

EMC TEST REPORT




Project No.	LBE20140759	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	February 11, 2014	
EUT	Type of device	<input checked="" type="checkbox"/> Class B personal computers and peripherals <input type="checkbox"/> All other devices	
	Equipment authorization	<input type="checkbox"/> Declaration of Conformity <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Verification	
	FCC ID	A3LSMG900A	
	Kind of product	Mobile Phone	
	Model No.	SM-G900A	
	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	47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2009		
Test Period	February 12, 2014 ~ February 14, 2014		
Issue date	February 21, 2014		
Test result : Complied			
<p>The equipment under test has found to be compliant with the applied standards. (Refer to the attached test result for more detail.)</p>			
Tested by : Young-Jin Kim		Reviewed by : Min-Gon Kim	
			
<p>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.</p>			
			
<p>(Maetan dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-so, 443-742, Republic of Korea Tel: 82 31 279 1750, Fax: 82 31 279 1745</p>			

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	7
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	There are no revisions and this version is basic test report.

2. Summary of test results

1.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result
<input checked="" type="checkbox"/>	Conducted Disturbance (Mains port)	47 CFR Part 15, Subpart B / ANSI C63.4-2009 (Class B)	Complied
<input checked="" type="checkbox"/>	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	SM-G900A	-	SAMSUNG	A3LSMG900A
B	Battery	EB-BG900BBU	AAaF128CS/2-B	SAMSUNG	-
C	Headset	EO-EG900BW	-	SAMSUNG	-
D	Data Cable	ET-DQ11Y1WE	-	SAMSUNG	-
E	Micro SD Card	32GB	-	SANDISK	-
F	Desk-Top Computer	DM301S3A	DF3A98ECAA000ME	SAMSUNG	DoC
G	LCD Monitor	U2713HMt	CN-0GK0KD-74445-332-106L	DELL	DoC
H	Mouse	M-S48a	LZA00153189	SAMSUNG	DoC
I	Keyboard	SKG-2000PB	CNBA5902830AGP53Z5A3485	SAMSUNG	DoC
J	Router	H3008	10070100009	EFM Networks	DoC
K	Power Supply	HB12B-050200SPA	HBK520201025	Shen Zhen	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

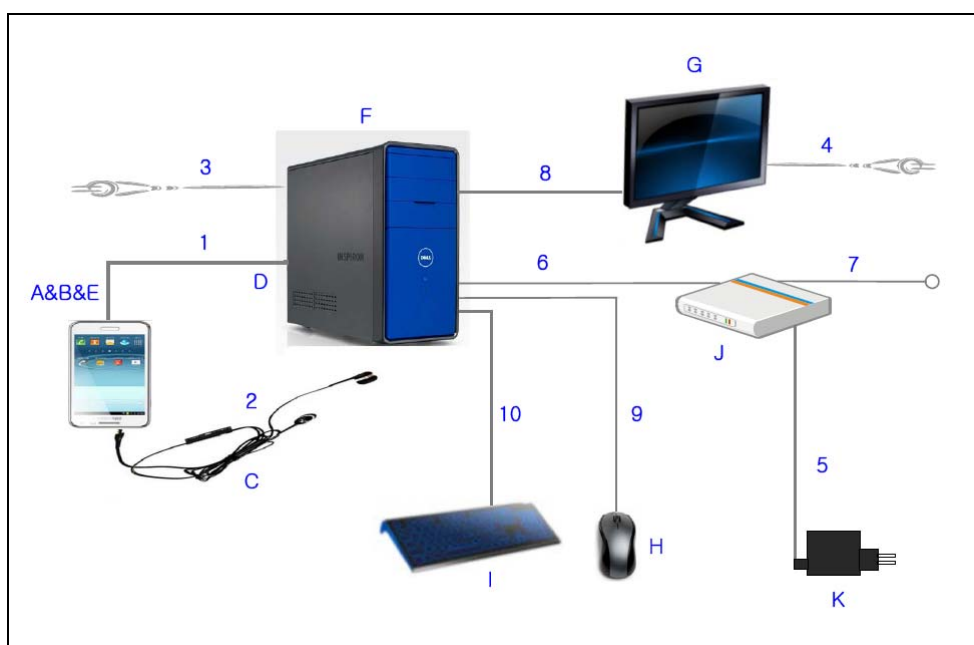
Customer selected, single unit.

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	1.5	Yes	From EUT to Desk-Top Computer
2	Headset	1.2	No	For EUT
3	Power	1.8	No	For Desk-Top Computer
4	Power	1.8	No	For LCD Monitor
5	Power	1.8	No	From Router to Power Supply
6	LAN	1.5	No	From Desk-Top Computer to Router
7	LAN	1.5 </td <td>No</td> <td>From Router to Local Area Network</td>	No	From Router to Local Area Network
8	RGB	1.8	Yes	From Desk-Top Computer to LCD TV Monitor
9	PS/2	1.8	Yes	From Desk-Top Computer to Mouse
10	PS/2	1.8	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	
Operating Temperature (°C)	-20 ~ +60	
Operating Humidity (%)	0 ~ 95	
Frequency Rang	GSM 850	TX : 824.2 ~ 848.8 MHz RX : 869.2 ~ 893.8 MHz
	GSM 1900	TX : 1 850.2 ~ 1 909.8 MHz RX : 1 930.2 ~ 1 989.8 MHz
	WCDMA 850	TX : 826.4 ~ 846.6 MHz RX : 871.4 ~ 891.6 MHz
	WCDMA 1900	TX : 1 852.4 ~ 1 907.6 MHz RX : 1 932.4 ~ 1 987.6 MHz
	LTE 700	TX : 706.5 ~ 713.5 MHz RX : 736.5 ~ 743.5 MHz
	LTE 850	TX : 826.5 ~ 846.5 MHz RX : 871.5 ~ 891.5 MHz
	LTE 1700	TX : 1 712.5 ~ 1 752.5 MHz RX : 2 112.5 ~ 2 152.5 MHz
	LTE 1900	TX : 1 852.5 ~ 1 907.5 MHz RX : 1 932.5 ~ 1 987.5 MHz

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	2 500

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	2.95 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.69 dB
	Vertical	4.83 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	5.47 dB
	Vertical	5.45 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

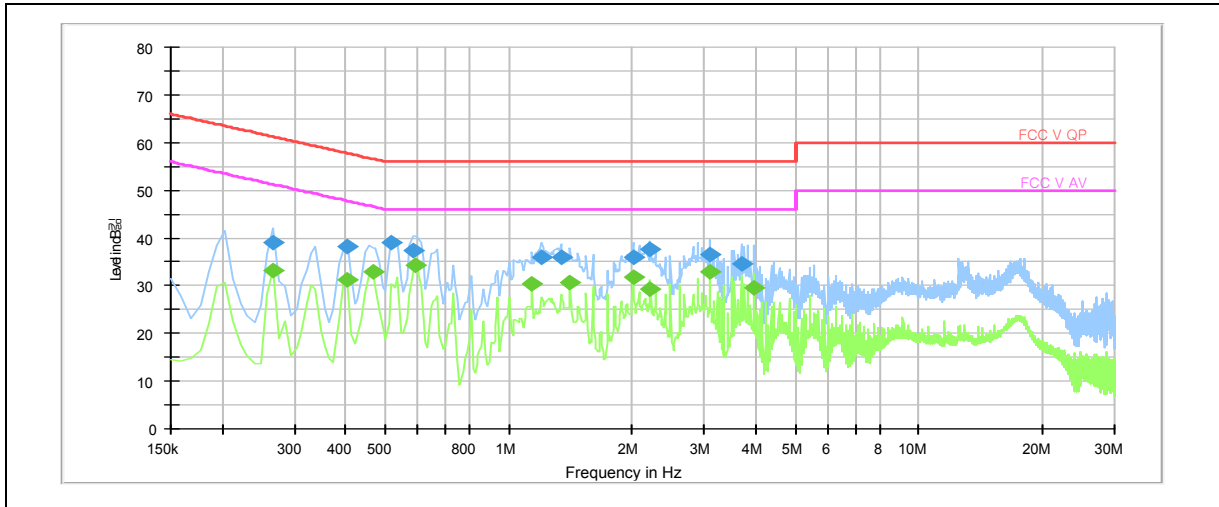
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E5I-016	EMI TEST RECEIVER	ESU	R&S	100482	2013-08-29	12
E3I-259	Two-Line V-Network	ENV216	R&S	101369	2013-11-17	12
E3I-260	Two-Line V-Network	ENV216	R&S	100366	2013-07-28	12

5.1.2 Temperature and humidity condition

Test date	2014-02-14	Test engineer	Young-Jin Kim
Climate condition	Ambient temperature	22.8 °C	Limit (15.0 to 35.0) °C
	Relative humidity	32.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.1 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.

Test Results (Quasi-Peak and CAV)

Quasi-peak final measurement results table

Frequency [MHz]	Quasi-Peak [dBμV]	Line	Factor [dB]	Margin [dB]	Limit [dBμV]
0.267	39.1	L1	10.0	22.1	61.2
0.402	38.2	L1	10.0	19.6	57.8
0.519	39.1	L1	10.0	16.9	56.0
0.582	37.3	L1	10.0	18.7	56.0
1.203	36.0	L1	9.8	20.0	56.0
1.338	36.0	L1	9.8	20.0	56.0
2.013	36.0	N	9.7	20.0	56.0
2.211	37.6	N	9.7	18.4	56.0
3.084	36.5	N	9.7	19.5	56.0
3.687	34.6	N	9.7	21.4	56.0

CAV final measurement results table

Frequency [MHz]	CAV [dBμV]	Line	Factor [dB]	Margin [dB]	Limit [dBμV]
0.267	33.2	L1	10.0	18.0	51.2
0.402	31.3	L1	10.0	16.5	47.8
0.465	32.8	L1	10.0	13.8	46.6
0.591	34.3	N	10.0	11.7	46.0
1.140	30.4	N	9.8	15.6	46.0
1.410	30.7	N	9.8	15.3	46.0
2.013	31.7	N	9.7	14.3	46.0
2.211	29.3	N	9.7	16.7	46.0
3.084	33.0	N	9.7	13.0	46.0
3.957	29.4	N	9.7	16.6	46.0

Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Factor (LISN Insertion Loss + Cable Loss)

Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)

QP = Quasi-Peak, CAV = CISPR-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 detectors.

Peak/CISPR-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 CISPR-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 [$\mu\text{V/m}$]	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	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.

5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-273	Preamplifier	317	SONOMA	312701	2013-03-30	12
E3I-274	Preamplifier	317	SONOMA	312702	2013-03-30	12
E3I-003	BILOG Antenna	CBL6112B	Schaffner	2805	2012-04-19	24
E3I-130	BILOG Antenna	CBL6112D	TESEQ	25513	2013-08-01	24
E3I-233	EMI TEST RECEIVER	ESU-26	R&S	100364	2013-07-25	12
E5I-019	EMI TEST RECEIVER	ESU-08	R&S	100485	2013-07-25	12
E3I-132	EMI TEST RECEIVER	ESIB-26	R&S	100291	2013-11-28	12
E3I-170	Double-Ridged Waveguide Horn Antenna	HF906	R&S	100028	2012-08-13	24

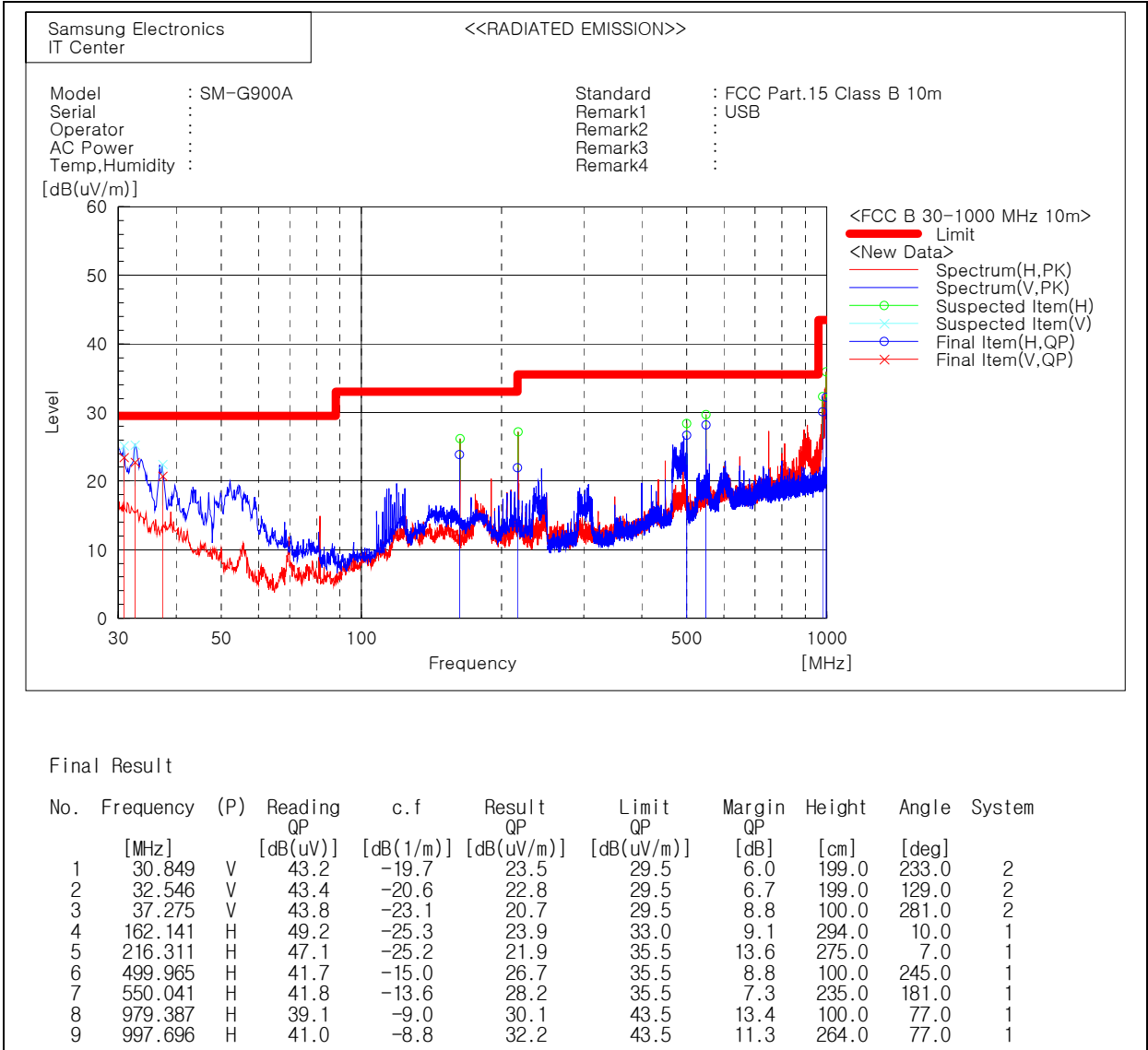
5.2.2 Temperature and humidity condition

Test date	2014-02-12	Test engineer	Young-Jin Kim
Climate condition	Ambient temperature	22.5 °C	Limit (15.0 to 35.0) °C
	Relative humidity	30.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.4 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

5.2.3 Test results

Operating Mode 1

- Frequencies below 1 GHz



Note) Receiving antenna polarization : Horizontal, Vertical

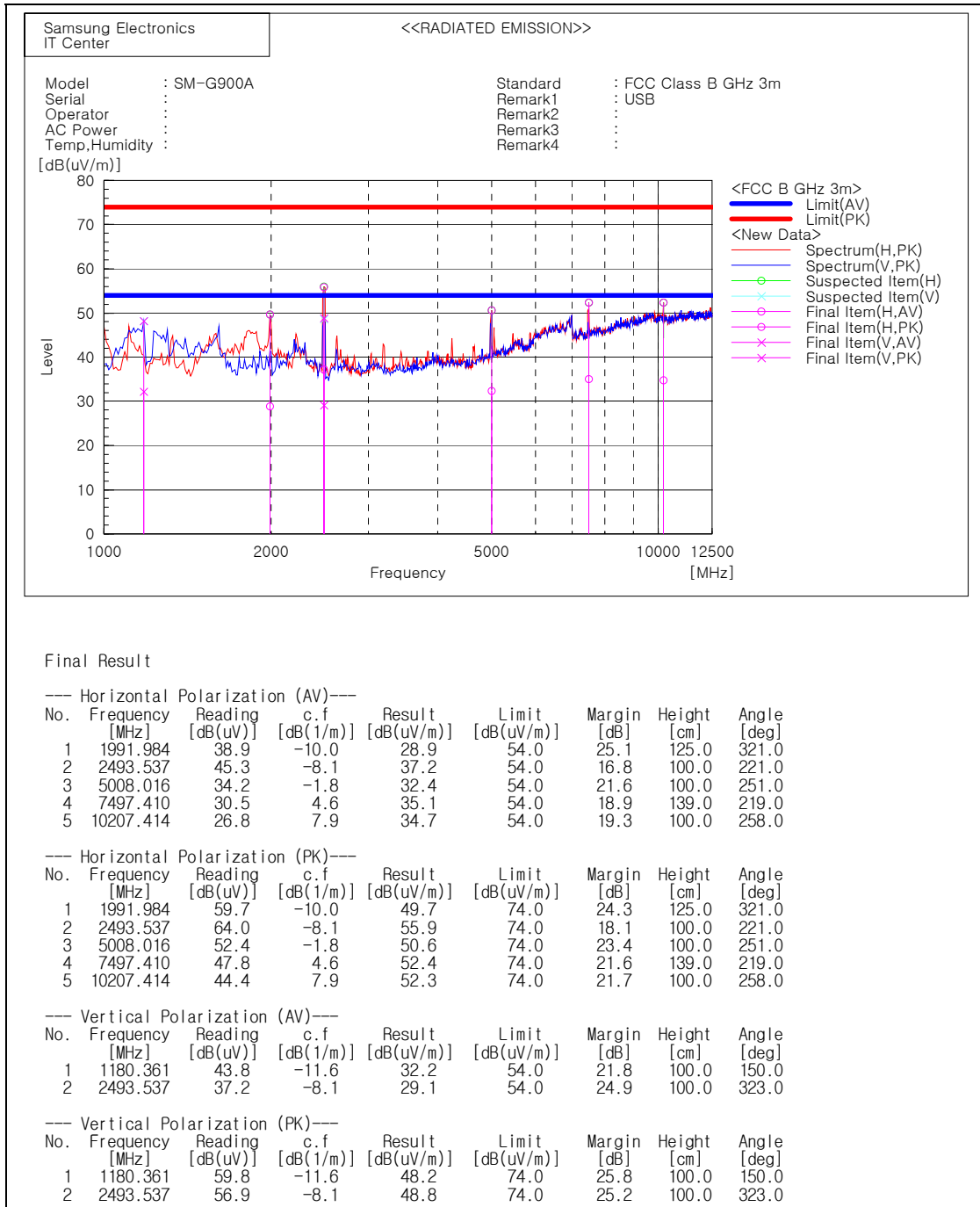
Test Distance : 10 m, Antenna Height : 1 to 4 meters

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

Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak, c.f = Correction Factor

- Frequencies above 1 GHz



Note 1) Receiving antenna polarization : Horizontal, Vertical

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

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

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

PK = Peak, CAV = CISPR-Average, c.f = Correction Factor