EMC TEST REPORT

Project No.	LBE20123519	**Issue No.**	0
Applicant	**Name of organization**	Samsung Electronics Co., Ltd.	
	Address	416, Maetan 3-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	Date of application	July 6, 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		July 10, 2012 ~ July 12, 2012	
Issue date		July 23, 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 : Su-Young Son	**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	- LBE20123519 (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 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.

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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	GT-E3309	-	SAMSUNG	A3LGTE3309
B	Battery	AB463446BU		SAMSUNG	-
C	Headset	EHS64ASFWE	-	SAMSUNG	-
D	Data Cable	UF/ECC1DU6BBE	-	SAMSUNG	-
E	microSD Card	4GB	-	SANDISK	-
F	Desktop PC	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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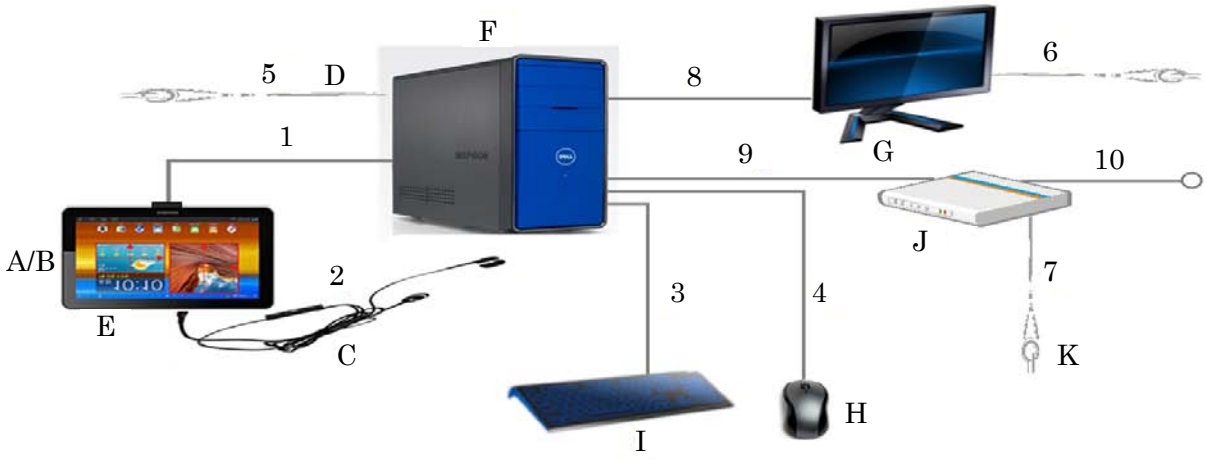
4.4 Used cable description

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	1.5	Yes	From EUT to Desktop PC
2	Headset	1.2	No	For Headset
3	USB Cable	1.6	Yes	For Keyboard
4	USB Cable	1.7	Yes	For Mouse
5	Power	1.7	No	For Desktop PC
6	Power	1.7	No	For Monitor
7	Power	3.9	No	For Power Supply
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



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4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	PCS1900	TX : 1 850 ~ 1 910 MHz RX : 1 930 ~ 1 990 MHz
Operating Temperature (℃)	-20 ~ +50	
Operating Humidity (%)	0 ~ 95	

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	468

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	±4.64 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

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	2012-07-10	**Test engineer**	Su-Young Son
Climate condition	Ambient temperature	23.4 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	43.1 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.7 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR8)		

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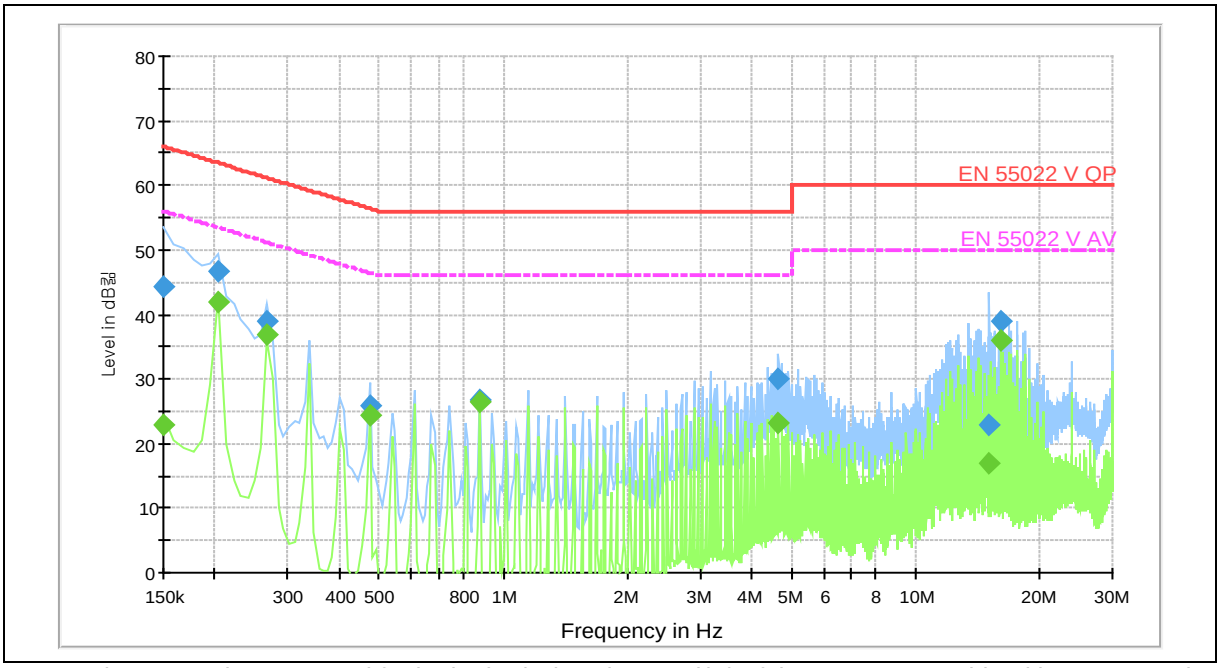
5.1.3 Test results

- 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	44.2	N	9.9	21.8	66.0
0.204	46.7	N	10.0	16.7	63.4
0.267	38.9	N	10.0	22.3	61.2
0.474	25.9	L1	10.0	30.5	56.4
0.879	26.8	N	9.9	29.2	56.0
4.659	30.0	L1	9.8	26.0	56.0
15.117	23.0	N	9.9	37.0	60.0
16.170	39.0	N	9.9	21.0	60.0

Average final measurement results table:

Frequency (MHz)	Level (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	23.0	N	9.9	33.0	56.0
0.204	41.9	N	10.0	11.5	53.4
0.267	36.9	N	10.0	14.3	51.2
0.474	24.5	L1	10.0	22.0	46.4
0.879	26.4	N	9.9	19.6	46.0
4.659	23.2	L1	9.8	22.8	46.0
15.117	16.9	N	9.9	33.1	50.0
16.170	35.8	N	9.9	14.2	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

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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 3 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

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

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

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

Class	Limits [dB(μV/m)]	
	Peak	Average
A	80	60
B	74	54
Average limit 500, 20 log 500 = 53.979 dB ≒ 54 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.

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5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-233	EMI Test Receiver	ESU-26	R&S	100364	2011-10-24	12
E3I-231	Horn Antenna	3115	ETS Lindgren	00101620	2012-01-12	24
E3I-175	Preamplifier	310N	Sonoma	273121	2011-12-06	12
E3I-130	BILOG Antenna	CBL6112D	TESEQ	25513	2010-11-12	24

5.2.2 Temperature and humidity condition

Test date	2012-07-12	**Test engineer**	Su-Young Son
Climate condition	Ambient temperature	20.1 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	42.6 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.8 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

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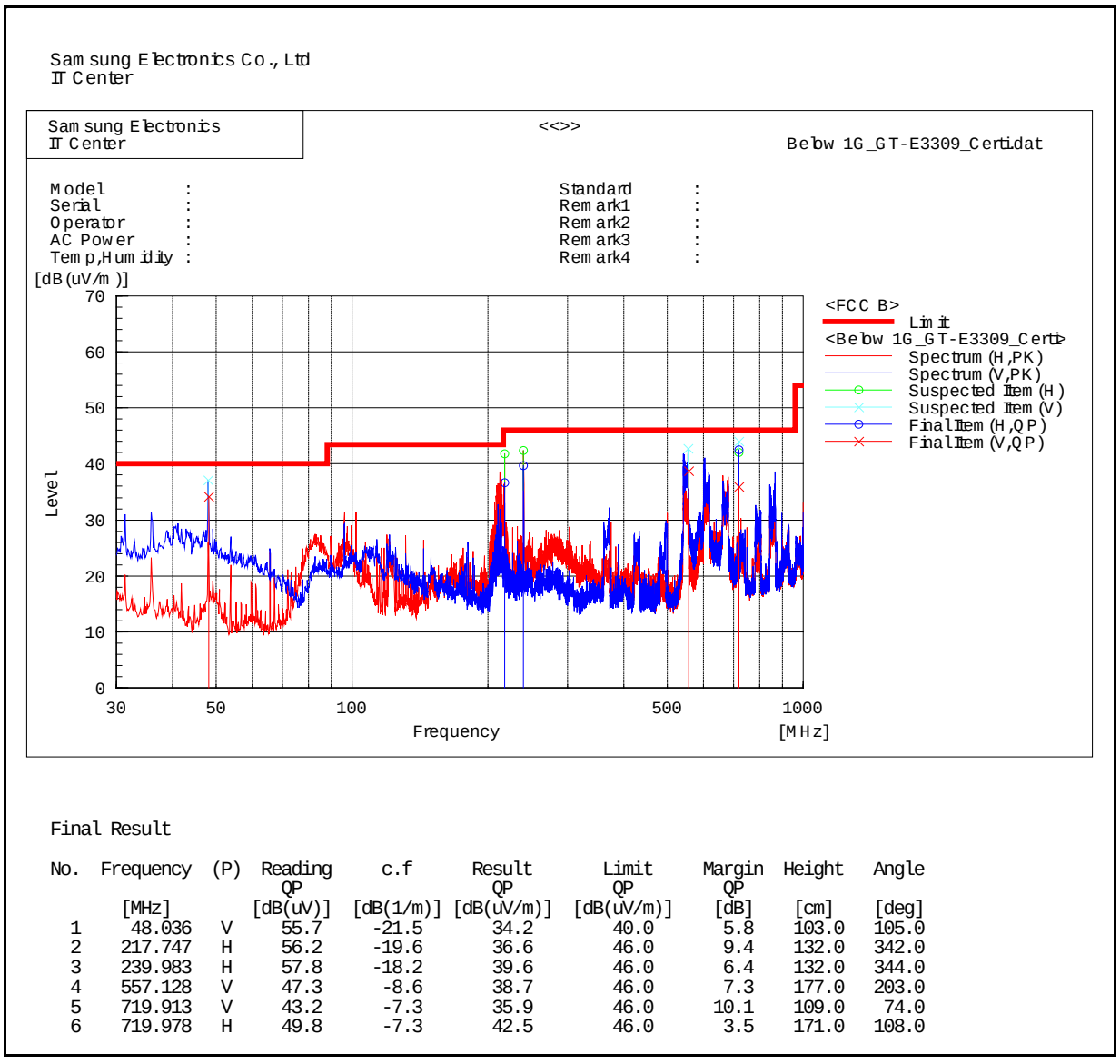
5.2.3 Test results

☐ 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]
1	48.036	V	55.7	-21.5	34.2	40.0	5.8	103.0	105.0
2	217.747	H	56.2	-19.6	36.6	46.0	9.4	132.0	342.0
3	239.983	H	57.8	-18.2	39.6	46.0	6.4	132.0	344.0
4	557.128	V	47.3	-8.6	38.7	46.0	7.3	177.0	203.0
5	719.913	V	43.2	-7.3	35.9	46.0	10.1	109.0	74.0
6	719.978	H	49.8	-7.3	42.5	46.0	3.5	171.0	108.0

Note) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 3 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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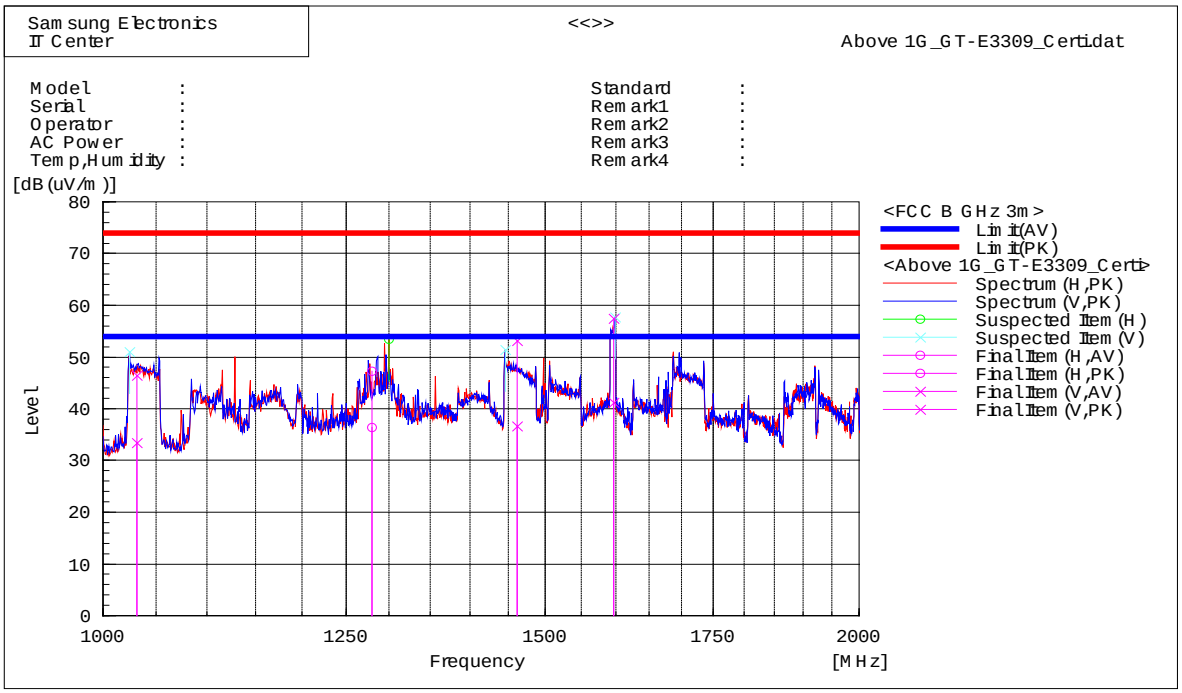
- Frequency range: 1 000 ~ 2 000 MHz



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	1280.044	47.8	-11.4	36.4	54.0	17.6

--- 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	1280.044	58.6	-11.4	47.2	74.0	26.8

--- 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	1031.445	45.6	-12.2	33.4	54.0	20.6
2	1461.744	47.0	-10.4	36.6	54.0	17.4
3	1597.257	50.9	-9.7	41.2	54.0	12.8

--- 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	1031.445	58.7	-12.2	46.5	74.0	27.5
2	1461.744	63.5	-10.4	53.1	74.0	20.9
3	1597.257	67.2	-9.7	57.5	74.0	16.5

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

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