EMC TEST REPORT

Project No.	LBE20145189	**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 27, 2014	
EUT	**Type of device**	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSMG130BT	
	Kind of product	Mobile Phone	
	Model No.	SM-G130BT	
	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 Samsung Electronica Da Amazonia Ltda. (Campinas) 730-722 CEP13097-105 R. Thomas Nilsen Junior, 150 Pq. Imperador, Campinas, SP, Brazil	
Applied Standards		47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2009	
Test Period		September 30, 2014 ~ October 01, 2014	
Issue date		October 06, 2014	

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 : Min-Gon Kim	**Reviewed by** : Tae-Young Jang

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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
☒	Conducted Disturbance (Mains port)	47 CFR Part 15, Subpart B / ANSI C63.4-2009 (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, 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	SM-G130BT	-	SAMSUNG	A3LSMG130BT
B	Battery	EB-BG130ABE	AA1F813vS/4-B	SAMSUNG	-
C	Headset	EHS61ASFWE	-	SAMSUNG	-
D	USB Cable	ECB-DU28WE	KD1DB19TS E	SAMSUNG	-
E	Micro SD Card	32GB	-	SANDISK	-
F	Desk-Top Computer	HP Compaq dx2200 Microtower	CNG7060LW0	HP	DoC
G	LCD Monitor	U2713HMt	CN-0GK0KD-74445-332-106L	Dell	DoC
H	Mouse	M-SBF96	LZ949BG0D9Y	Logitech	DoC
I	Keyboard	SKG-2000PB	CNBA5902830AGP53Z5A3485	SAMSUNG	DoC
J	Router	T3004	T300475G00563	EFM Networks	DoC
K	Power Supply	FS0D0900800K	FW121030770D13041902138	FAIRONE	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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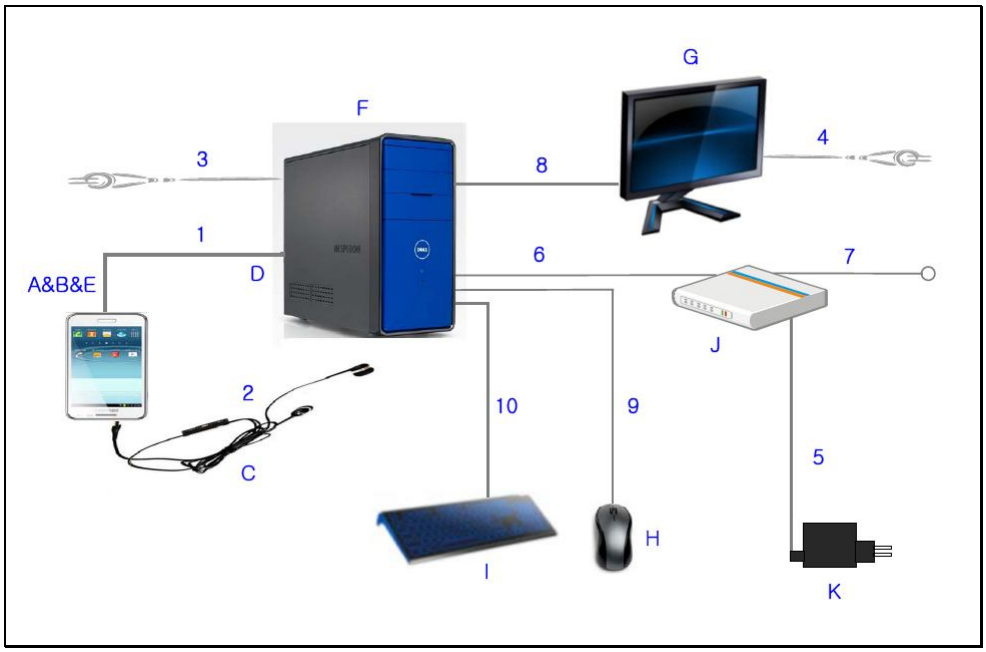
4.4 Used cable description

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	USB Cable	0.8	Yes	From EUT to Desk-Top Computer
2	Headset	1.6	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	No	From Router to Local Area Network
8	RGB	1.8	Yes	From Desk-Top Computer to LCD 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



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4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Operating Temperature (℃)	-20 ~ +60	
Operating Humidity (%)	0 ~ 95	
Frequency Range	GSM850	TX : 824.2 ~ 848.8 MHz RX : 869.2 ~ 893.8 MHz
	GSM1900	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

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	3.12 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.90 dB
	Vertical	4.65 dB
Radiated Disturbance (Above 1 GHz)	Horizontal	5.45 dB
	Vertical	5.43 dB

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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)
E4I-B-006	EMI Test Receiver	ESIB-26	R&S	100147	2014-04-16	12
E3I-259	Two-Line V-Network	ENV216	R&S	101369	2013-11-17	12
E3I-049	Two-Line V-Network	ESH3-Z5	R&S	100260	2014-01-15	12

5.1.2 Temperature and humidity condition

Test date	2014-10-01	**Test engineer**	Min-Gon Kim
Climate condition	Ambient temperature	23.8 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	42.0 % 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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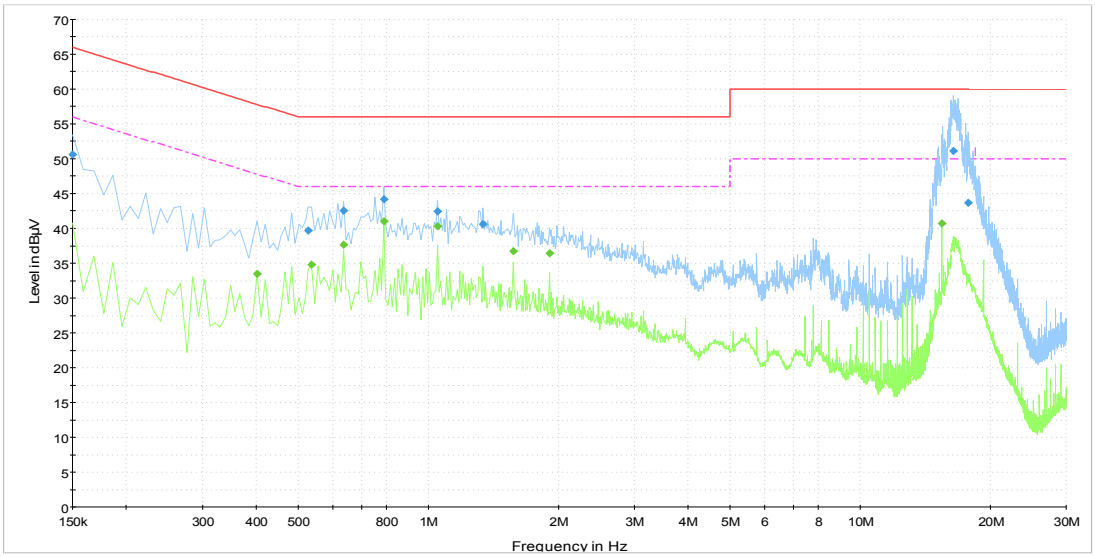
5.1.3 Test results

☐ 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.

Test Results (Quasi-Peak and CAV)

Quasi-peak final measurement results table

Frequency [MHz]	Quasi-Peak [dBµV]	Line	Factor [dB]	Margin [dB]	Limit [dBµV]
0.150	50.6	L1	9.9	15.4	66.0
0.528	39.7	L1	9.9	16.3	56.0
0.636	42.5	L1	9.9	13.5	56.0
0.789	44.2	N	9.9	11.8	56.0
1.050	42.5	N	9.8	13.5	56.0
1.338	40.6	L1	9.8	15.4	56.0
16.440	51.1	N	9.7	8.9	60.0
17.799	43.7	N	9.7	16.3	60.0

CAV final measurement results table

Frequency [MHz]	CAV [dBµV]	Line	Factor [dB]	Margin [dB]	Limit [dBµV]
0.402	33.4	N	10.0	14.4	47.8
0.537	34.8	N	10.0	11.2	46.0
0.636	37.7	L1	9.9	8.3	46.0
0.789	41.0	N	9.9	5.0	46.0
1.050	40.3	N	9.8	5.7	46.0
1.572	36.8	N	9.8	9.2	46.0
1.905	36.4	L1	9.7	9.6	46.0
15.432	40.7	N	9.8	9.3	50.0

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

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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/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 10 m

Frequency range Limits (MHz)	Resolution Bandwidth(kHz)	Quasi-peak Limits, dB(μV/m)
30 ~ 230	120	30
230 ~ 1 000	120	37

Limits above 1 GHz at a measurement distance of 3 m

Frequency range Limits [MHz]	Field Strength [dB(μV/m)]
Above 960	54.0

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	Manufacturer	Model name	Serial No.	Calibration	
					Date	Interval (Month)
E3I-290	EMI Test Receiver	R&S	ESU8	100482	2014-06-16	12
E3I-233	EMI Test Receiver	R&S	ESU26	100364	2014-05-15	12
E3I-005	EMI Test Receiver	R&S	ESIB-26	100355	2014-02-17	12
E3I-004	Horn Antenna	R&S	HF906	100027	2013-05-31	24
E3I-190	BiLog Antenna	Teseq	CBL6112D	36997	2013-11-06	24
E3I-130	BiLog Antenna	Teseq	CBL6112D	25513	2012-11-27	24
E3I-213	Preamplifier	Sonoma	317	282424	2013-11-13	12
E3I-214	Preamplifier	Sonoma	317	282425	2013-11-13	12
E3I-082	Universal Radio Communicator	R&S	CMU200	101859	2013-11-20	12
E3I-284	Preamplifier	R&S	ESV-Z3	815111	2014-04-10	24

5.2.2 Temperature and humidity condition

Test date	2014-09-30	**Test engineer**	Min-Gon Kim
Climate condition	Ambient temperature	23.6 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	37.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.2 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC4)		

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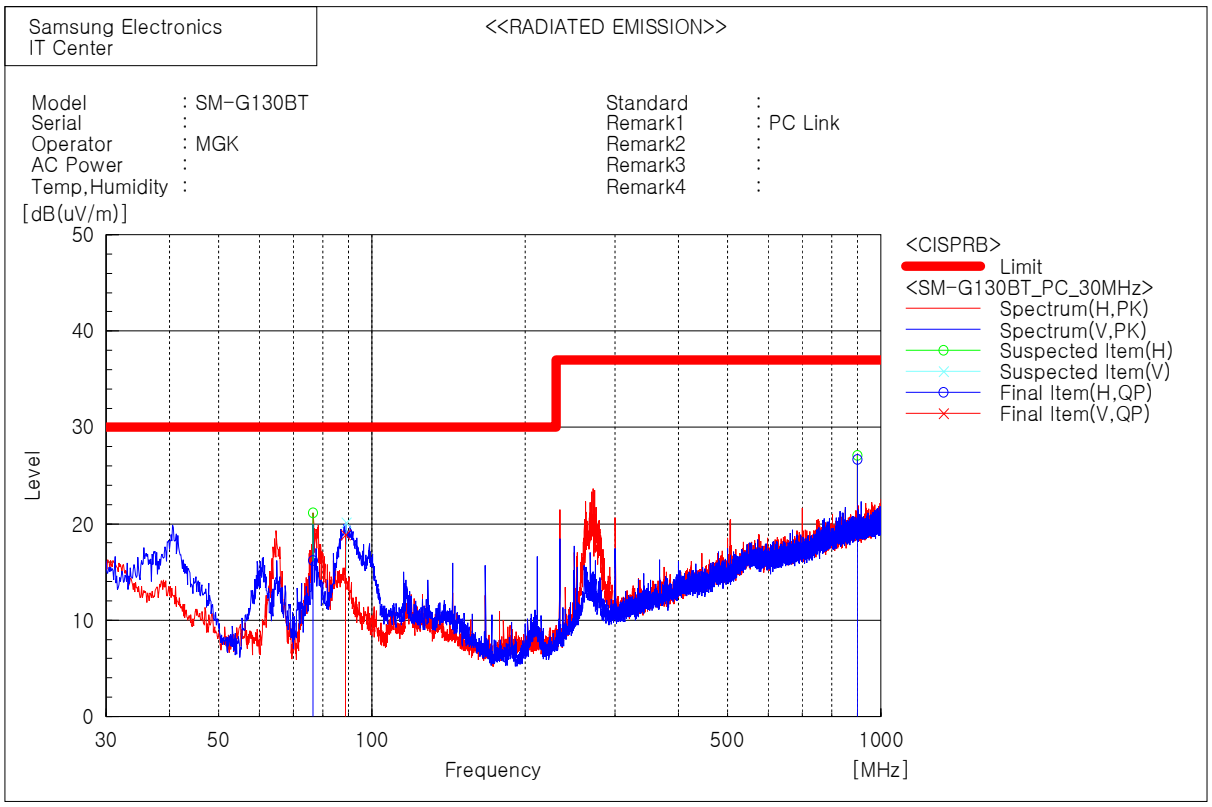
5.2.3 Test results

☐ Operating Mode 1

- Frequencies below 1 GHz



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	76.516	H	44.5	-28.3	16.2	30.0	13.8	399.0	64.0	1
2	88.530	V	46.7	-27.8	18.9	30.0	11.1	207.0	352.0	2
3	900.090	H	35.8	-9.1	26.7	37.0	10.3	400.0	111.0	1

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

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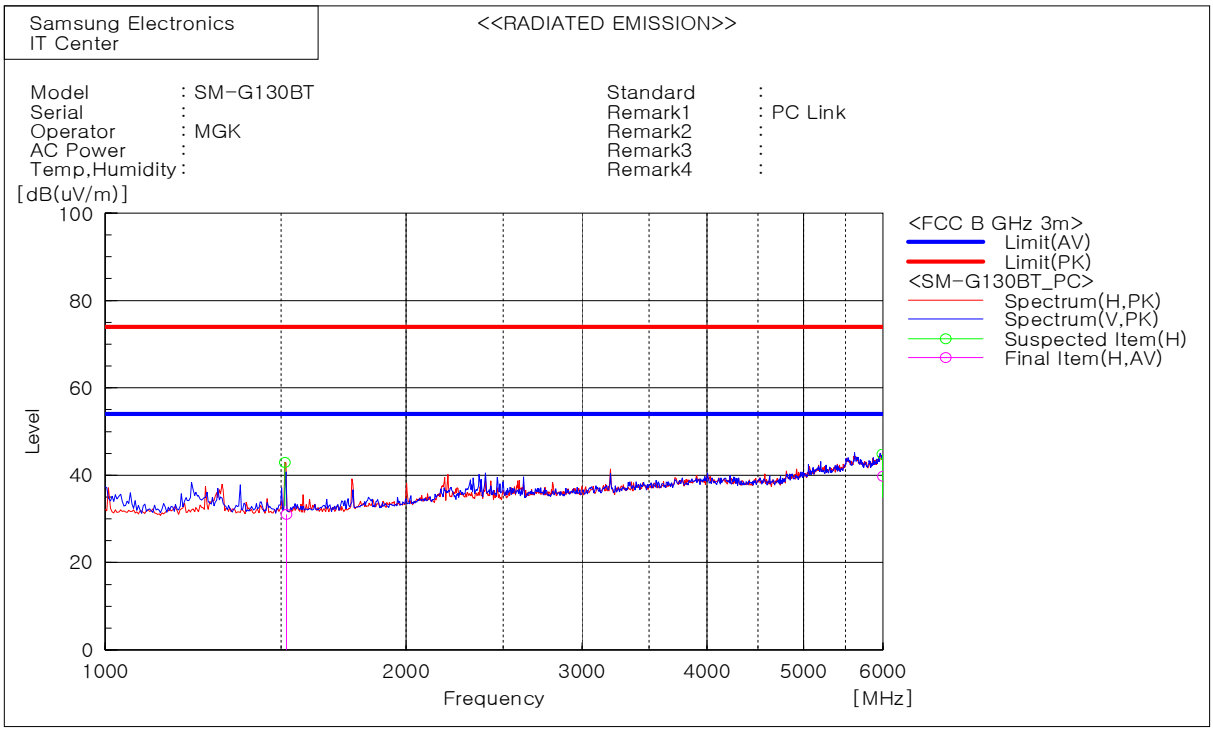
- Frequencies above 1 GHz



Peak Measurement

Frequency [MHz]	(P) 1)	Reading PK 2) [dB(uV)]	Factor 3) [dB(1/m)]	Level PK 4) [dB(uV/m)]	Limit [dB(uV/m)]	Margin PK 5) [dB]	Height [cm]	Angle [deg]
1 513.026	H	54.3	-11.4	42.9	74.0	31.1	115.0	32.0
5 993.988	H	43.8	1.1	44.9	74.0	29.1	123.0	234.0

C/Average Measurement

Frequency [MHz]	(P) 1)	Reading C/AV 2) [dB(uV)]	Factor 3) [dB(1/m)]	Level C/AV 4) [dB(uV/m)]	Limit [dB(uV/m)]	Margin C/AV 5) [dB]	Height [cm]	Angle [deg]
1 518.377	H	42.4	-11.4	31.0	54.0	23.0	119.0	33.0
5 998.742	H	38.7	1.1	39.8	54.0	14.2	113.0	233.0

Note) (P) : Abbreviation of Antenna Polarity (Horizontal, Vertical)

Reading (PK and/or C/AV) : Received raw signal

Factor = Antenna factor + Cable loss – Amplifier gain

Level (PK and/or C/AV) = Reading (PK and/or C/AV) + Factor, Real signal level

Margin (PK and/or C/AV) = Limit – Level (PK and/or C/AV)

* PK : Abbreviation of Peak, C/AV : Abbreviation of CISPR-Average

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