EMC TEST REPORT

Project No.	LBE20135915	**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 1, 2013	
EUT	**Type of device**	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSMT111	
	Kind of product	Portable Device	
	Model No.	SM-T111	
	Variant Model No.	Refer to clause 4.6	
	Manufacturer	**SEV Samsung Telecommunication Co., Ltd** Yen Phong I Industrial Park, Yen Phong District Bac Nhih Province, Vietam	
Applied Standards		47 CFR Part 15, Subpart B, Class B / ANSI C63.4-2009	
Test Period		December 2, 2013 ~ December 6, 2013	
Issue date		December 16 , 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 : 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.

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-T111	4A67LP85K5Q	SAMSUNG	A3LSMT111
B	Headset	EHS61ASFWE	-	SAMSUNG	-
C	microSD Card	16GB	-	SANDISK	DoC
D	Data Cable	ECB-DU28BE	-	SAMSUNG	-
E	Desk-Top Computer	HP Compaq dx2200 Microtower	CNG7060LW0	HP	DoC
F	LCD TV Monitor	UE22C4000PWXZT	B20B3HUB200001A	SAMSUNG	DoC
G	Mouse	M-S48a	LZA00153189	SAMSUNG	DoC
H	Keyboard	SKG-2000PB	CNBA5902830AGP53Z5A3485	SAMSUNG	DoC
I	Gigabit Switch Hub	H3008	10070100009	EFM Networks	DoC
J	Power Supply	HB12B-050200SPA	HBK520201025	Shen Zhen City Hong Ben	-

This tablet 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

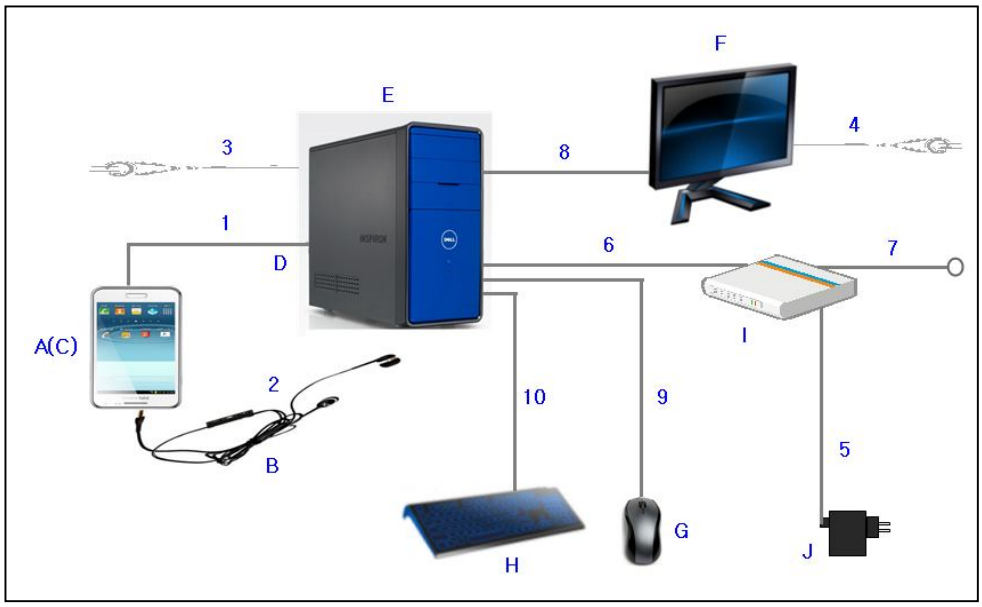
Customer selected, single unit.

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	0.8	Y	From EUT to Desk-Top Computer
2	Headset	1.6	N	For EUT
3	Power	1.8	N	For Desk-Top Computer
4	Power	1.8	N	For LCD TV Monitor
5	Power	1.8	N	From Gigabit Switch Hub to Power Supply
6	LAN	1.5	N	From Desk-Top Computer to Gigabit Switch Hub
7	LAN	1.5	N	From Gigabit Switch Hub to Local Area Network
8	RGB	1.8	Y	From Desk-Top Computer to LCD TV Monitor
9	PS/2	1.8	Y	From Desk-Top Computer to Mouse
10	PS/2	1.8	Y	From Desk-Top Computer to Keyboard

4.5 Test arrangement



4.6 EUT Description

4.6.1 The following features describe EUT represented by this report:

Item	Specification	
Frequency Range	GSM850	TX : 824.2 ~ 848.8 MHz RX : 869.2 ~ 893.8 MHz
	GSM1900	TX : 1 850.2 ~ 1909.8 MHz RX : 1 930.2 ~ 1989.8 MHz
Operating Temperature (℃)	-20 ~ +60	
Operating Humidity (%)	0 ~ 95	

4.6.2 The variant models

- None

4.7 Clock Frequencies

Kind of Clocks	Frequency [MHz]	Kind of Clocks	Frequency [MHz]
CPU	1 200	USB 2.0	24

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	2.95 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.69 dB
	Vertical	4.83 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	5.47 dB
	Vertical	5.45 dB

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

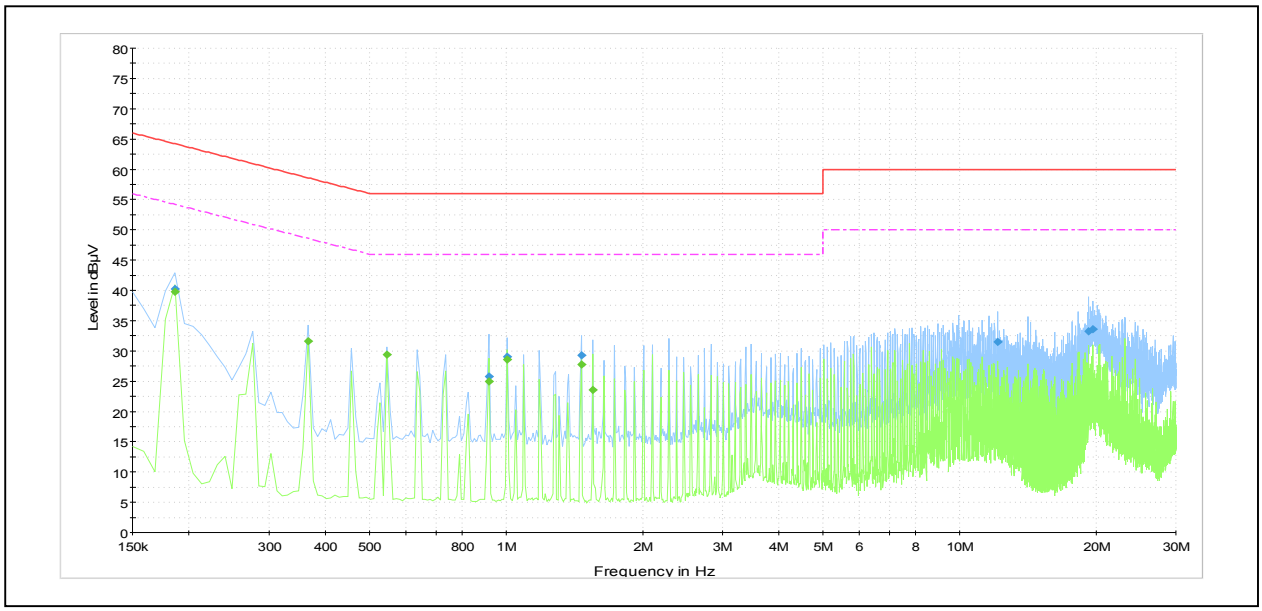
EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E5I-016	EMI TEST RECEIVER	ESU	R&S	100482	2013-08-29	12
E3I-259	Two-Line V-Network	ENV216	R&S	101369	2013-11-17	12
E3I-049	Two-Line V-Network	ESH3-Z5	R&S	100260	2013-01-08	12

5.1.2 Temperature and humidity condition

Test date	2013-12-06	**Test engineer**	Min-Gon Kim
Climate condition	Ambient temperature	23.2 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	42.0% R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.8 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.

Final measurement results table(QP):

Frequency (MHz)	Level (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186	40.2	N	10.1	24.0	64.2
0.915	25.7	L1	9.9	30.3	56.0
1.005	29.1	L1	9.8	26.9	56.0
1.464	29.2	L1	9.8	26.8	56.0
12.138	31.4	N	9.8	28.6	60.0
19.248	33.2	N	10.0	26.8	60.0
19.707	33.6	N	10.0	26.4	60.0

Final measurement results table(CAV):

Frequency (MHz)	Level (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186	39.8	N	10.1	14.4	54.2
0.366	31.6	N	10.0	17.0	48.6
0.546	29.4	N	10.0	16.6	46.0
0.915	24.9	L1	9.9	21.1	46.0
1.005	28.6	L1	9.8	17.4	46.0
1.464	27.7	L1	9.8	18.3	46.0
1.554	23.6	L1	9.8	22.4	46.0

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

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 detector.

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 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.

5.2.1 Test instrumentation

EMC No.	Test Instrument	Model name	Manufacturer	Serial No.	Calibration	
					Date	Interval (Month)
E3I-005	EMI TEST RECEIVER	ESIB-26	R&S	100355	2013-02-06	12
E3I-263	BILOG Antenna	CBL 6143A	TESEQ	30262	2013-05-16	24
E3I-217	Preamplifier	310N	SONOMA	282363	2013-02-04	12
E3I-170	Double-Ridged Waveguide Horn Antenna	HF906	R&S	100028	2012-08-13	24

5.2.2 Temperature and humidity condition

Test date	2013-12-02	**Test engineer**	Min-Gon Kim
Climate condition	Ambient temperature	22.5 ℃	Limit (15.0 to 35.0) ℃
	Relative humidity	42.0 % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	100.6 kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber (SAC7)		

5.2.3 Test results

☐ Operating Mode 1

- Frequencies below 1 GHz

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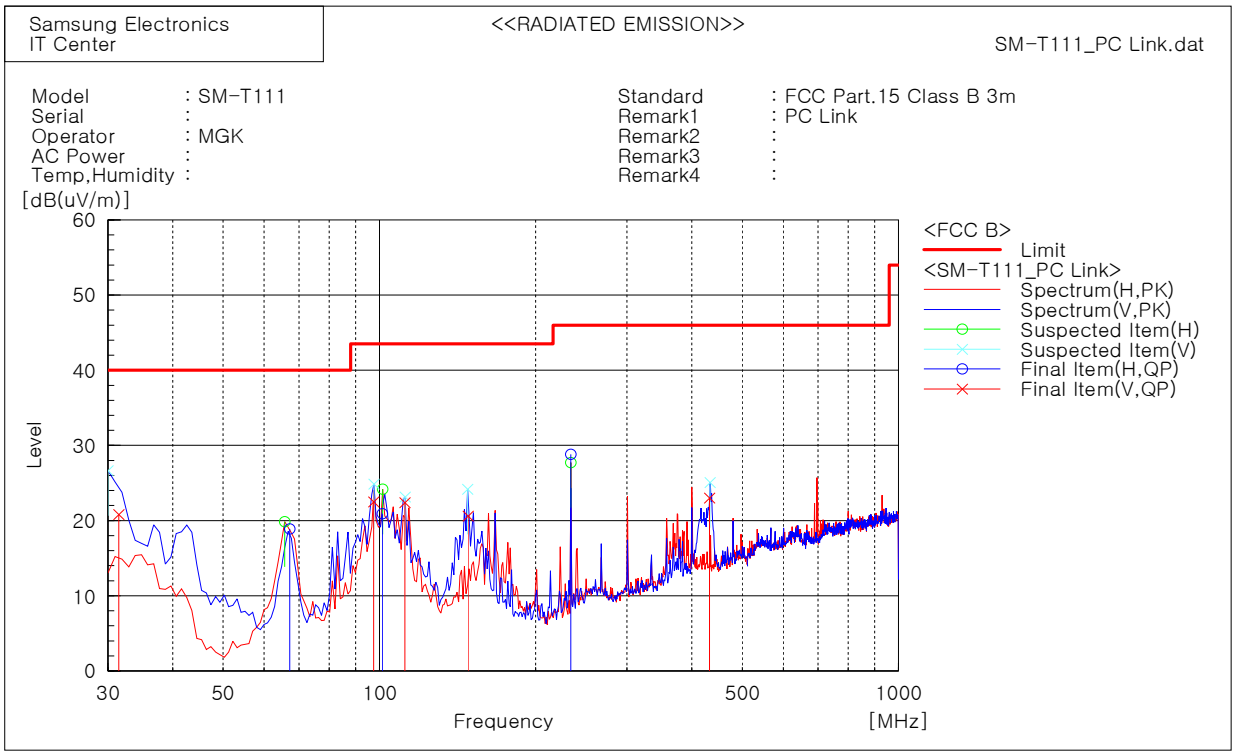

Final Result

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	31.473	V	41.0	-20.2	20.8	40.0	19.2	101.0	303.0
2	67.193	H	46.5	-27.6	18.9	40.0	21.1	397.0	239.0
3	97.494	V	41.5	-19.0	22.5	43.5	21.0	101.0	25.0
4	101.358	H	38.6	-17.7	20.9	43.5	22.6	247.0	187.0
5	111.935	V	39.3	-16.9	22.4	43.5	21.1	101.0	144.0
6	148.264	V	38.2	-17.6	20.6	43.5	22.9	101.0	173.0
7	233.836	H	46.6	-17.8	28.8	46.0	17.2	101.0	280.0
8	432.373	V	34.8	-11.8	23.0	46.0	23.0	101.0	288.0

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 – Result (QP)
QP = Quasi-Peak, c.f = Correction Factor

5.2.3 Test results

☐ Operating Mode 1

- Frequencies above 1 GHz

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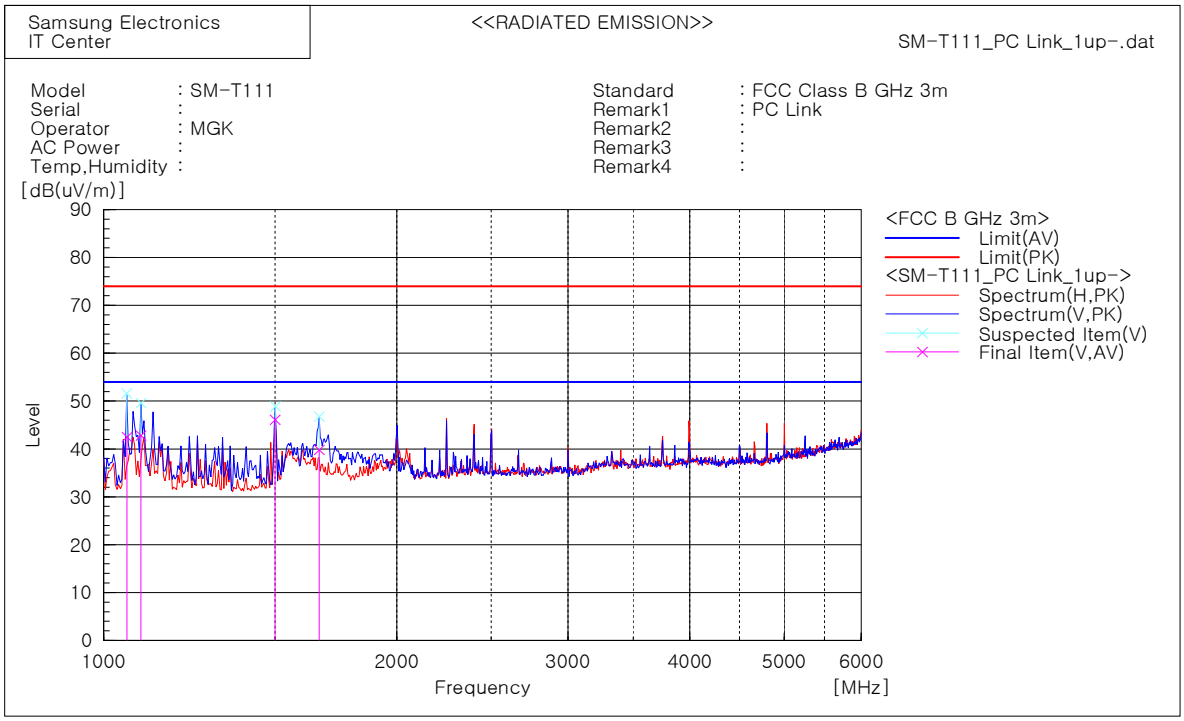

Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin AV [dB]	Height [cm]	Angle [deg]
1	1056.856	V	51.1	-8.6	42.5	54.0	11.5	123.0	153.0
2	1092.184	V	51.4	-8.6	42.8	54.0	11.2	101.0	155.0
3	1500.269	V	53.8	-7.7	46.1	54.0	7.9	103.0	312.0
4	1665.563	V	46.8	-7.0	39.8	54.0	14.2	102.0	36.0

Note) Receiving antenna polarization : Horizontal, Vertical
Test Distance : 3 m, Antenna Height : 1 to 4 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