

# EMC TEST REPORT

<b>Project No.</b>	LBE20122682	<b>Issue No.</b>	1
<b>Applicant</b>	<b>Name of organization</b>	Samsung Electronics Co., Ltd.	
	<b>Address</b>	416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	<b>Date of application</b>	May 10, 2012	
<b>EUT</b>	<b>Type of device</b>	Class B personal computers and peripherals	
	<b>Equipment authorization</b>	<input type="checkbox"/> Declaration of Conformity <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Verification	
	<b>FCC ID</b>	A3LGTS5698	
	<b>Kind of product</b>	Mobile Phone	
	<b>Model No.</b>	GT-S5698	
	<b>Variant Model No.</b>	Refer to clause 3.5	
	<b>Manufacturer</b>	SAMSUNG ELECTRONICS CO., LTD. 94-1, Imsu-dong, Gumi-si, Gyengsangbuk-do, 730-722, Republic of Korea  TIANJIN SAMSUNG TELECOM TECHNOLOGY CO., LTD. 300385 China Tianjin No.9, WeiWu Rd., Micro Electronic Industrial Park, Xiqing Dist, Tianjin, China	
<b>Applied Standards</b>		FCC Part 15, Subpart B, Class B / ANSI C63.4-2003	
<b>Test Period</b>		May 11, 2012 ~ May 14, 2012	
<b>Issue date</b>		May 14, 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** : Jong-Sup Jeong



**Reviewed by** : Tae-Young Jang



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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
<input checked="" type="checkbox"/>	Conducted Disturbance (Mains port)	FCC Part 15 Subpart B / ANSI C63.4-2003	Complied	Meets Class B Limit
<input checked="" type="checkbox"/>	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	GT-S5698	-	SAMSUNG	A3LGTS5698
Battery	EB484659VU	TH1BC02AS/5-B	SAMSUNG	-
Headset	EHS49AS0WE	-	SAMSUNG	-
Data Cable	APCBU11BBC	-	SAMSUNG	-
microSD Card	2GB	-	SANDISK	-
Desk-Top Computer	HP Compaq dx2200 Microtower	CNG7060LW0	HP	DoC
LCD TV Monitor	PM24KO	ZQ9XH1HBC00520E	SAMSUNG	DoC
Mouse	N3+Optical	K034729902	HP	DoC
Keyboard	SDM8500P	8M000131	SAMSUNG	DoC
Gigabit Switch 8	3CGSU08	AB/9XRQAC0024825	3COM	DoC
Power Supply	PW150	KA1203N03	AULT	DoC

### 3.2 EUT operating mode

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

<b>Operating Mode 1</b>	USB Mode (Data Communication)
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### 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	1.0	Yes	From EUT to Desk-Top Computer
Headset	1.6	No	For EUT
Power	1.8	No	For Desk-Top Computer
Power	1.8	No	For LCD TV Monitor
Power	1.8	No	For Power Supply
Power	1.8	No	From Gigabit Switch 8 to Power Supply
LAN	1.5	No	From Desk-Top Computer to Gigabit Switch 8
LAN	1.5	No	From Desk-Top Computer to Local Area Network
RGB	1.8	Yes	From Desk-Top Computer to LCD TV Monitor
PS/2	1.8	Yes	From Desk-Top Computer to Mouse
PS/2	1.8	Yes	From Desk-Top Computer to Keyboard

### 3.5 EUT Description

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

Item	Specification	
Frequency Range	GSM1900	TX : 1 850.2 ~ 1 909.8 MHz RX : 1 930.2 ~ 1 989.8 MHz
Operating Temperature (°C)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	

2. The variant models

- None

### 3.6 Clock Frequencies

Kind of Clocks	Frequency [ MHz ]
<b>CPU</b>	<b>806</b>
USB 2.0	24

### 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	$\pm 3.24$ dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	$\pm 4.59$ dB
	Vertical	$\pm 4.75$ dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	$\pm 4.18$ dB
	Vertical	$\pm 4.15$ 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

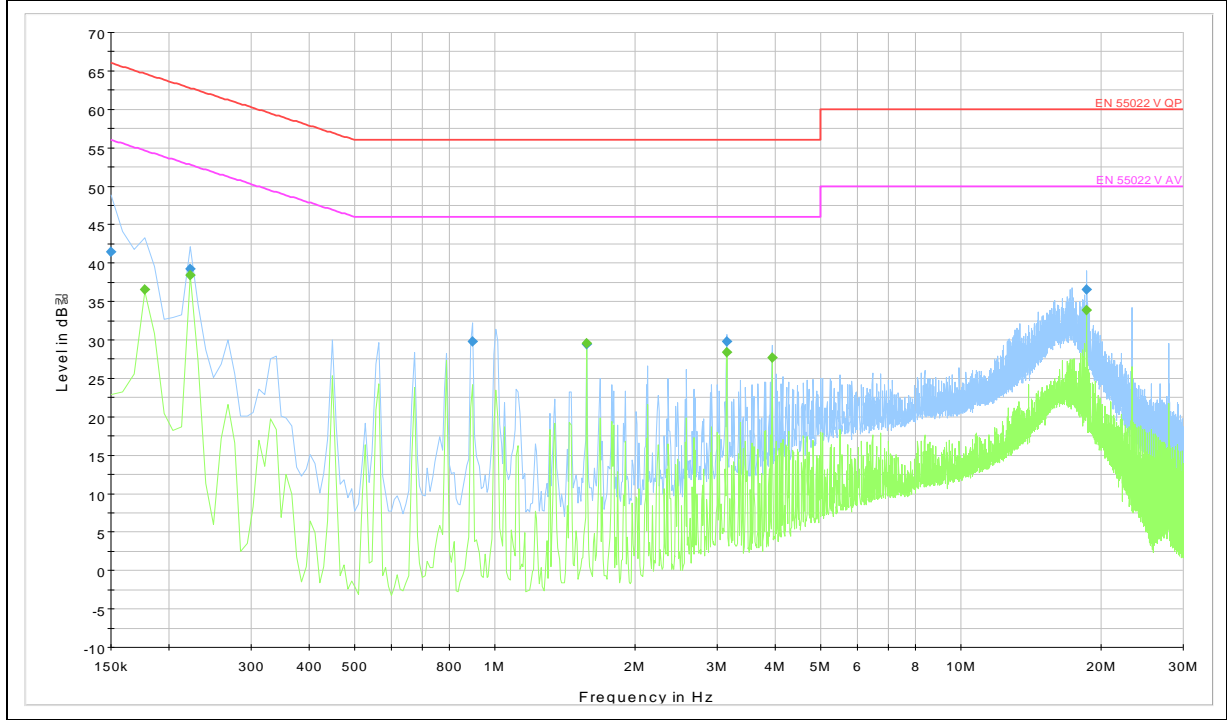
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E4I-093	Test Receiver	ESCI	R&S	100086	2011-11-11	12
E3I-050	LISN	ESH3-Z5	R&S	100263	2011-10-12	12
E3I-259	LISN	ENV216	R&S	101369	2011-10-11	12

#### 4.1.2 Temperature and humidity condition

Test date	2012-05-14	Test engineer	Jong-Sup Jeong
Climate condition	Ambient temperature	23.4 °C	Limit (15.0 to 35.0) °C
	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)		

## 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
0.150	41.5	9.9	66.0	24.5	L1
0.222	39.2	10.0	62.7	23.5	N
0.897	29.7	9.9	56.0	26.3	N
1.572	29.4	9.8	56.0	26.6	L1
3.147	29.7	9.8	56.0	26.3	L1
18.636	36.5	9.8	60.0	23.5	L1

Average final measurement results table:

Frequency (MHz)	Level (dBµV)	Corr. (dB)	Limit (dBµV)	Margin (dB)	Line
0.177	36.6	10.2	54.6	18.1	N
0.222	38.4	10.0	52.7	14.3	N
1.572	29.5	9.8	46.0	16.5	L1
3.147	28.3	9.8	46.0	17.7	L1
3.930	27.7	9.8	46.0	18.3	L1
18.636	33.9	9.8	50.0	16.1	L1

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 ( $L - 20\text{dB}$ ), 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 10 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 5<sup>th</sup> 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 and 10 m

Frequency range Limits [ MHz ]	Field Strength		
	$\mu\text{V/m}$	$\text{dB}(\mu\text{V/m})$	$\text{dB}(\mu\text{V/m})$
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.

#### 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-175	Preamplifier	310N	Sonoma	273121	2011-12-06	12
E3I-231	Horn Antenna	3115	ETS Lindgren	00101620	2012-01-12	24
E3I-257	EMI Test Receiver	ESU26	R&S	100364	2011-10-24	12

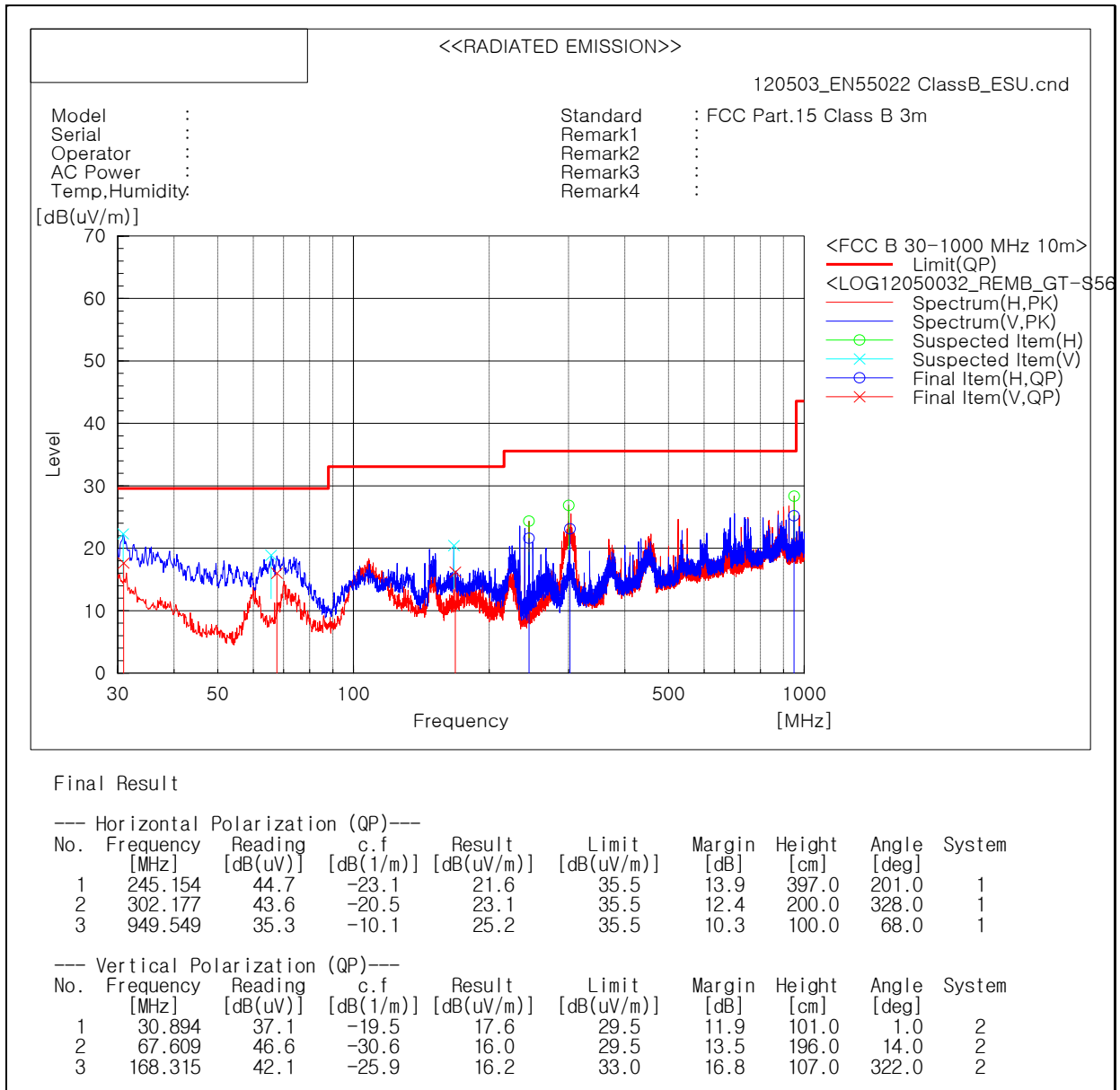
#### 4.2.2 Temperature and humidity condition

<b>Test date</b>	2012-05-11	<b>Test engineer</b>	Jong-Sup Jeong
<b>Climate condition</b>	Ambient temperature	24.2 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	39.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.5 kPa	Limit (86.0 to 106.0) kPa
<b>Test place</b>	Semi-Anechoic Chamber (SAC4)		

### 4.2.3 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

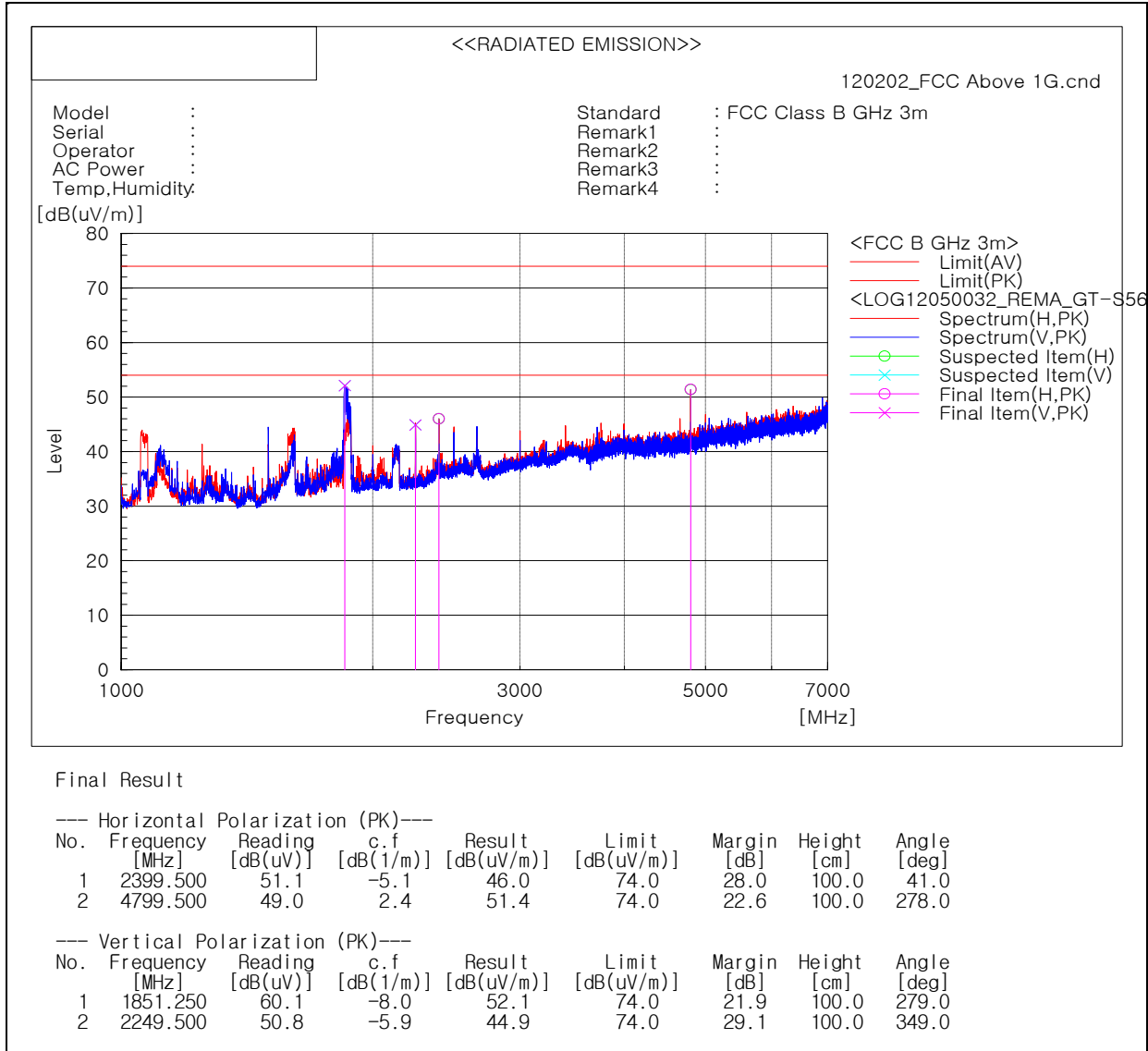
Level (QP) = Reading (QP) + c.f (Antenna Factor + Cable Loss - Amp. Gain)

Margin (QP) = Limit - Level (QP)

QP = Quasi-Peak

Operating Mode 1

- Frequency range: 1 000 ~ 6 000 MHz



Note 1) Representative operating modes were selected by customer and any emissions that do not exceed average limit were not tested with average detector mode.

Note 2) 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