

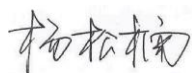
EMC TEST REPORT

Project No.	LBE20153308	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	May 18, 2015	
EUT	Type of device	☒ Class B personal computers and peripherals ☐ All other devices	
	Equipment authorization	☐ Declaration of Conformity ☒ Certification ☐ Verification	
	FCC ID	A3LSMG531Y	
	Kind of product	Mobile Phone	
	Model No.	SM-G531Y	
	Variant Model No.	Refer to clause 4.6	
	Manufacturer	Tianjin Samsung Telecom Technology Co., Ltd. 300385 No.9 WeiWu Rd. Micro Electronic Industrial Park Xiqing Dist, Tianjin, China	
Applied Standards		FCC Part 15, Subpart B, Class B / ANSI C63.4-2009	
Test Period		May 20, 2015 ~ May 22, 2015	
Issue date		May 25, 2015	

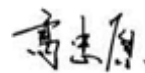
Test result : Complied

The equipment under test has found to be compliant with the applied standards.
(Refer to the attached test result for more detail.)

Tested by : Songnan Yang



Reviewed by : Zhongyuan Gao



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 CSQAL



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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)	FCC Part 15 Subpart B / ANSI C63.4-2009 (Class B)	Complied
☒	Radiated Disturbance		Complied

3. General Information

3.1 Test facility

CHINA SAMSUNG QUALITY ASSURANCE LABORATORY(CSQAL) Wei 4 Road, Microelectr
onics Industrial Park, Jingang High way, Tianjin, China

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.

CHINA SAMSUNG QUALITY ASSURANCE LABORATORY(CSQAL) is operated as testing la
boratory 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	Mobile Phone	SM-G531Y	-	SAMSUNG	A3LSMG531Y
B	Battery	EB-BG531BBE	-	SAMSUNG	-
C	Headset	EHS61ASFWE	-	SAMSUNG	-
D	Data Cable	ECB-DU7AWT	-	SAMSUNG	-
E	microSD Card	4GB	-	SAMSUNG	-
F	Desk-Top Computer	DB-Z400-PC01CN	JBT391YDB0081N	SAMSUNG	DoC
G	LCD Monitor	LS24C45KBW	ZX1DHTED500003Y	SAMSUNG	DoC
H	USB Keyboard	SK-8185	OY526K	Dell	DoC
I	USB Mouse	SNJ-B138	Z164146	Dell	DoC
J	Router	H505	10012700728	ipTime	DoC
K	Power Supply	FLDE0501000K	HU10486-9002A	ipTime	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)
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4.3 Details of Sampling

Customer selected, single unit.

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
	GSM 1900	TX : 1 850.2 ~ 1 909.8 MHz RX : 1 930.2 ~ 1 989.8 MHz
	GSM 900	TX : 890 ~ 915MHz RX :935 ~ 960MHz
	DCS 1800	TX : 1710 ~ 1785 MHz RX :1805 ~ 1880
	WCDMA B1	TX :1920 ~ 1980 MHz RX :2110 ~ 2170MHz
	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
	WCDMA B8	TX : 880 ~ 915 MHz RX : 935 ~ 960 MHz
	LTE B1	TX : 1920 ~ 1980 MHz RX : 2110 ~ 2170 MHz
	LTE B3	TX : 1710 ~ 1785 MHz RX : 1805 ~ 1880MHz
	LTE B5	TX : 824 ~ 849 MHz RX : 869 ~ 894 MHz
	LTE B7	TX : 2500 ~ 2570 MHz RX : 2620 ~ 2690 MHz
	LTE B8	TX : 880 ~ 915 MHz RX : 925 ~ 960 MHz
	LTE B28	TX : 703 ~ 748MHz RX : 758 ~ 803 MHz
Operating Temperature (°C)		5 ~ 35
Operating Humidity (%)		0 ~ 95

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

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	3.0 dB
Radiated Disturbance (30 MHz ~ 1 GHz)	Horizontal	4.6 dB
	Vertical	4.6 dB
Radiated Disturbance (1 GHz ~ 6 GHz)	Horizontal	3.8 dB
	Vertical	3.8 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	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

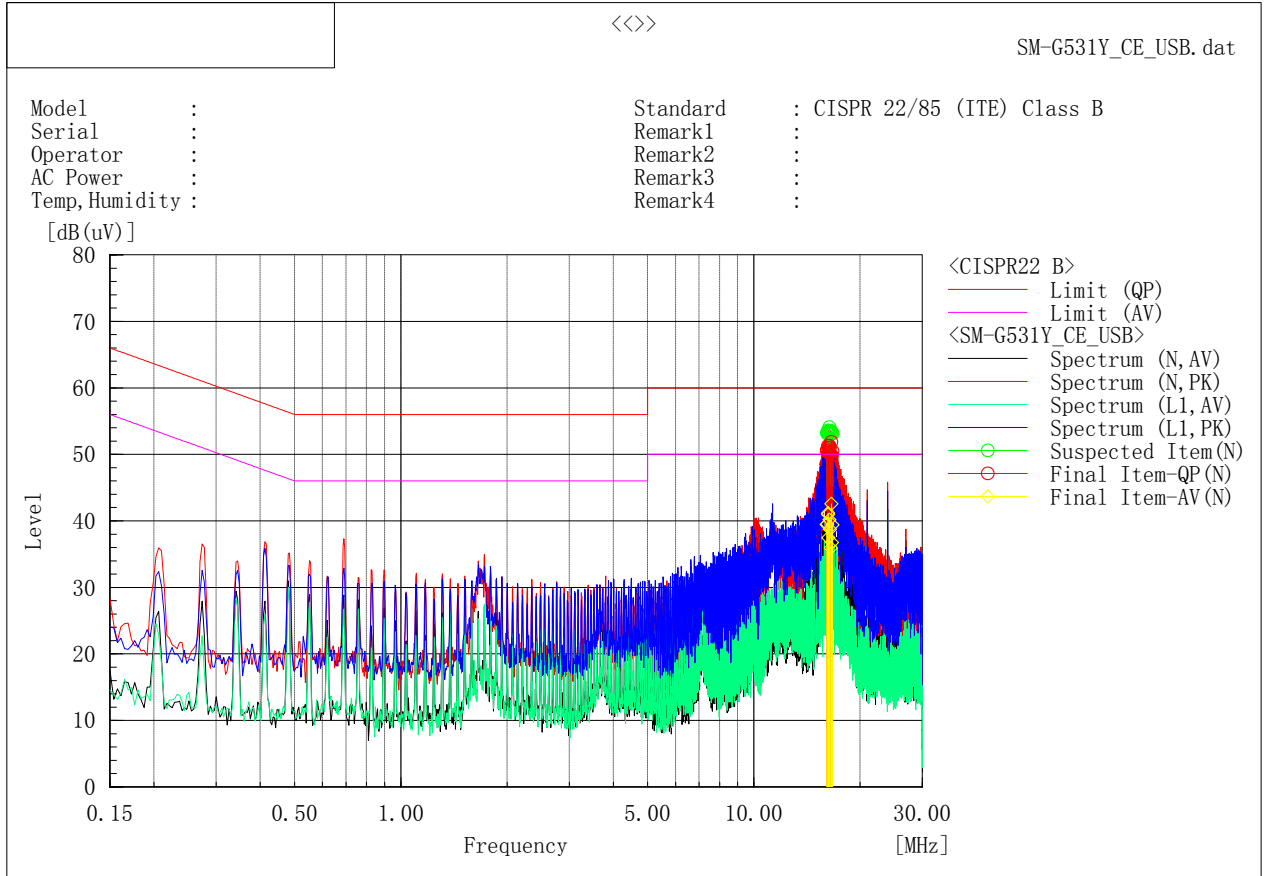
Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5CE	TOYO	V 4.7.10	N/A	N/A
Measuring receiver	ESCI	R&S	101027	2015.03.02	12
Artificial mains network	ENV216	R&S	101123	2014.08.18	12
Artificial mains network	ENV216	R&S	101059	2014.08.18	12

5.1.2 Temperature and humidity condition

Test date	2015-05-20	Test engineer	Songnan Yang
Climate condition	Ambient temperature	(22.7 ~ 22.9) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(45.1 ~ 45.3) R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(101.2 ~ 101.4) kPa	Limit (86.0 to 106.0) kPa
Test place	Shielded Room #2		

5.1.3 Test results

- Operating Mode 1: AC Mains



Final Result

--- N Phase ---											
No.	Frequency	Reading QP	Reading CAV	c. f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV	Remark
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]	
1	16.57914	41.8	32.5	10.1	51.9	42.6	60.0	50.0	8.1	7.4	
2	16.36958	41.2	30.0	10.1	51.3	40.1	60.0	50.0	8.7	9.9	
3	16.23437	41.2	31.1	10.1	51.3	41.2	60.0	50.0	8.7	8.8	
4	16.23151	40.9	30.8	10.1	51.0	40.9	60.0	50.0	9.0	9.1	
5	16.43486	40.9	28.6	10.1	51.0	38.7	60.0	50.0	9.0	11.3	
6	16.1582	40.7	29.4	10.1	50.8	39.5	60.0	50.0	9.2	10.5	
7	16.08925	40.5	29.3	10.1	50.6	39.4	60.0	50.0	9.4	10.6	
8	16.71794	40.4	29.3	10.1	50.5	39.4	60.0	50.0	9.5	10.6	
9	16.27346	40.2	27.4	10.1	50.3	37.5	60.0	50.0	9.7	12.5	
10	16.5221	39.8	25.8	10.1	49.9	35.9	60.0	50.0	10.1	14.1	
11	16.63623	39.7	26.6	10.1	49.8	36.7	60.0	50.0	10.2	13.3	

Note) Level (Quasi-Peak and/or Average) = Meter Reading (Quasi-Peak and/or Average) + Factor (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

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 [$\mu\text{V/m}$]	3 m [dB($\mu\text{V/m}$)]	10 m [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

Frequency range Limits [MHz]	Peak dB($\mu\text{V/m}$)	Average dB($\mu\text{V/m}$)
1000 to 6000	74	54

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

5.2.1 Test instrumentation

30MHz~1GHz

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5/RE	TOYO	V 4.7.10	N/A	N/A
Bi-con Antenna	CBL6112D	TESEQ	29069	2015.03.16	24
EMI Receiver	ESCI	R&S	101026	2015.03.02	12
AMPLIFIER	310N	SONOMA	300911	2014.07.05	12
Ant Mast	MA4000	INN CO	-	N/A	N/A
Mast Controller	CO2000	INN CO	-	N/A	N/A
RF Selector	NS4900N	TOYO	-	N/A	N/A

Above 1G

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5/RE	TOYO	V 4.7.10	N/A	N/A
Broad-Band Horn Antenna	BBHA9120B	Schwarzbeck	520	2014.02.19	24
EMI Receiver	ESU26	R&S	100243	2015.03.02	12
AMPLIFIER	AMF-4D-00500800-18-13P	TOYO	0934	2014.07.05	12
Ant Mast	AUDIX	AUDIX	-	N/A	N/A

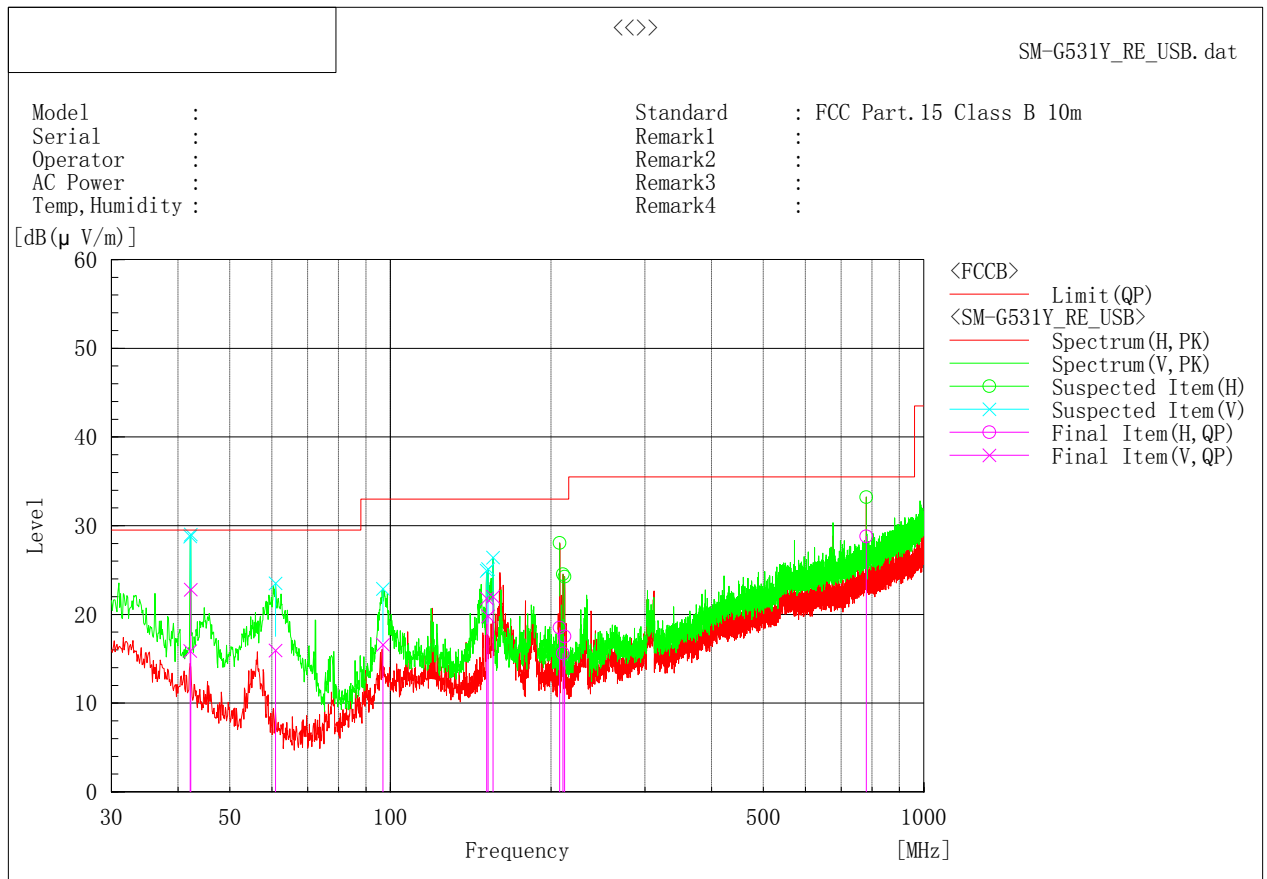
5.2.2 Temperature and humidity condition

Test date	2015-05-21	Test engineer	Songnan Yang
Climate condition	Ambient temperature	(23.0 ~ 23.3) °C	Limit (15.0 to 35.0) °C
	Relative humidity	(48.4 ~ 48.6) % R.H.	Limit (25.0 to 75.0) % R.H.
	Atmospheric pressure	(102.0 ~ 102.2) kPa	Limit (86.0 to 106.0) kPa
Test place	Semi-Anechoic Chamber		

5.2.3 Test results

☐ Operating Mode 1

- Frequencies below 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μ V)]	c. f [dB(1/m)]	Result QP [dB(μ V/m)]	Limit QP [dB(μ V/m)]	Margin QP [dB]	Height [cm]	Angle [°]	System	Remark
1	42.246	V	37.5	-14.7	22.8	29.5	6.7	100.0	289.5	2	
2	155.736	V	36.7	-14.7	22.0	33.0	11.0	100.0	30.4	2	
3	780.053	H	31.8	-3.0	28.8	35.5	6.7	377.0	113.1	1	
4	151.493	V	36.5	-14.7	21.8	33.0	11.2	259.0	10.4	2	
5	152.463	V	34.5	-14.7	19.8	33.0	13.2	234.0	2.1	2	
6	207.631	H	35.1	-16.6	18.5	33.0	14.5	400.0	51.3	1	
7	212.118	H	34.5	-17.0	17.5	33.0	15.5	400.0	98.9	1	
8	96.809	V	32.0	-15.4	16.6	33.0	16.4	182.0	328.1	2	
9	60.919	V	36.3	-20.4	15.9	29.5	13.6	100.0	314.4	2	
10	42.125	V	30.6	-14.7	15.9	29.5	13.6	100.0	289.5	2	
11	210.663	H	32.4	-16.8	15.6	33.0	17.4	400.0	224.6	1	

Note) Receiving antenna polarization : Horizontal and/or Vertical

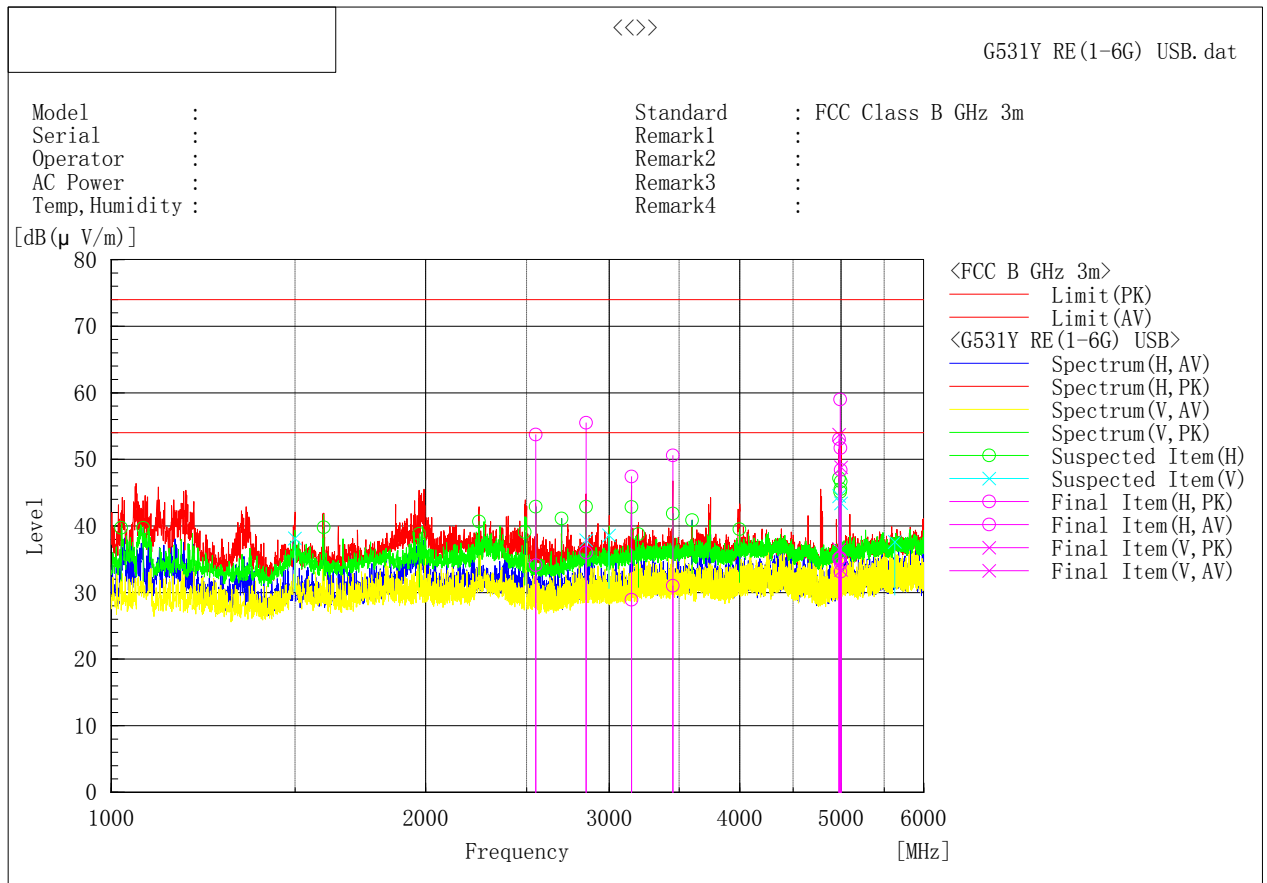
Test Distance : 3m, Antenna Height : 1 to 4 meters

Result (Quasi-Peak) = Reading QP + C.F (Antenna Factor + Cable Loss - Amp. Gain)

Margin QP (Quasi-Peak) = Limit - Level QP

QP = Quasi-Peak, c.f = Correction Factor

- Frequencies above 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μ V)]	Reading AV [dB(μ V)]	c.f [dB(1/m)]	Result PK [dB(μ V/m)]	Result AV [dB(μ V/m)]	Limit PK [dB(μ V/m)]	Limit AV [dB(μ V/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [°]	Remark
1	4979.375	H	63.7	45.8	-10.7	53.0	35.1	74.0	54.0	21.0	18.9	138.0	2.3	
2	4998.750	H	59.1	45.0	-10.7	48.4	34.3	74.0	54.0	25.6	19.7	100.0	184.7	
3	4995.000	H	62.4	43.8	-10.7	51.7	33.1	74.0	54.0	22.3	20.9	233.0	202.2	
4	4991.875	H	69.7	45.9	-10.7	59.0	35.2	74.0	54.0	15.0	18.8	100.0	202.2	
5	4979.375	V	64.4	47.2	-10.7	53.7	36.5	74.0	54.0	20.3	17.5	100.0	359.9	
6	4999.375	V	59.5	44.1	-10.7	48.8	33.4	74.0	54.0	25.2	20.6	156.0	359.9	
7	2850.000	H	69.4	49.9	-13.9	55.5	36.0	74.0	54.0	18.5	18.0	100.0	290.6	
8	2550.000	H	69.2	49.6	-15.5	53.7	34.1	74.0	54.0	20.3	19.9	199.0	61.5	
9	3150.000	H	60.8	42.3	-13.4	47.4	28.9	74.0	54.0	26.6	25.1	100.0	202.2	
10	3450.000	H	63.7	44.1	-13.1	50.6	31.0	74.0	54.0	23.4	23.0	100.0	210.9	

Note) Receiving antenna polarization : Horizontal, Vertical

Test Distance : 3m, Antenna Height : 1 to 4 meters

Result (Average) = Reading AV + C.F (Antenna Factor + Cable Loss - Amp. Gain)

Margin AV (Average) = Limit – Result AV