

FCC TEST REPORT

Test report No.: EMC-2011/067
Type of Equipment: Mobile Phone
Model Name: SC-03D
FCC ID: A3LSWDSC03D
Applicant: Samsung Electronics Co., Ltd.
416, Maetan 3-dong, Youngtong-gu,
Suwon city, Kyunggi-do, Korea.
Manufacturer: Samsung Electronics Co., Ltd.
416, Maetan 3-dong, Youngtong-gu,
Suwon city, Kyunggi-do, Korea.
Test standards: FCC part 15 subpart B, Class B
Certification

Test Procedure and Items

- AC Power Line Conducted Emissions Measurement: ANSI C63.4-2009

- Radiated Emissions Measurement : ANSI C63.4-2009

Testing Laboratory: EMC Compliance Ltd.

Test result: Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

Date of receipt: 2011. 10. 21

Date of testing: 2011. 10. 22

Issued date: 2011. 10. 25

Tested by:



KIM, IN-HO

Approved by:



YEOM, HAN-SEOK

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1. Applicant information

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2. Laboratory information

Address

EMC compliance Ltd.

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Telephone Number: 82 31 336 9919

Facsimile Number: 82 31 336 4767

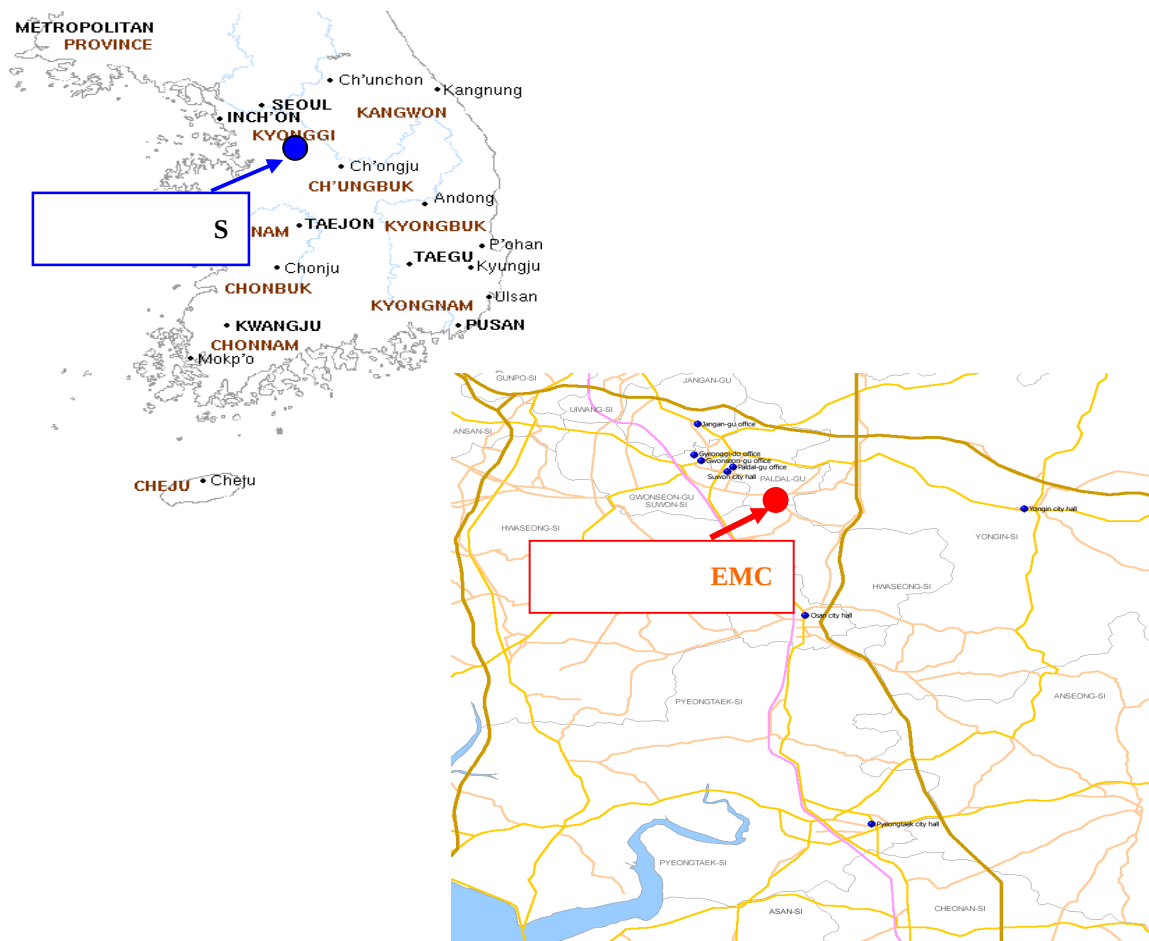
FCC CAB.: KR0040

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber(10 m)	: 23 °C	40 % R.H.	-
Shielded room(CE)	: 24 °C	38 % R.H.	-

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission
Chamber (10 m) : Radiated Emission (Test distance: 3 m)

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Conducted emission measurement : ($k = 2$, 95 %)

9 kHz ~ 150 kHz: ± 3.77 [dB]

150 kHz ~ 30 MHz: ± 3.35 [dB]

Radiated Emission measurement : ($k = 2$, 95 %)

30 MHz ~ 300 MHz: 3 m: + 4.28 [dB], - 4.30 [dB]

10 m: + 4.27 [dB], - 4.28 [dB]

300 MHz ~ 1 000 MHz: 3 m: + 4.56 [dB], - 4.57 [dB]

10 m: + 4.41 [dB], - 4.43 [dB]

4. Description of E.U.T.

4.1 General information

- SC-03D is a Mobile Phone

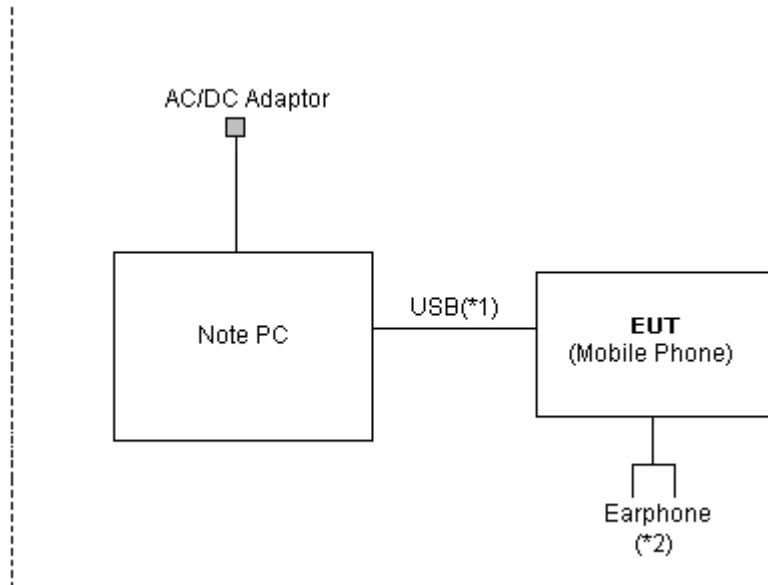
4.2 Product description

Type of product	Mobile Phone
Model name (Basic)	SC-03D
Model name (Variant)	N/A
Difference	-
Trade name	-
Serial no	Engineering Sample
Testing voltage	120 V , 60 Hz
Product rating	Power supplied from battery.
Frequency Range	GSM850 (824 ~ 849 MHz, 869 ~ 894 MHz) PCS (1850 ~ 1915 MHz, 1930 ~ 1995 MHz) WiFi (2412 ~ 2484 MHz, 4915 ~ 8525 MHz)
Note	AC/DC adaptor was provided by the manufacturer.

4.3 Auxiliary equipments

Type	Model / Part #	Serial number	Manufacturer	FCC ID / DoC
Mobile Phone	SC-03D	-	SAMSUNG	A3LSWDSC03D
Note PC	C1410	463680121002	FUJITSU	-

4.4 Test configuration



* Power supplied from battery *

Note *	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	EUT (Mobile Phone)	USB	Note PC	USB	1.5	Shield
2		Earphone	Earphone	Earphone	1.5	Non-Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

This test was done at worst case.

Test mode	Normal operating
USB test mode	EMI exerciser using the read / write test.

5. Summary of test results

In the above configuration tested, The EUT complied with the requirement of the specification

5.1 Modification to the E.U.T.

- No modifications to the EUT were necessary to comply.

5.2 Summary of EMI emission test results

FCC Part 15 Subpart B (Class B)

ANSI C63.4 – 2009

Application	Test method	Test result
Conducted emission - AC main port	ANSI C63.4 – 2009	Complied
Radiated emission	ANSI C63.4 – 2009	Complied

6. Test results

6.1 Conducted Emission

Test specification	FCC Part 15, Section 15.107(a), Class B		
Test mode	USB test mode		
Date	2011. 10. 22		
Testing voltage	120 V, 60 Hz		
Test facility	Shielded room (CE#1)		
Temperature(°C)	24 °C	Humidity (% R.H.)	38 % R.H.
Remarks	Complied Minimum limit margin is 11.70 dB at 0.519 MHz. (Quasi-peak)		

6.1.1 Limits of conducted emission measurement

Frequency [MHz]	Class A (dB(μV))		Class B (dB(μV))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	79	66	66 ~ 56 *	56 ~ 46*
0.5 ~ 5	73	60	56	46
5 ~ 30	73	60	60	50

*The limit decreases linearly with the logarithm of frequency.

6.1.2 Measurement procedure

The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 m above the reference ground plane. The rear of table was located 0.4 m to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 0.4 m to the Horizontal metal ground 0.3 m ~ 0.4 m long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 0.8 m from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

6.1.3 Used equipments

Equipment	Model	Serial No.	Makers	Next Cal. Date	Used
Test Receiver	ESHS10	843276/003	R&S	12.06.14	☒
LISN	ESH3-Z5	100267	R&S	12.07.08	☒
LISN	L2-16A	0000J10705	PMM	-	☒

6.1.4 Conducted emission measurement result

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit	Reading	Result	Limit	Reading	Result
				[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]
0.192	0.29	0.01	H	63.95	50.95	51.25	53.95	32.44	32.74
0.264	0.29	0.01	H	61.30	42.22	42.52	51.30	32.21	32.51
0.336	0.31	0.01	H	59.30	38.96	39.28	49.30	26.03	26.35
0.402	0.32	0.01	H	57.81	38.34	38.67	47.81	28.04	28.37
0.462	0.32	0.01	H	56.66	42.43	42.76	46.66	32.64	32.97
0.468	0.30	0.01	N	56.55	42.17	42.48	46.55	32.01	32.32
0.519	0.33	0.01	H	56.00	43.96	44.30	46.00	31.35	31.69
0.528	0.32	0.01	N		43.16	43.49		28.83	29.16
0.582	0.34	0.01	N		40.87	41.22		28.66	29.01
0.762	0.38	0.02	H		40.55	40.95		29.18	29.58
0.828	0.40	0.02	H		40.32	40.74		30.17	30.59
1.032	0.46	0.03	H		43.42	43.91		31.72	32.21
7.110	3.13	0.11	N	60.00	31.94	35.18	50.00	24.71	27.95
7.460	3.16	0.11	H		28.55	31.82		22.52	25.79
10.030	4.07	0.15	N		30.99	35.21		22.75	26.97
11.110	4.20	0.15	N		28.17	32.52		25.35	29.70
12.160	4.40	0.17	N		30.27	34.84		21.00	25.57
22.410	4.25	0.24	H		27.80	32.29		22.33	26.82

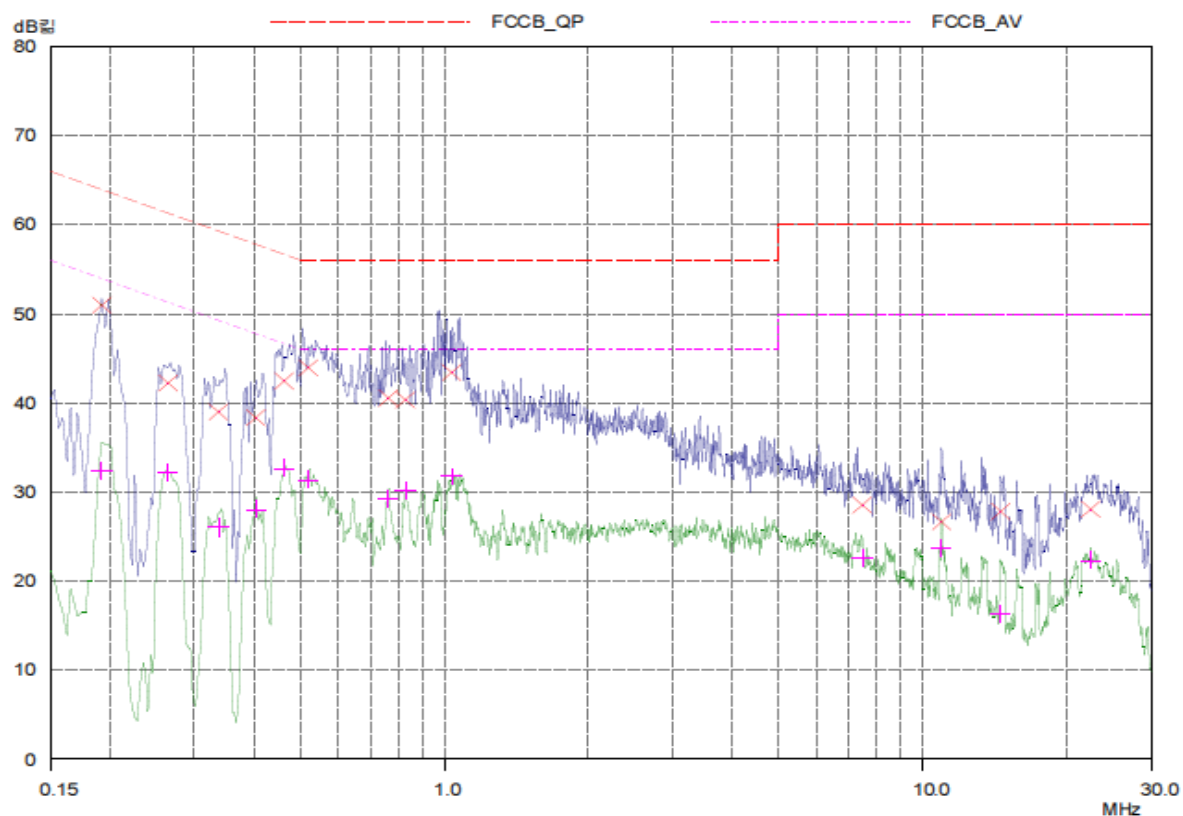
EUT: SC-03D
Manuf:
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: usb_h.dat : New Measurement

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	2msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



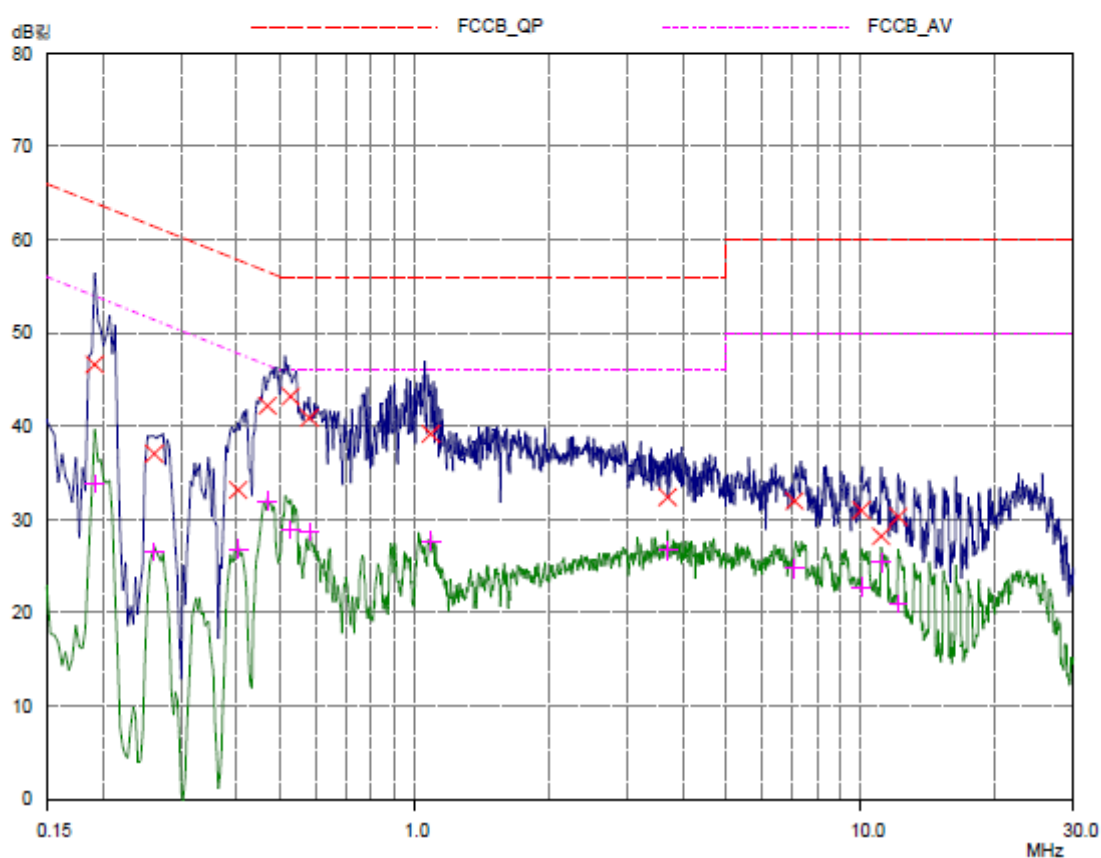
EUT: SC-03D
Manuf:
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: usb_n.dat : New Measurement

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	2msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



6.2 Radiated Emission

Test specification	FCC Part 15, Section 15.109(g), Class B		
Test mode	USB test mode		
Date	2011. 10. 22		
Testing voltage	120 V, 60 Hz		
Test facility	10 m Chamber (Test distance: 3 m)		
Temperature (°C)	23 °C	Humidity (% R.H.)	40 % R.H.
Remarks	Complied Minimum limit margin is 11.9 dB at 191.986 MHz. (30 MHz ~ 1 GHz) Minimum limit margin is 16.8 dB at 1997.923 MHz. (1 GHz ~ 6 GHz_Average)		

6.2.1 Limits of radiated emission measurement

* Radiated disturbance

Of those disturbances above ($L - 20\text{dB}$), where L is the limit level in logarithmic units, record at least the disturbance levels and the frequencies of the six highest disturbances.

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 Polarization	Resolution Bandwidth	Turntable position [degrees]
100 ~ 400	Horizontal, Vertical	120 kHz	Continuous

Measurements within 20 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using quasi-peak detectors.

Peak/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 Polarization	Resolution Bandwidth	Turntable position [degrees]
100	Horizontal, Vertical	1 MHz	Continuous

Measurements within 20 dB of the limit were then maximized by adjusting turntable position.

Final measurements were made using peak and average detectors.

* Limits for radiated disturbance of ITE at a measuring distance of 3 m

Frequency [MHz]	Class A (dB(μ V/m)) @ 10 m	Class B (dB(μ V/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

*** Note- Alternative standard: CISPR, Pub. 22 ***

6.2.2 Measurement procedure

The test was done at a 3 m distance at 10 m chamber with a quasi-peak detector.

EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.

Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane. Cables connected to EUT were fixed to cause maximum emission.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test Receiver	ESCI	100710	R&S	11.12.01	☒
Bi-Log Antenna	VULB 9168	9168-440	SCHWARZBECK	13.10.04	☒
Amplifier	310N	293004	SONOMA INSTRUMENT	11.12.01	☒
3 dB Attenuator	8491A	27444	HP	11.11.30	☒
Antenna Mast	MA4000-EP	303	Innco Systems	-	☒
Turn Table	DT2000S-1t	079	Innco Systems	-	☒
Horn ANT	3115	00086706	ETS	11.12.22	☒
Amplifier	8449B	3008A01802	AGILENT	12.05.11	☒
Spectrum Analyzer	FSP7	100289	R&S	11.12.17	☒

6.2.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

$$\text{Result} = \text{M.R} + \text{C.F}(\text{A.F} + \text{C.L} + 3 \text{ dB Att} - \text{A.G})$$

M.R = Meter Reading

A.F = Antenna Factor

C.L = Cable Loss

A.G= Amplifier Gain

3 dB Att = 3 dB Attenuator

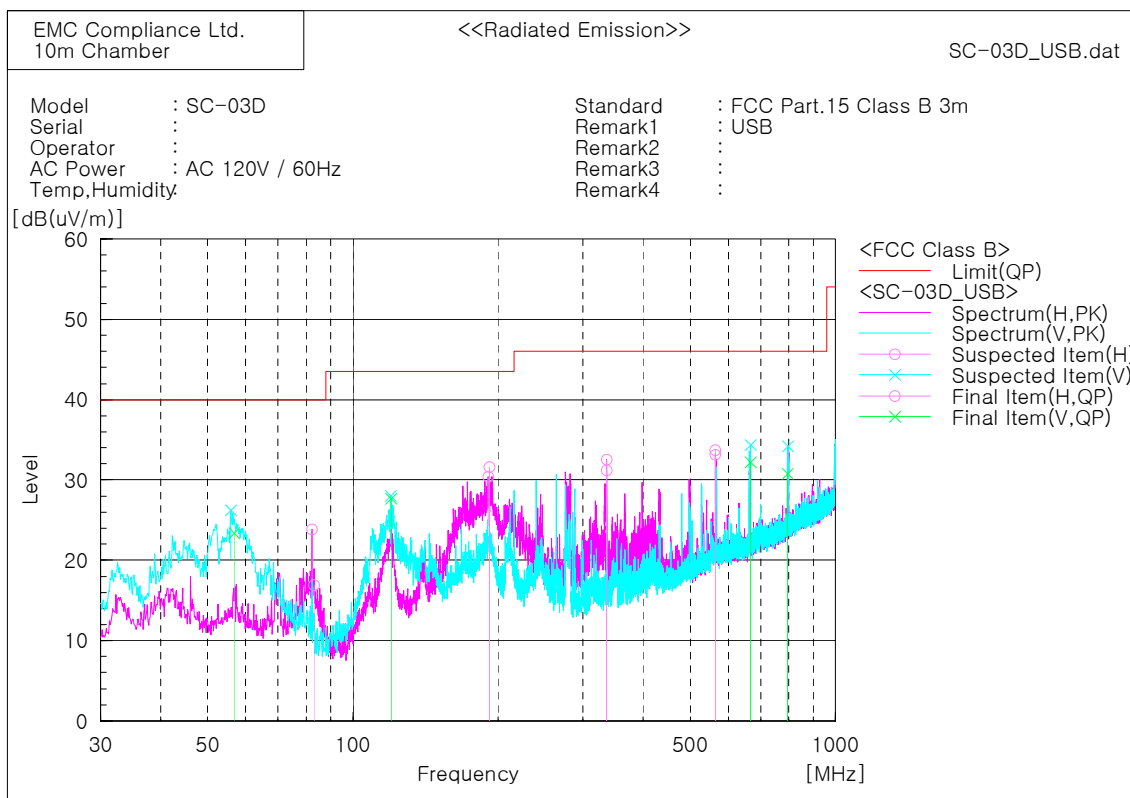
If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB

The result is $30 + 12 + 5 + 3 - 35 = 15 \text{ dB}(\mu\text{V/m})$

6.2.5 Radiated emission measurement result

* Graph and Data

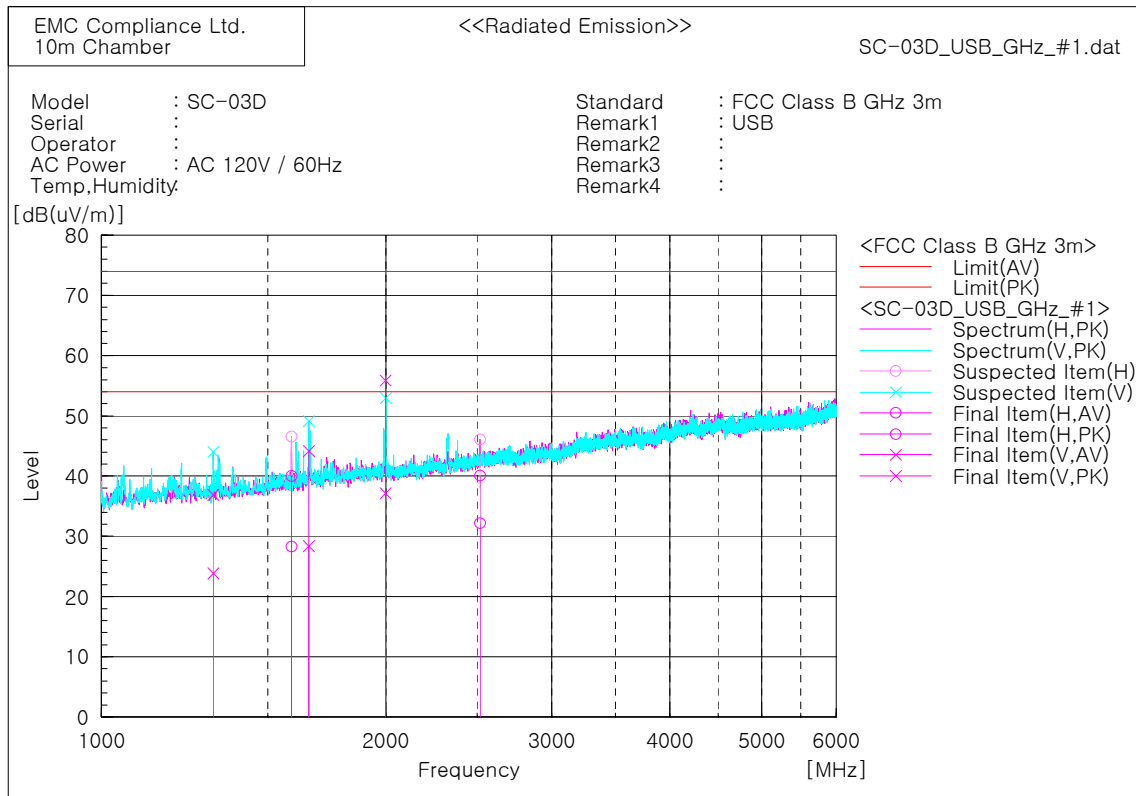
* 30 MHz ~ 1 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	56.732	V	37.8	-14.4	23.4	40.0	16.6	100.0	243.1	
2	83.095	H	35.6	-18.7	16.9	40.0	23.1	301.0	326.8	
3	119.996	V	43.9	-16.2	27.7	43.5	15.8	100.0	94.4	
4	191.986	H	47.9	-16.3	31.6	43.5	11.9	201.0	244.4	
5	335.987	H	42.8	-11.6	31.2	46.0	14.8	100.0	290.2	
6	564.018	H	39.7	-6.0	33.7	46.0	12.3	201.0	193.4	
7	666.456	V	36.7	-4.5	32.2	46.0	13.8	100.0	352.1	
8	796.186	V	33.0	-2.2	30.8	46.0	15.2	199.0	232.8	

* 1 GHz ~ 6 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result AV [dB(uV/m)]	Result PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [deg]	Remark
1	1314.250	V	32.9	45.9	-9.0	23.9	36.9	54.0	74.0	30.1	37.1	200.0	285.0	
2	1589.500	H	35.2	46.9	-6.9	28.3	40.0	54.0	74.0	25.7	34.0	100.0	149.4	
3	1658.500	V	34.8	50.6	-6.4	28.4	44.2	54.0	74.0	25.6	29.8	100.0	124.8	
4	1997.923	V	41.5	60.2	-4.3	37.2	55.9	54.0	74.0	16.8	18.1	200.0	295.5	
5	2518.000	H	34.2	42.1	-2.0	32.2	40.1	54.0	74.0	21.8	33.9	202.0	260.8	