

EMC TEST REPORT

Project No.	LBE20124257	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	August 16, 2012	
EUT	Type of device	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LGTE3309	
	Kind of product	Mobile Phone	
	Model No.	GT-E3309	
	Variant Model No.	Refer to clause 4.6	
	Manufacturer	SEHZ Samsung Telecommunication 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		August 21, 2012 ~ August 24, 2012	
Issue date		August 30, 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 : Jeong-Soo 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.			
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1. Report Information

1.1 Revision history

No	Revised detailed information
Issue 0	- LBE20123519 (SAMSUNG)
Issue 1	- LBE20124257 (SAMSUNG) Changed the Headset (EHS64AVFWE → EHS61ASFBE) Changed the Data Cable (UF/ECC1DU6BBE → UM/ECB-DU28BE)

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.

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	GT-E3309	-	SAMSUNG	A3LGTE3309
B	Battery	AB463446BU		SAMSUNG	-
C	Headset	EHS61ASFBE	-	SAMSUNG	-
D	Data Cable	UM/ECB-DU28BE	-	SAMSUNG	-
E	microSD Card	4GB	-	SANDISK	-
F	Desktop PC	Compaq dx2200	CNG7060W0	HP	DoC
G	LCD Monitor	UN22C4000	ZOBY31KZ700003F	SAMSUNG	DoC
H	Mouse	N3+Optical	K034729902	HP	DoC
I	Keyboard	SDM8500P	8M000131	SAMSUNG	DoC
J	Router	3CFS U08	AB/ 9XSQ950036589	3COM	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)
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4.3 Details of Sampling

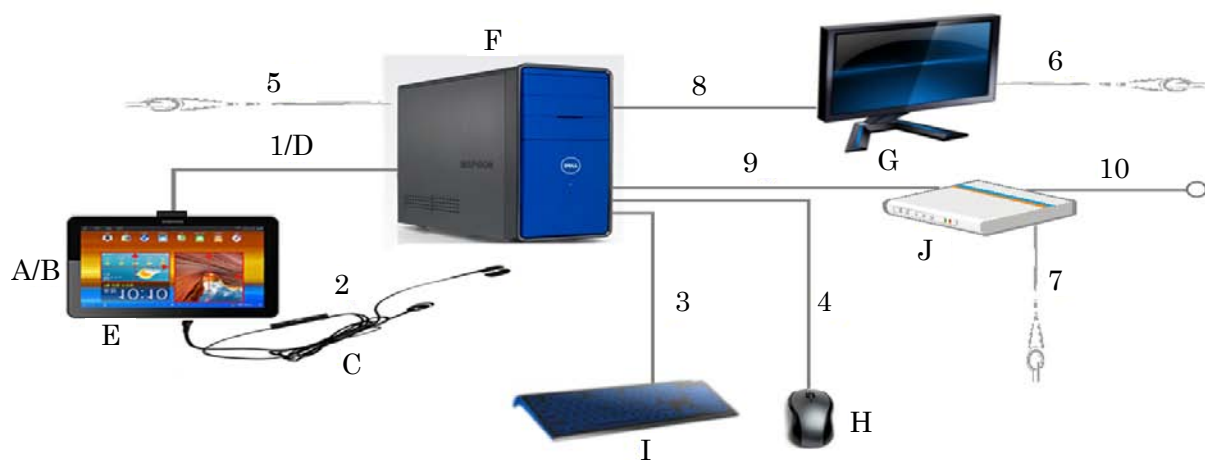
Customer selected, single unit.

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 Desktop PC
2	Headset	1.6	No	For Headset
3	PS2	1.8	Yes	For Keyboard
4	PS2	1.8	Yes	For Mouse
5	Power	1.8	No	For Desktop PC
6	Power	1.8	No	For Monitor
7	Power	1.8	No	For Router
8	RGB Cable	1.8	Yes	From Monitor to PC
9	LAN cable	1.5	Yes	From Desktop PC to Router
10	LAN cable	1.5	Yes	From Router to Building Network

4.5 Test arrangement



4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	GSM 850	TX : 824.2 ~ 848.8 MHz RX : 869.2 ~ 893.8 MHz
	PCS1900	TX : 1 850 ~ 1 910 MHz RX : 1 930 ~ 1 990 MHz
Operating Temperature (°C)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	468
USB Clock	480

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	± 3.24 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

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

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

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

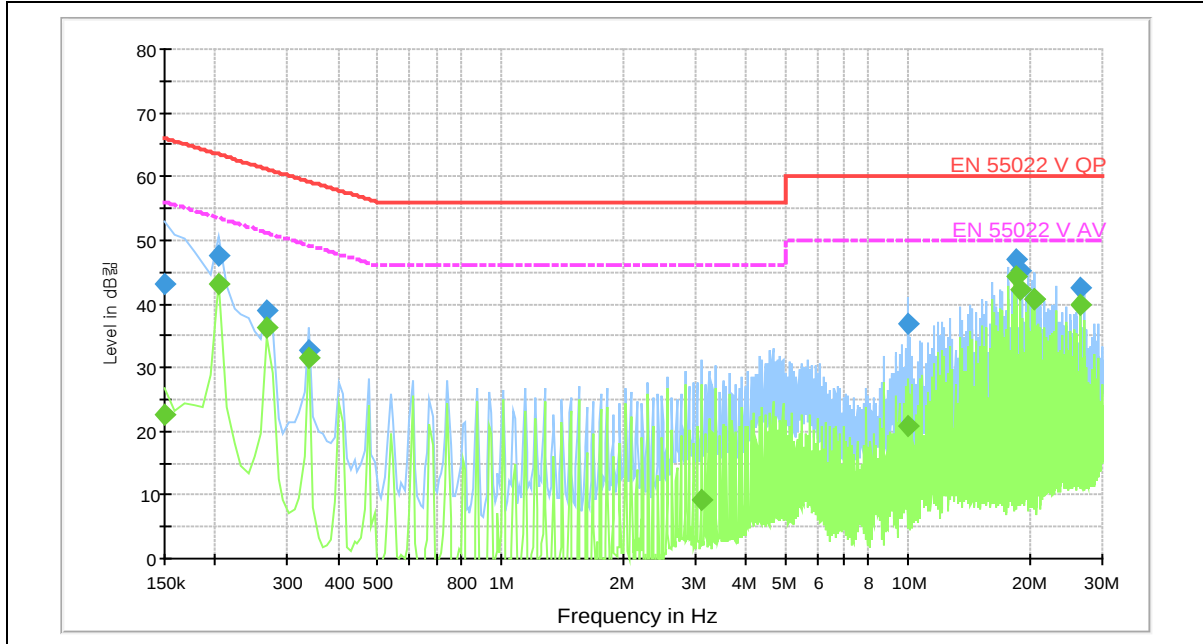
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E4I-093	Test Receiver	ESCI3	R&S	100086	2011-11-11	12
E3I-259	LISN	ENV216	R&S	101369	2011-10-11	12
E3I-050	LISN	ESH3-Z5	R&S	100263	2011-10-12	12

5.1.2 Temperature and humidity condition

Test date	2012-08-24	Test engineer	Jeong-Soo Kim
Climate condition	Ambient temperature	23.1 °C	Limit (15.0 to 35.0) °C
	Relative humidity	42.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.2 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)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150	43.2	N	9.9	22.8	66.0
0.204	47.5	N	10.0	15.9	63.4
0.267	38.8	N	10.0	22.4	61.2
0.339	32.7	N	10.0	26.5	59.2
10.005	36.8	L1	9.8	29.2	60.0
18.366	47.0	N	10.0	13.0	60.0
18.915	45.3	N	10.0	14.7	60.0
26.610	42.5	N	10.1	17.5	60.0

Average final measurement results table:

Frequency (MHz)	Level (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150	22.7	N	9.9	33.3	56.0
0.204	43.0	N	10.0	10.4	53.4
0.267	36.4	N	10.0	14.8	51.2
0.339	31.6	N	10.0	17.6	49.2
3.111	9.1	L1	9.8	36.9	46.0
10.005	20.8	L1	9.8	29.2	50.0
18.366	44.4	N	10.0	5.6	50.0
18.915	42.3	N	10.0	7.7	50.0
20.319	40.6	N	10.0	9.4	50.0
20.382	40.6	N	10.0	9.4	50.0
26.610	39.9	N	10.1	10.1	50.0

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	Video bandwidth	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	120 kHz	300 kHz	Continuous

Measurements within 6 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 and 10m

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

Peak/Average measurements were made over the changeable frequency range 1GHz to 40GHz or 5th in accordance with internal maximum operating frequency at a measurement distance of 3m 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

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

Class	Limits [dB($\mu\text{V/m}$)]	
	Peak	Average
A	80	60
B	74	54
Average limit 500, $20 \log 500 = 53.979 \text{ dB} \approx 54 \text{ dB}$		

Measurements within 6 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using peak and average detectors.

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-190	BILOG Antenna	CBL6112B	Schaffner	2804	2011-06-22	24
E3I-130	BILOG Antenna	CBL6112D	Teseq	25513	2010-11-12	24
E3I-231	Double-Ridged Waveguide Horn Antenna	3115	ETS Lindgren	00101620	2012-01-12	24
E3I-213	Preamplifier	317	Sonoma	282424	2011-12-06	12
E3I-214	Preamplifier	317	Sonoma	282425	2011-12-06	12
E4I-013	EMI Test Receiver	ESU8	R&S	100085	2012-03-22	12
E3I-233	EMI Test Receiver	ESU26	R&S	100364	2011-10-24	12

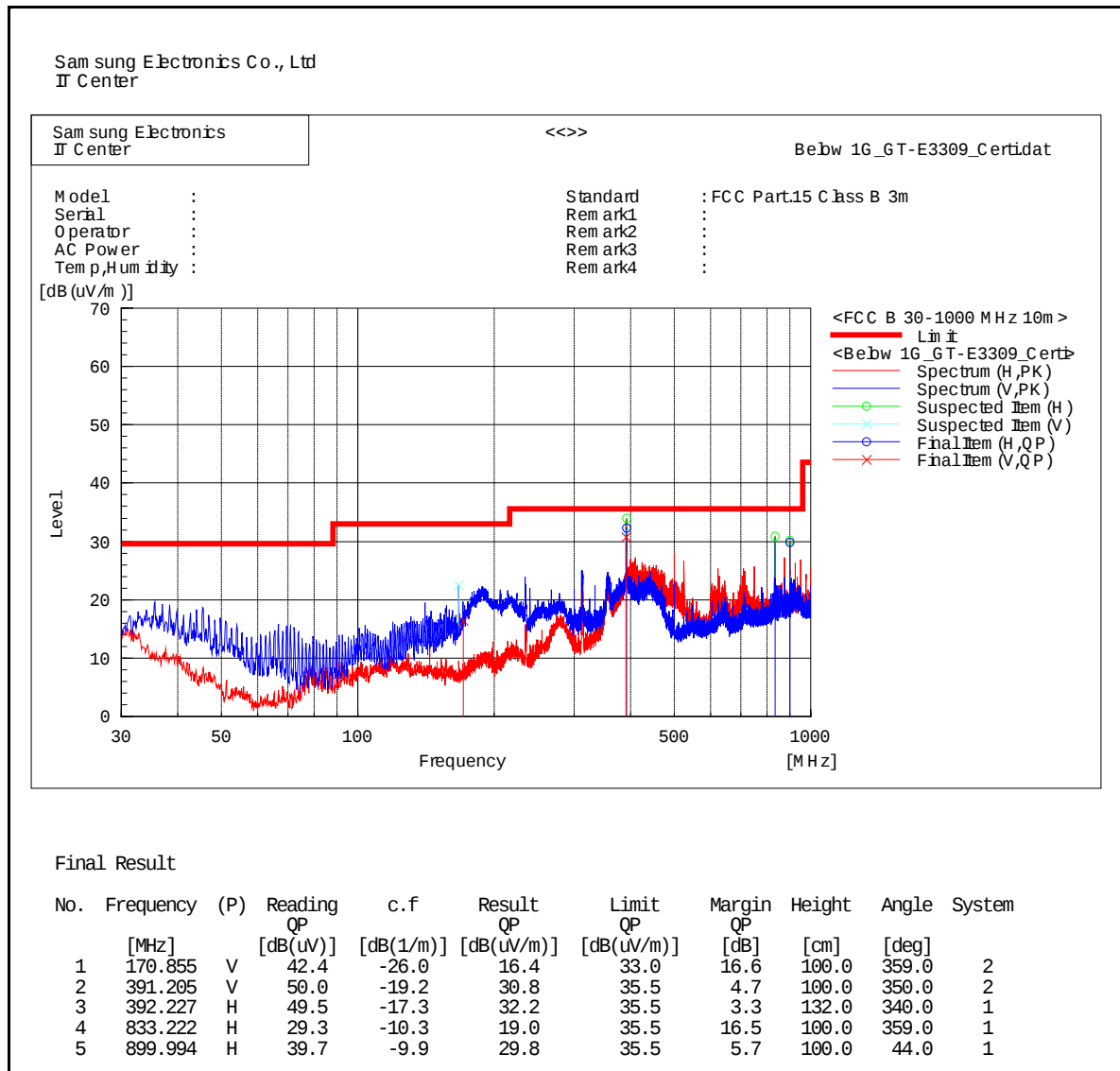
5.2.2 Temperature and humidity condition

Test date	2012-08-21	Test engineer	Jeong-Soo Kim
Climate condition	Ambient temperature	20.7 °C	Limit (15.0 to 35.0) °C
	Relative humidity	42.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.5 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

5.2.3 Test results

☐ Operating Mode 1

- Frequency range: 30 ~ 1 000 MHz



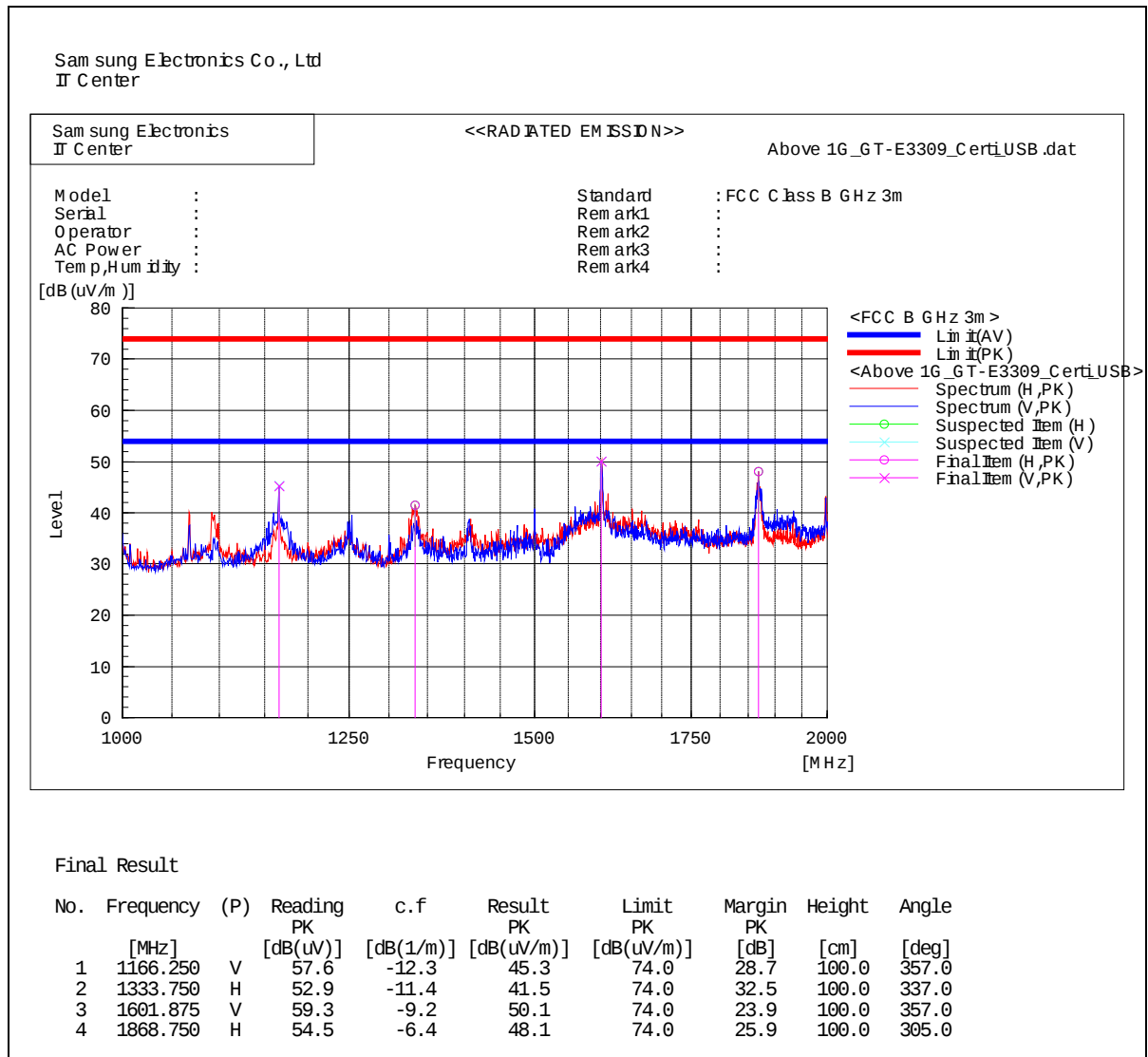
Note) Receiving antenna polarization : Horizontal, Vertical

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

- Frequency range: 1 000 ~ 2 000 MHz

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