EMC TEST REPORT

Project No.	LBE20135891	**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	December 5, 2013	
EUT	**Type of device**	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSMP901A	
	Kind of product	Portable Device	
	Model No.	SM-P901	
	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 ELECTRONICS HUIZHOU CO.,LTD. 516229, Chenjiang Town, HuiZhou City, Guangdong Province, China	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2009	
Test Period		December 11, 2013 ~ December 12, 2013	
Issue date		December 17, 2013	

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 : Hee-Sung Kim	**Reviewed by** : Jong-Sup Jeong

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

(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

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

This report must not be reproduced, except in full, without written permission from CS & Environment center.

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)	FCC 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.

This report must not be reproduced, except in full, without written permission from CS & Environment center.

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	Portable Device	SM-P901	-	SAMSUNG	A3LSMP901A
B	Battery	T9500E	-	SAMSUNG	-
C	Headset	EO-HS3303WE	-	SAMSUNG	-
D	Data Cable	ET-DQ11Y1WE	-	SAMSUNG	-
E	Micro SD Card	64GB	-	SANDISK	-
F	Desk-Top Computer	DM300S3A	EBDEDC6FFD	SAMSUNG	DoC
			-	SAMSUNG	DoC
G	LCD TV Monitor	CF19MS	CF19H1LS700048Y	SAMSUNG	DoC
		EF23TS	EM23H1LS300070L	SAMSUNG	DoC
H	Mouse	SML-210PB	TAKD125021R	SAMSUNG	DoC
I	Keyboard	SDM8500P	8M001183	SAMSUNG	DoC
J	Router	J9794A	CN33FQ71XK	HP	DoC
K	Power Supply	EADP-15DC A	DIKD1245096576	HP	DoC

This portable device does not contain the minimum number of ports required for personal computer testing per ANSI C63.4, but the EUT is attached to a computer through its only available port, which represents worst case emissions. All other aspects of C63.4 testing requirements were maintained.

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.

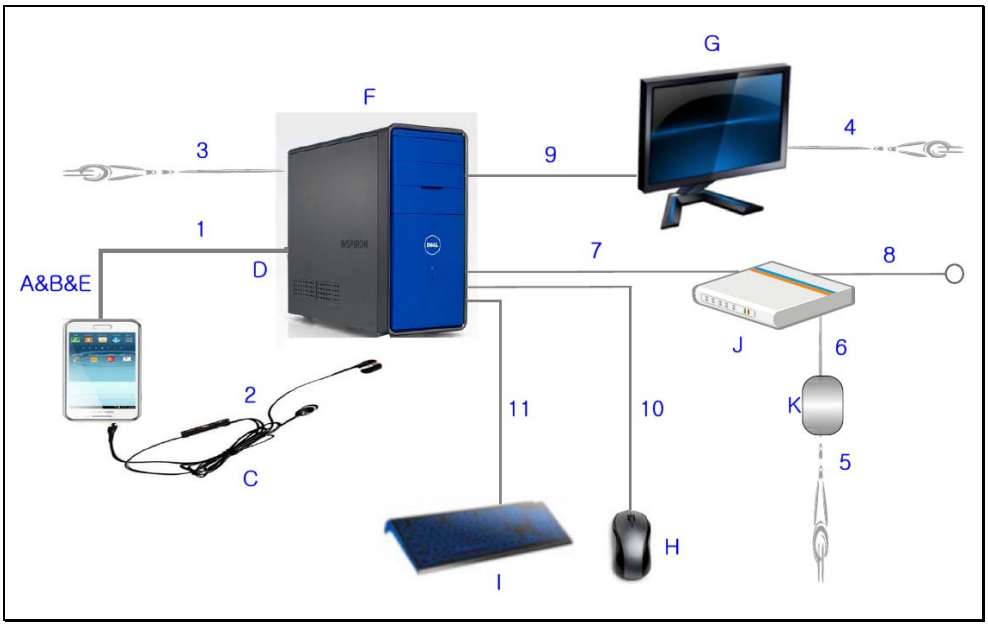
This report must not be reproduced, except in full, without written permission from CS & Environment center.

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	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 TV Monitor
5	Power	1.8	No	For Power Supply
6	Power	1.8	No	From Router to Power Supply
7	LAN	1.5	No	From Desk-Top Computer to Router
8	LAN	1.5	No	From Router to Local Area Network
9	RGB	1.8	Yes	From Desk-Top Computer to LCD TV Monitor
10	PS/2	1.8	Yes	From Desk-Top Computer to Mouse
11	PS/2	1.8	Yes	From Desk-Top Computer to Keyboard

4.5 Test arrangement



This report must not be reproduced, except in full, without written permission from CS & Environment center.

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	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 B2	TX : 1 852.4 ~ 1 907.6 MHz RX : 1 932.4 ~ 1 987.6 MHz
	WCDMA B5	TX : 826.4 ~ 846.6 MHz RX : 871.4 ~ 891.6 MHz

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]
CPU	1 800

This report must not be reproduced, except in full, without written permission from CS & Environment center.

Form No.: SRA-TRF-46/1

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	3.12 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.03 dB
	Vertical	4.13 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	4.53 dB
	Vertical	4.51 dB

This report must not be reproduced, except in full, without written permission from CS & Environment center.

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-010	LISN	ESH3-Z5	R&S	100263	2013-10-17	12
E5I-016	EMI Test Receiver	ESU8	R&S	100482	2013-06-11	12
E5I-043	LISN	ENV216	R&S	101630	2013-06-07	12

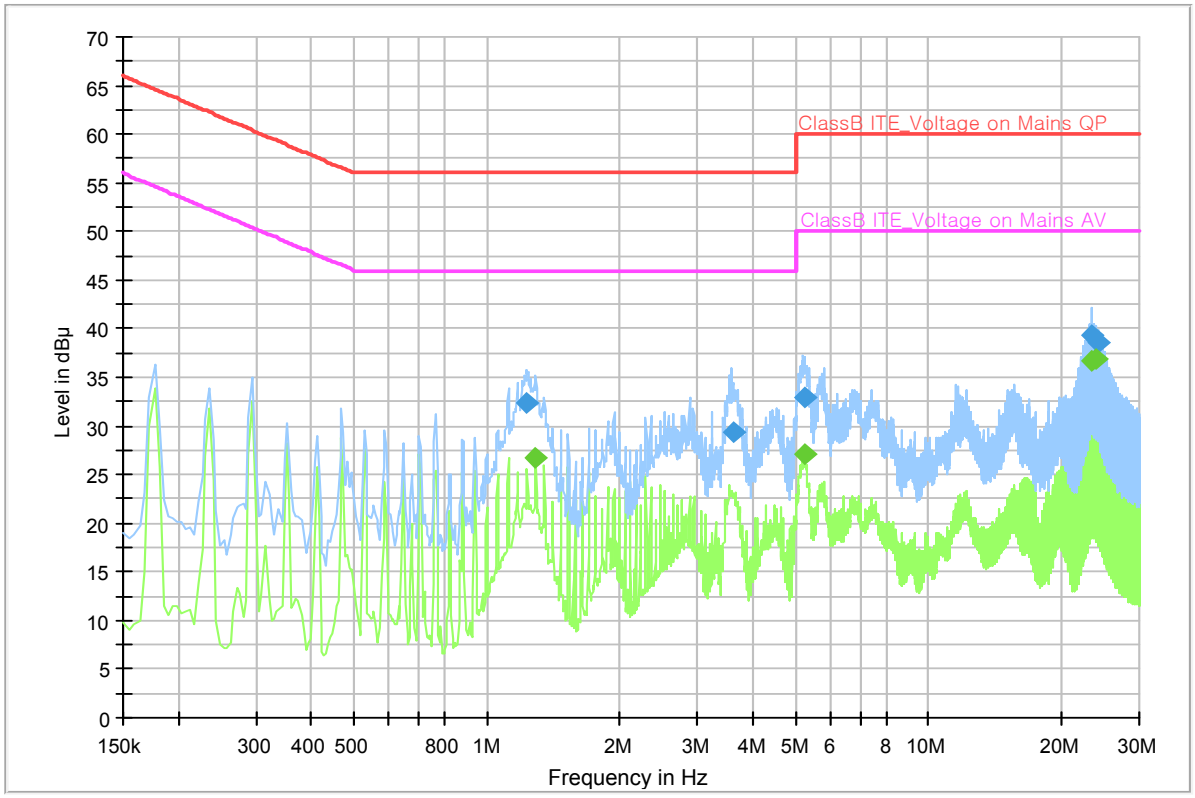
5.1.2 Temperature and humidity condition

Test date	2013-12-12	**Test engineer**	Hee-Sung Kim
Climate condition	Ambient temperature	22.6 ℃	Limit (15.0 to 35.0) ℃
	elative humidity	42.2 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.6 kPa	Limit (86.0 to 106.0) kPa
Test place	Shield Room (SR14)		

This report must not be reproduced, except in full, without written permission from CS & Environment center.

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 /CAV final measurement results table:

Frequency (MHz)	QuasiPeak (dBµV)	CAV (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
1.236	32.4	---	56.0	23.6	L1	9.8
1.291	---	26.7	46.0	19.3	L1	9.8
3.620	29.3	---	56.0	26.7	L1	9.7
5.229	---	27.1	50.0	22.9	L1	9.7
5.231	32.9	---	60.0	27.1	N	9.7
23.328	39.3	---	60.0	20.7	N	10.0
23.332	---	36.8	50.0	13.2	L1	10.0
24.034	---	36.9	50.0	13.1	L1	10.0
24.093	38.5	---	60.0	21.5	L1	10.0

Note 2) Level (QP and/or CAV) = Meter Reading (QP and/or CAV) + Corr. (LISN Insertion Loss + Cable Loss)
Margin (QP and/or CAV) = Limit – Level (QP and/or CAV)
QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

This report must not be reproduced, except in full, without written permission from CS & Environment center.

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 ~ 200	Horizontal, Vertical	1	3	0 ~ 345 (Step size: 15 degrees)

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 [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

Results checked manually; and points close to the limit line were re-measured.

This report must not be reproduced, except in full, without written permission from CS & Environment center.

5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E5I-017	EMI Test Receiver	ESU8	R&S	100483	2013-06-11	12
E5I-021	EMI Test Receiver	ESU40	R&S	100376	2013-06-11	12
E5I-035	Horn Antenna	HF907	R&S	100507	2013-04-02	24
E5I-072	BiLog Antenna	CBL6112D	Teseq	36009	2013-06-03	24
E5I-071	BiLog Antenna	CBL6112D	Teseq	35384	2013-05-23	24
E5I-073	Preamplifier	310N	Sonoma	332016	2013-06-10	12
E5I-074	Preamplifier	310N	Sonoma	332017	2013-06-10	12

5.2.2 Temperature and humidity condition

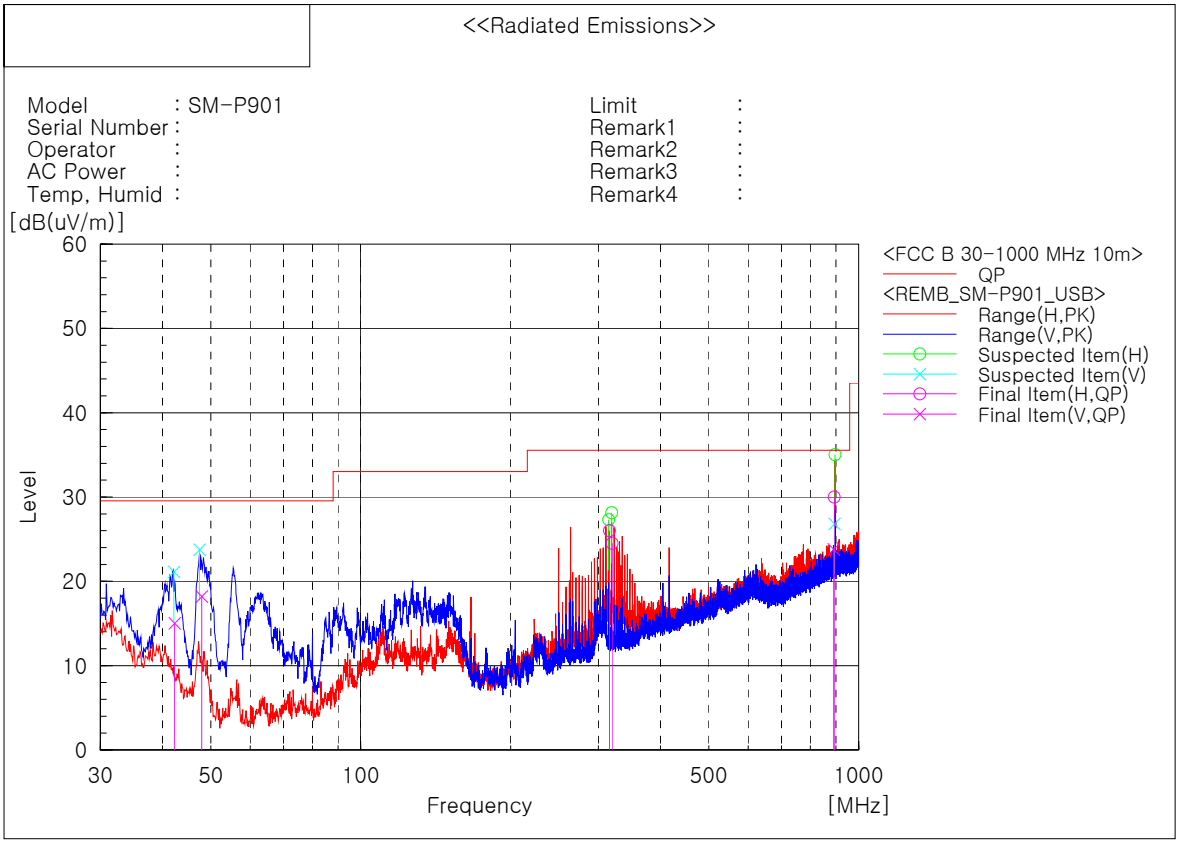
Test date	2013-12-11	Test engineer	Hee-Sung Kim
Climate condition	Ambient temperature	23.3 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	46.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	101.4 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC8)		

This report must not be reproduced, except in full, without written permission from CS & Environment center.

5.2.3 Test results

☐ Operating Mode 1

- Frequencies below 1 GHz



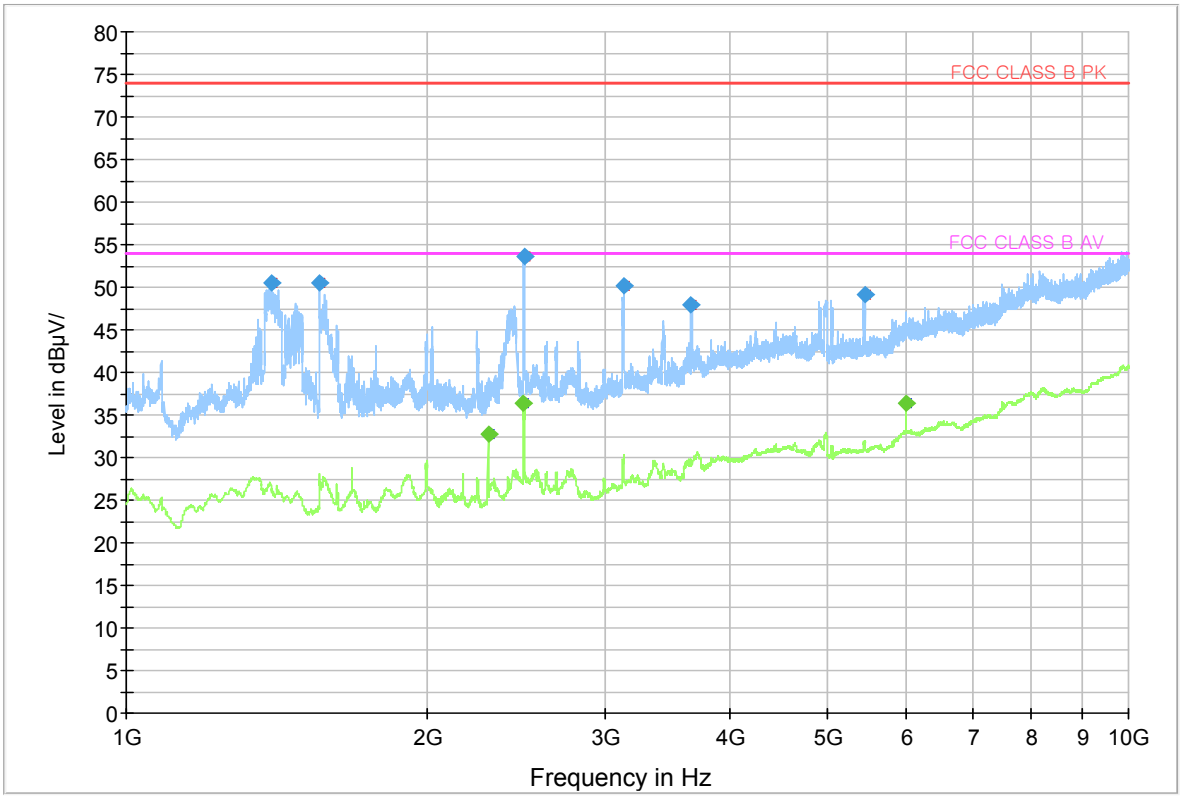
Final Result

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	Remark
1	42.257	V	34.6	-19.6	15.0	29.5	14.5	100	230	2	
2	47.926	V	40.6	-22.4	18.2	29.5	11.3	148	106	2	
3	315.940	H	41.2	-15.2	26.0	35.5	9.5	315	58	1	
4	319.964	H	39.7	-15.2	24.5	35.5	11.0	190	72	1	
5	891.325	V	30.1	-6.3	23.8	35.5	11.7	212	335	2	
6	893.569	H	36.6	-6.6	30.0	35.5	5.5	104	134	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

This report must not be reproduced, except in full, without written permission from CS & Environment center.

- Frequencies above 1 GHz



Frequency (MHz)	MaxPeak (dB µ V/m)	CAV (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 394.0	50.4	---	74.0	23.6	100.0	V	180.0	-7.5
1 560.0	50.6	---	74.0	23.4	100.0	V	180.0	-6.2
2 296.0	---	32.7	54.0	21.3	100.0	V	0.0	-2.0
2 491.0	---	36.3	54.0	17.7	100.0	H	270.0	-0.9
2 496.0	53.7	---	74.0	20.3	100.0	H	270.0	-0.8
3 136.0	50.2	---	74.0	23.8	100.0	H	90.0	3.1
3 659.5	48.0	---	74.0	26.1	100.0	V	0.0	5.5
5 467.5	49.1	---	74.0	24.9	100.0	H	270.0	10.4
6 000.0	---	36.3	54.0	17.7	100.0	H	0.0	13.0

Note) Receiving antenna polarization : Horizontal, Vertical
Test Distance : 3 m, Antenna Height : 1 to 2 meters
Level (PK and/or CAV) = Reading (PK and/or CAV) + Corr. (Antenna Factor + Cable Loss - Amp. Gain)
Margin (PK and/or CAV) = Limit – Level (PK and/or CAV)
PK = Peak, CAV = CISPR-Average, Corr. = Correction Factor

This report must not be reproduced, except in full, without written permission from CS & Environment center.
Form No.: SRA-TRF-46/1