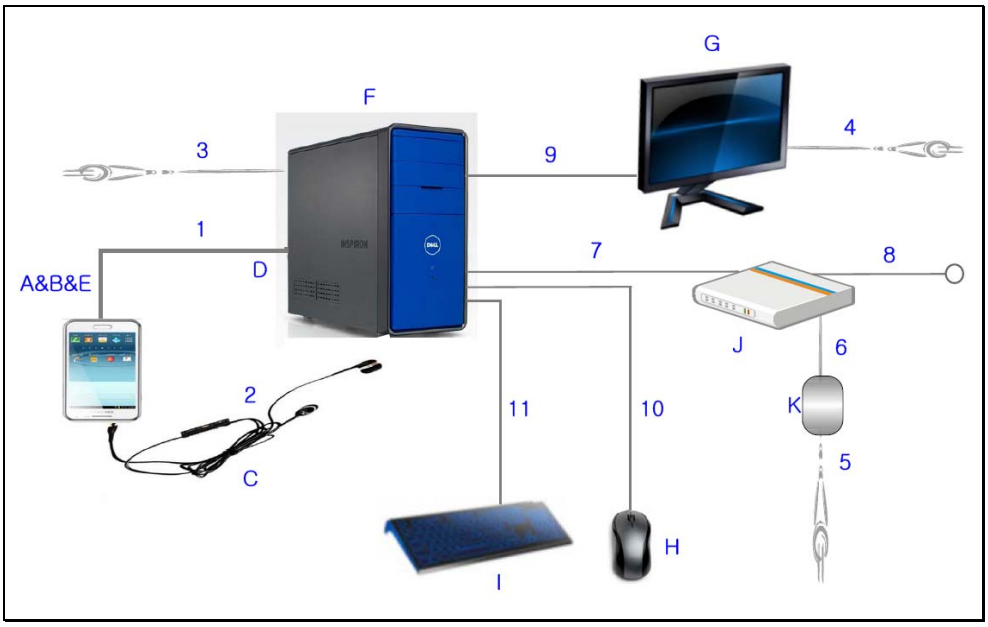
4.4 Used cable description

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	1.50	Yes	From EUT to Desk-Top Computer
2	Headset	1.25	No	For EUT
3	Power	1.80	No	For Desk-Top Computer
4	Power	1.80	No	For LCD Monitor
5	Power	1.80	No	For Power Supply
6	Power	3.90	No	From Router to Power Supply
7	LAN	1.50	No	From Desk-Top Computer to Router
8	LAN	1.50	No	From Desk-Top Computer to Local Area Network
9	RGB	1.80	Yes	From Desk-Top Computer to LCD Monitor
10	USB	1.80	Yes	From Desk-Top Computer to Mouse
11	USB	1.50	Yes	From Desk-Top Computer to Keyboard

4.5 Test arrangement



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4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	GSM 850	TX : 824 ~ 849 MHz RX : 869 ~ 894 MHz
	GSM 1 900	TX : 1 850 ~ 1 910 MHz RX : 1 930 ~ 1 990 MHz
Operating Temperature (℃)	-20 ~ +60	
Operating Humidity (%)	0 ~ 95	

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	1 200

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

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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	±3.24 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	±4.59 dB
	Vertical	±4.75 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	±4.18 dB
	Vertical	±4.15 dB

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5. Results of individual test

5.1 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 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.	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

5.1.2 Temperature and humidity condition

Test date	2012-09-27	Test engineer	Young-Jin Kim
Climate condition	Ambient temperature	24.0 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	44.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.2 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

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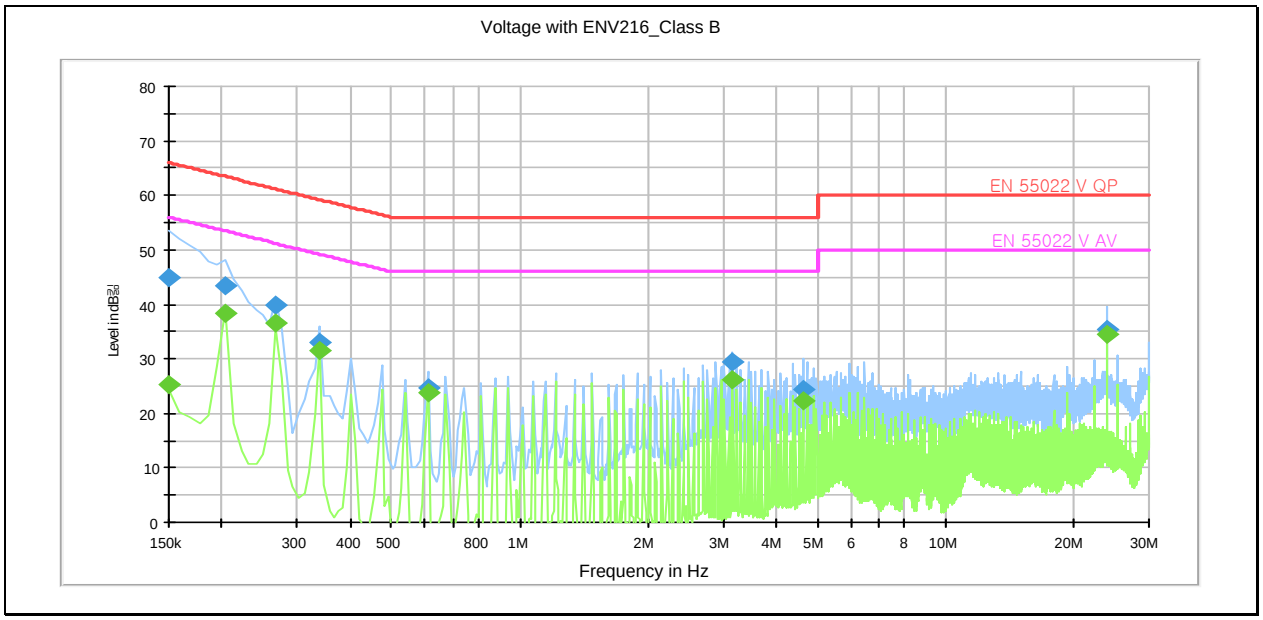
5.1.3 Test results

☐ 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)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	44.8	L1	9.9	21.20	66.00
0.204	43.4	L1	10.0	20.00	63.40
0.267	39.9	N	10.0	21.30	61.20
0.339	33.0	N	10.0	26.20	59.20
0.609	24.6	L1	0.0	31.40	56.00
3.165	29.4	N	9.7	26.60	56.00
4.650	24.5	N	9.8	31.50	56.00
23.901	35.5	L1	9.8	24.50	60.00

Average final measurement results table:

Frequency (MHz)	Level (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	25.2	L1	9.9	30.80	56.00
0.204	38.3	L1	10.0	15.10	53.40
0.267	36.6	N	10.0	14.60	51.20
0.339	31.5	N	10.0	17.70	49.20
0.609	23.8	L1	10.0	22.20	46.00
3.165	26.1	N	9.7	19.90	46.00
4.650	22.3	N	9.8	23.70	46.00
23.901	34.6	L1	9.8	15.40	50.00

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

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

Measurements within 6 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 Class B ITE at a measuring distance of 3 m and 10 m

Frequency range Limits [MHz]	Field Strength		
	3 m [μV/m]	3 m [dB(μV/m)]	10 m [dB(μV/m)]
30 to 88	100	40.0	29.5
88 to 216	150	43.5	33.0
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.

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5.2.1 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	Double-Ridged Waveguide Horn Antenna	3115	ETS Lindgren	00101620	2012-01-12	24
E3I-003	BILOG Antenna	CBL6112B	Schaffner	2805	2012-04-19	24
E3I-213	Preamplifier	317	Sonoma	282424	2011-12-06	12
E3I-214	Preamplifier	317	Sonoma	282425	2011-12-06	12
E3I-228	EMI Test Receiver	ESU8	R&S	100084	2011-10-10	12
E3I-233	EMI Test Receiver	ESU26	R&S	100364	2011-10-24	12

5.2.2 Temperature and humidity condition

Test date	2012-09-26	**Test engineer**	Young-Jin Kim
Climate condition	Ambient temperature	23.5 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	37.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.7 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

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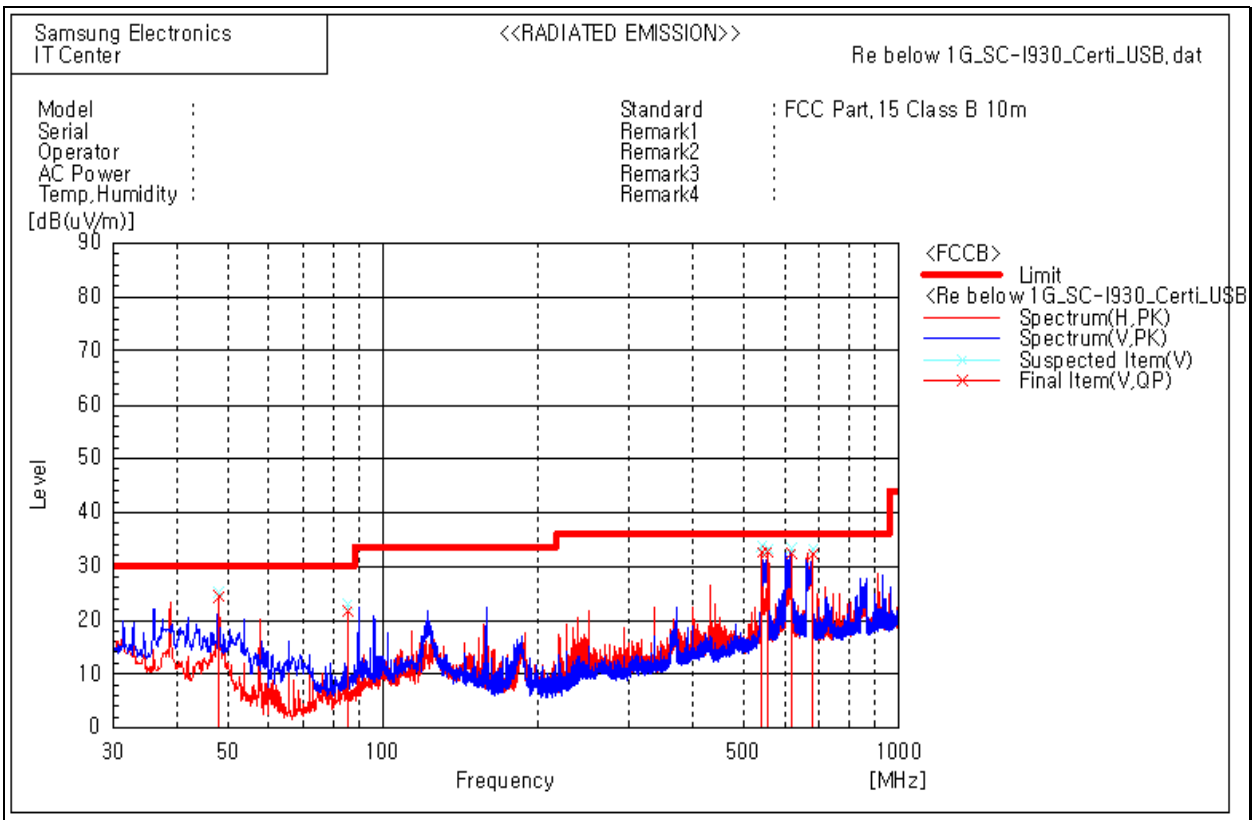
5.2.3 Test results

☐ 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]	System
1	47.945	V	52.7	-28.2	24.5	30.0	5.5	100.0	224.0	2
2	85.425	V	49.9	-28.1	21.8	30.0	8.2	100.0	231.0	2
3	543.251	V	47.8	-15.2	32.6	36.0	3.4	298.0	134.0	2
4	557.316	V	48.1	-15.4	32.7	36.0	3.3	298.0	156.0	2
5	619.154	V	47.1	-14.7	32.4	36.0	3.6	198.0	145.0	2
6	681.113	V	47.0	-14.7	32.3	36.0	3.7	198.0	131.0	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

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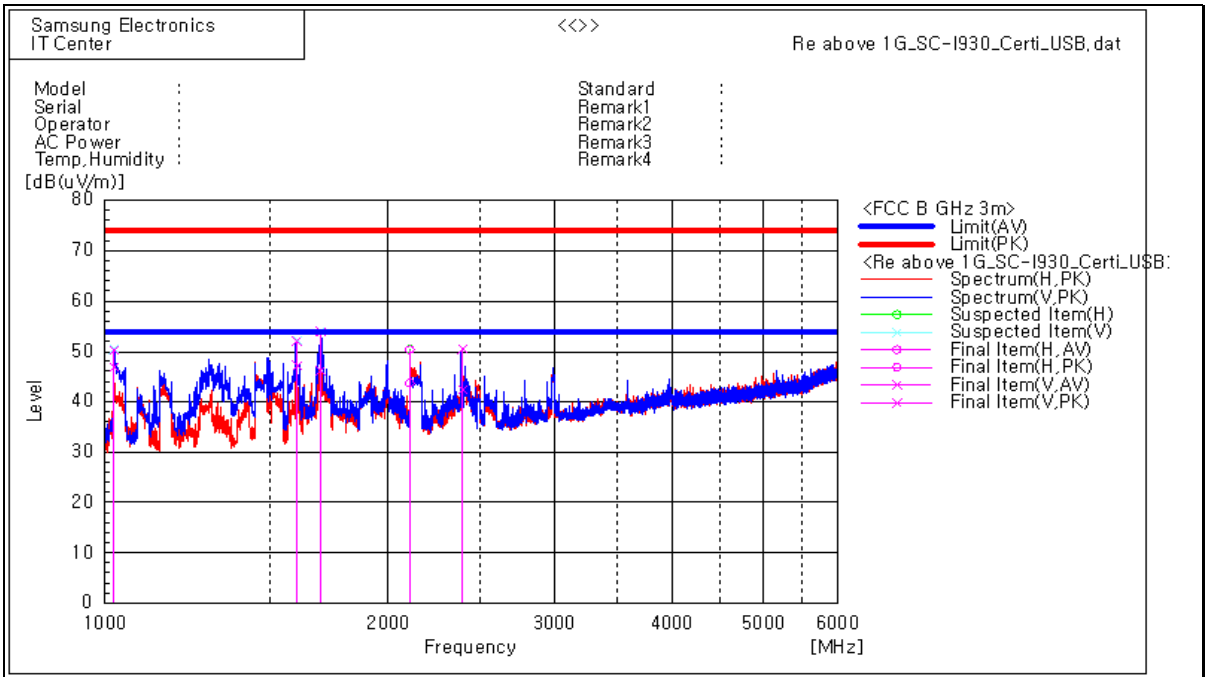
5.2.3 Test results

☐ Operating Mode 1

- Frequency range: 1 000 ~ 6 000 MHz



Final Result

--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
1	2108.750	49.4	-5.6	43.8	54.0	10.2

--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
1	2108.750	55.9	-5.6	50.3	74.0	23.7

--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
1	1023.750	59.4	-12.6	46.8	54.0	7.2
2	1598.750	56.5	-9.2	47.3	54.0	6.7
3	1693.125	54.6	-8.4	46.2	54.0	7.8
4	2398.125	47.9	-5.5	42.4	54.0	11.6

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]
1	1023.750	63.0	-12.6	50.4	74.0	23.6
2	1598.750	61.3	-9.2	52.1	74.0	21.9
3	1693.125	62.4	-8.4	54.0	74.0	20.0
4	2398.125	56.0	-5.5	50.5	74.0	23.5

Note) 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

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