



CERTIFICATION TEST REPORT

Report Number. : 4789841431-E7V1

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-G780G/DSM, SM-G780G/DS, SM-G780G

FCC ID : A3LSMG780G

EUT Description : GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,
WPT and NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

March 15, 2021

Prepared by:

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/15/21	Initial issue	Hyunsik Yun

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION.....	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	6
4.4. DECISION RULE	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT.....	7
5.2. MAXIMUM E-FIELD STRENGTH.....	7
5.3. WORST-CASE CONFIGURATION AND MODE	7
5.4. DESCRIPTION OF TEST SETUP	8
6. TEST AND MEASUREMENT EQUIPMENT	9
7. 20dB BANDWIDTH	10
8. RADIATED EMISSION TEST RESULTS.....	11
8.1. LIMITS AND PROCEDURE	11
8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)	13
8.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz.....	14
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz	15
8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [EUT with passive TAG mode]	16
8.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT with passive TAG mode].....	17
8.1.6. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT with passive TAG mode]	18
9. AC MAINS LINE CONDUCTED EMISSIONS.....	19
10. FREQUENCY STABILITY	22

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC

MODEL NUMBER: SM-G780G/DSM, SM-G780G/DS, SM-G780G

SERIAL NUMBER: 4b5859b4a4207ece, 4b5859b54c207ece (RADIATED);

DATE TESTED: MAR 02, 2021 – MAR 15, 2021;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Hyunsik Yun
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.10-2013.
4. 414788 D01 Radiated Test Site v01r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.01 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.72 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC. This test report addresses the DXX (NFC) operational mode.

This report covers the Samsung models SM-G780G/DSM, SM-G780G/DS and SM-G780G. These models are identical in hardware except SM-G780G/DSM is supported MST and SM-G780G/DS has dual SIM tray and SM-G780G has single SIM tray. All serise model was same hardware thus, SM-G780G/DS(Dual SIM tray) was set for final test.

5.2. MAXIMUM E-FIELD STRENGTH

The testing was performed at 3 meter. The transmitter maximum E-field at 30m distance is 16.87 dBuV/m which convert from 3 meter data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Y orientation was the worst-case orientation; therefore all final radiated testing was performed with the EUT in the Y orientation while generating continuous emissions.

The fundamental level of the EUT was investigated each type and bitrate. All test was performed worst case condition(type A and bit rate 106 kbps).

Radiated(fundamental level and spurious emissions) tests were performed both without reading a passive tag condition[test mode] and with reading a passive tag condition.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA200	R37M15D6V31SE3	N/A
Data Cable	SAMSUNG	N/A	N/A	N/A

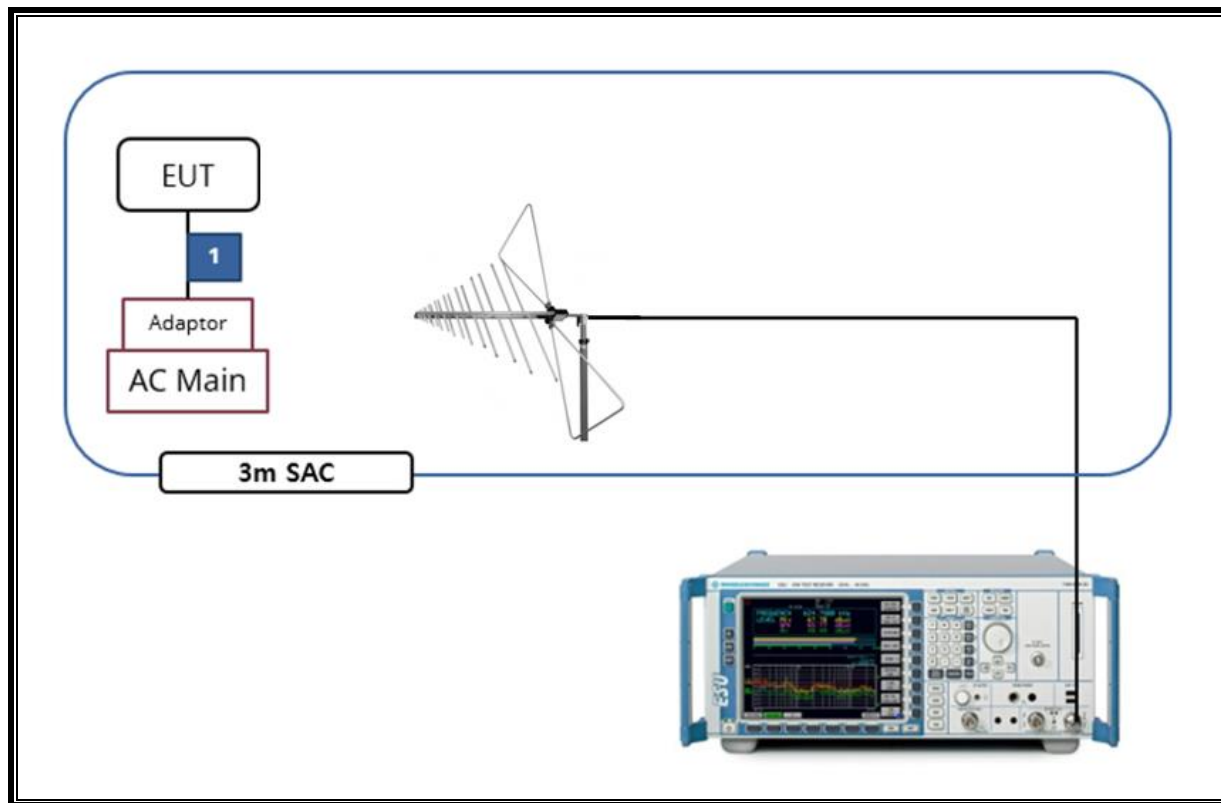
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

The EUT is a stand-alone device configured and tested in a worst-case setup.

Note: Worst case is using worst case orientation with AC charger attached to the EUT with NFC signal continuously transmitting.

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	08-05-21
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-03-21
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-05-21
Temperature Chamber	ESPEC	SH-642	93001109	08-04-21
LISN	R&S	ENV216	101837	08-06-21
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. 20dB BANDWIDTH

LIMITS

§15.215

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated

§15.225

Operation within the band 13.110 – 14.010MHz

TEST PROCEDURE

The spectrum analyzer connected receive antenna and the EUT placed on near the receive antenna. The RBW is set to 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

Frequency [MHz]	20 dB Bandwidth [kHz]
13.56	435

20dB Bandwidth Plot



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from µV/m to dBµV/m is:

Limit (dBµV/m) = 20 log limit (µV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

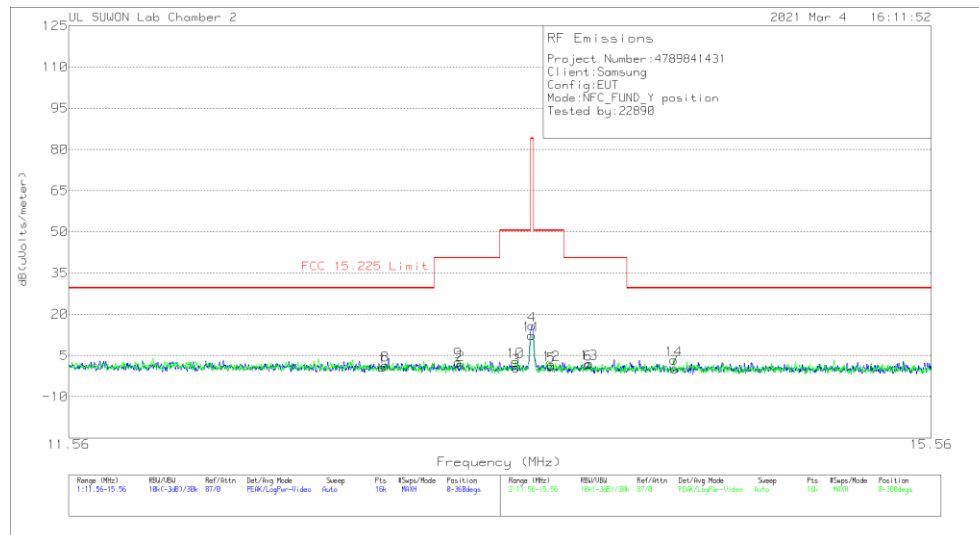
ANSI C63.10-2013

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)



Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
1	12.88125	20.23	Pk	20	-40	.5	.73	29.54	-28.81	0-360
2	13.23163	21.09	Pk	20	-40	.5	1.59	40.51	-38.92	0-360
3	13.48663	20.13	Pk	20	-40	.5	.63	50.5	-49.87	0-360
**4	13.56025	35.42	Pk	20	-40	.5	15.92	84	-68.08	0-360
5	13.65238	20.59	Pk	20	-40	.6	1.19	50.5	-49.31	0-360
6	13.82713	21.32	Pk	20	-40	.6	1.92	40.51	-38.59	0-360
7	14.24563	19.6	Pk	20	-40	.6	.2	29.54	-29.34	0-360

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
8	12.89163	20.89	Pk	20	-40	.5	1.39	29.54	-28.15	0-360
9	13.21913	22.19	Pk	20	-40	.5	2.69	40.51	-37.82	0-360
10	13.483	22.2	Pk	20	-40	.5	2.7	50.5	-47.8	0-360
**11	13.55913	31.76	Pk	20	-40	.5	12.26	84	-71.74	0-360
12	13.65238	21.06	Pk	20	-40	.6	1.66	50.5	-48.84	0-360
13	13.83075	21.48	Pk	20	-40	.6	2.08	40.51	-38.43	0-360
14	14.23913	22.74	Pk	20	-40	.6	3.34	29.54	-26.2	0-360

Pk - Peak detector

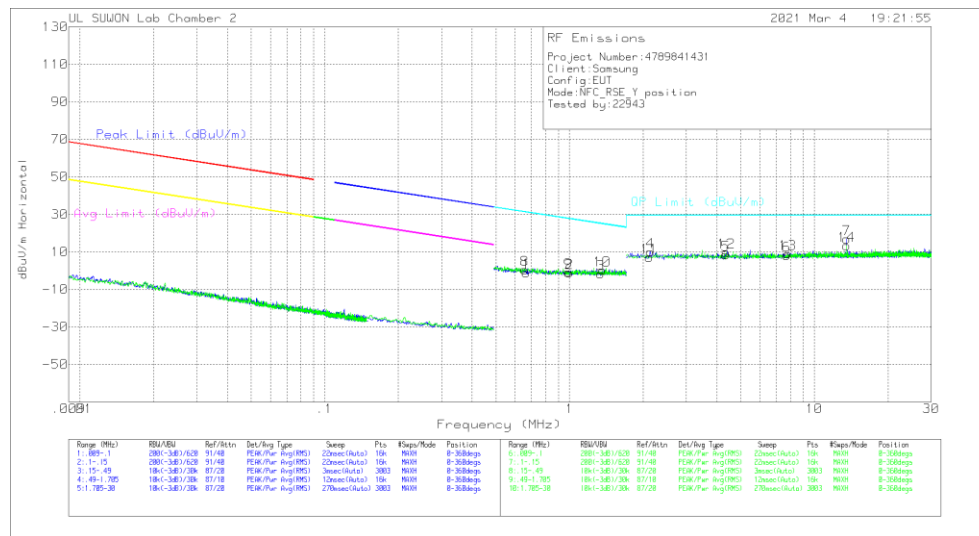
**Fundamental

Note 1 : Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.2. SPURIOUS EMISSION 0.009 TO 30 MHz



Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.66564	19.23	Pk	19.7	.1	-40	-9.7	31.15	-32.12	0-360
2	.99791	18.89	Pk	19.8	.2	-40	-1.11	27.64	-28.75	0-360
3	1.33953	18.29	Pk	19.8	.2	-40	-1.71	25.09	-26.8	0-360
4	2.13855	30.05	Pk	19.9	.2	-40	10.15	29.5	-19.35	0-360
5	4.33458	28.29	Pk	19.8	.3	-40	8.39	29.5	-21.11	0-360
6	7.70873	27.97	Pk	19.9	.4	-40	8.27	29.5	-21.23	0-360
**7	13.56165	36.34	Pk	20	.5	-40	16.84	29.5	-12.66	0-360

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.65682	20.81	Pk	19.7	.1	-40	.61	31.26	-30.65	0-360
9	.98746	19.16	Pk	19.8	.2	-40	-.84	27.73	-28.57	0-360
10	1.35891	20.31	Pk	19.8	.2	-40	.31	24.97	-24.66	0-360
11	2.1197	27.09	Pk	19.9	.2	-40	7.19	29.5	-22.31	0-360
12	4.37228	29.62	Pk	19.8	.3	-40	9.72	29.5	-19.78	0-360
13	7.78413	28.77	Pk	19.9	.4	-40	9.07	29.5	-20.43	0-360
**14	13.56165	32.94	Pk	20	.5	-40	13.44	29.5	-16.06	0-360

Pk - Peak detector

**Fundamental

Note 1: The data for marker number 7 and 14 are the fundamental signal.

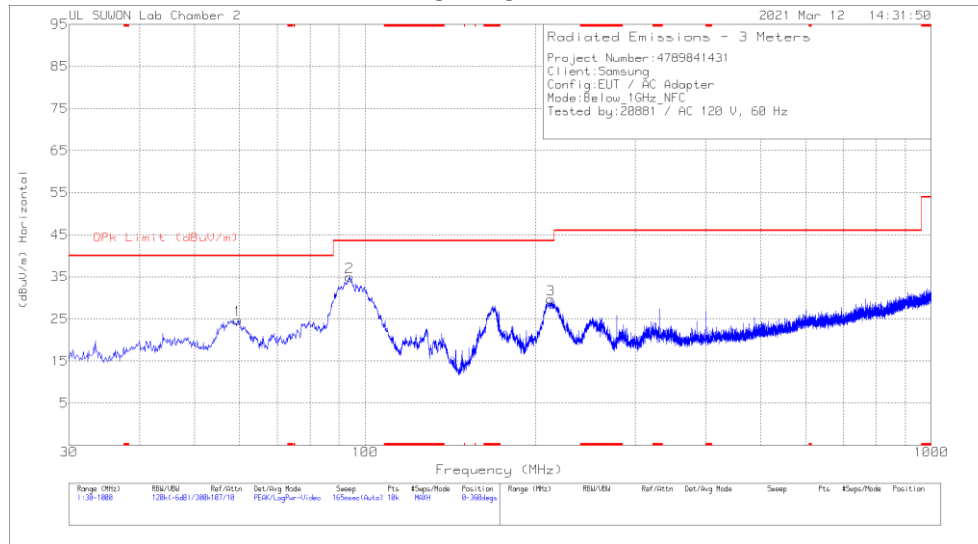
Please refer to section 8.1.1 about the fundamental level.

Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

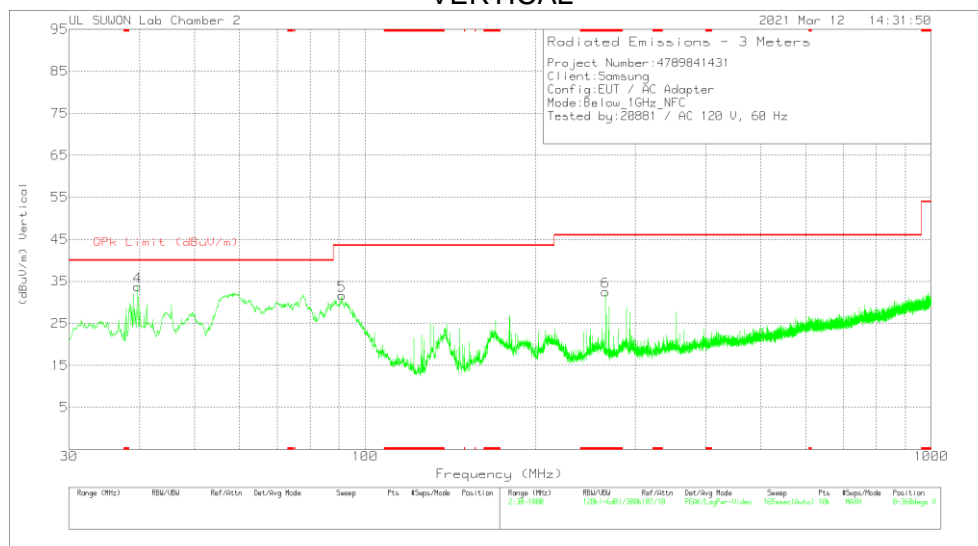
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

HORIZONTAL



VERTICAL

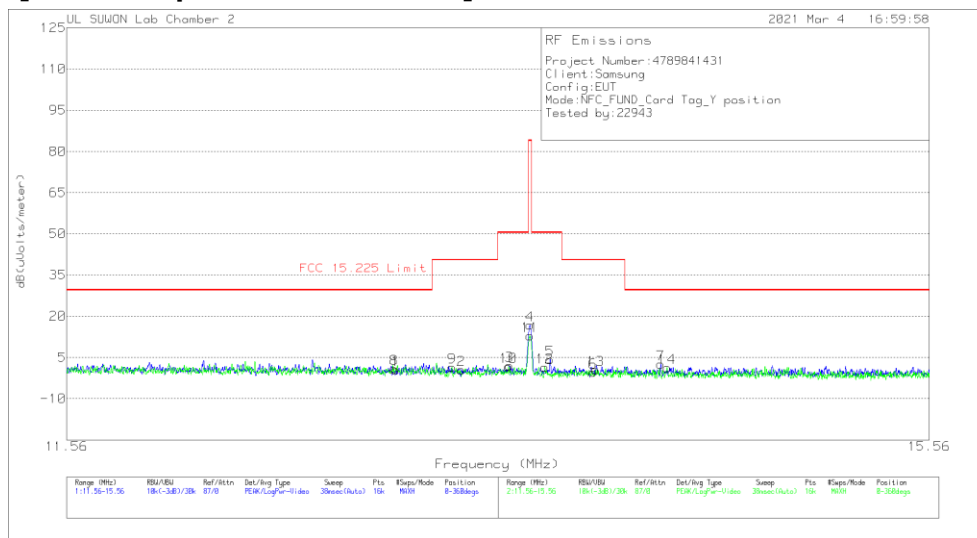


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	59.682	37.76	Pk	18.6	-31.6	24.76	40	-15.24	0-360	200	H
2	93.923	49.98	Pk	16.4	-31.4	34.98	43.52	-8.54	0-360	200	H
3	212.942	43.76	Pk	16.7	-30.8	29.66	43.52	-13.86	0-360	200	H
4	39.7	47.24	Pk	18.5	-32	33.74	40	-6.26	0-360	100	V
5	91.11	47.08	Pk	15.9	-31.3	31.68	43.52	-11.84	0-360	100	V
6	* 265.904	44.56	Pk	18.5	-30.5	32.56	46.02	-13.46	0-360	200	V

Pk - Peak detector

8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [EUT with passive TAG mode]



Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
1	12.94825	20.08	Pk	20	-40	.5	.58	29.54	-28.96	0-360
2	13.24388	20.12	Pk	20	-40	.5	.62	40.51	-39.89	0-360
3	13.46513	21.5	Pk	20	-40	.5	2	50.5	-48.5	0-360
**4	13.56025	36.37	Pk	20	-40	.5	16.87	84	-67.13	0-360
5	13.65488	23.64	Pk	20	-40	.6	4.24	50.5	-46.26	0-360
6	13.85913	18.96	Pk	20	-40	.6	-.44	40.51	-40.95	0-360
7	14.18538	21.92	Pk	20	-40	.6	2.52	29.54	-27.02	0-360

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
8	12.93938	20.36	Pk	20	-40	.5	.86	29.54	-28.68	0-360
9	13.20063	20.92	Pk	20	-40	.5	1.42	40.51	-39.09	0-360
10	13.46088	21.14	Pk	20	-40	.5	1.64	50.5	-48.86	0-360
**11	13.55988	32.43	Pk	20	-40	.5	12.93	84	-71.07	0-360
12	13.629	20.92	Pk	20	-40	.6	1.52	50.5	-48.98	0-360
13	13.87088	19.87	Pk	20	-40	.6	.47	40.51	-40.04	0-360
14	14.21625	20.65	Pk	20	-40	.6	1.25	29.54	-28.29	0-360

Pk - Peak detector

**Fundamental

Note 1: Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

UL SUWON Lab Chamber 2

2021 Mar -4 19:13:19

RF Emissions
 Project Number: 478984131
 Client: Samsung
 Config: EUT
 Mode: NFC_RSE Card Tag_Y position
 Tested by: 22943

Peak Limit (dBu/m)

Avg. Limit (dBu/m)

OP Limit (dBu/m)

Frequency (MHz)

Range (MHz)	RBW/BBW	Ref/Att'n	Det/Bw Type	Sweep	Pts	Ksps/Mode	Position	Range (MHz)	RBW/BBW	Ref/Att'n	Det/Bw Type	Sweep	Pts	Ksps/Mode	Position
1, 60K-1	30K(-3dB)/30K	31/40	PCW/Fer Avg(95)	20usec(Auto)	10k	9000	B-30dBps	6, 60K-1	30K(-3dB)/30K	31/40	PCW/Fer Avg(95)	20usec(Auto)	10k	9000	B-30dBps
2, 1-15	200K(-3dB)/30K	31/40	PCW/Fer Avg(95)	20usec(Auto)	10k	9000	B-30dBps	7, 1-15	200K(-3dB)/30K	31/40	PCW/Fer Avg(95)	20usec(Auto)	10k	9000	B-30dBps
3, 15-49	10K(-3dB)/30K	37/28	PCW/Fer Avg(95)	20usec(Auto)	3003	9000	B-30dBps	8, 15-49	10K(-3dB)/30K	37/28	PCW/Fer Avg(95)	20usec(Auto)	3003	9000	B-30dBps
4, 49-1.705	10K(-3dB)/30K	37/18	PCW/Fer Avg(95)	12usec(Auto)	10k	9000	B-30dBps	9, 49-1.705	10K(-3dB)/30K	37/18	PCW/Fer Avg(95)	12usec(Auto)	10k	9000	B-30dBps
5, 1.705-30	10K(-3dB)/30K	37/28	PCW/Fer Avg(95)	270usec(Auto)	3003	9000	B-30dBps	10, 1.705-30	10K(-3dB)/30K	37/28	PCW/Fer Avg(95)	270usec(Auto)	3003	9000	B-30dBps

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.66925	20.8	Pk	19.7	.1	-40	.6	31.1	-30.5	0-360
2	1.00277	18.61	Pk	19.8	.2	-40	-1.39	27.6	-28.99	0-360
3	1.40569	19.18	Pk	19.8	.2	-40	-.82	24.67	-25.49	0-360
4	2.51555	27.7	Pk	19.9	.3	-40	7.9	29.5	-21.6	0-360
5	4.8718	27.49	Pk	19.8	.3	-40	7.59	29.5	-21.91	0-360
6	8.25538	28.85	Pk	19.9	.4	-40	9.15	29.5	-20.35	0-360
**7	13.56165	36.88	Pk	20	.5	-40	17.38	29.5	-12.12	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading dBuV/m	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.63968	20.01	Pk	19.7	.1	-40	-.19	31.49	-31.68	0-360
9	1.00748	18.86	Pk	19.8	.2	-40	-1.14	27.56	-28.7	0-360
10	1.4229	20.32	Pk	19.8	.2	-40	.32	24.57	-24.25	0-360
11	2.47785	28.79	Pk	19.9	.3	-40	8.99	29.5	-20.51	0-360
12	4.8341	28.65	Pk	19.8	.3	-40	8.75	29.5	-20.75	0-360
13	8.25538	29	Pk	19.9	.4	-40	9.3	29.5	-20.2	0-360
**14	13.56165	33	Pk	20	.5	-40	13.5	29.5	-16	0-360

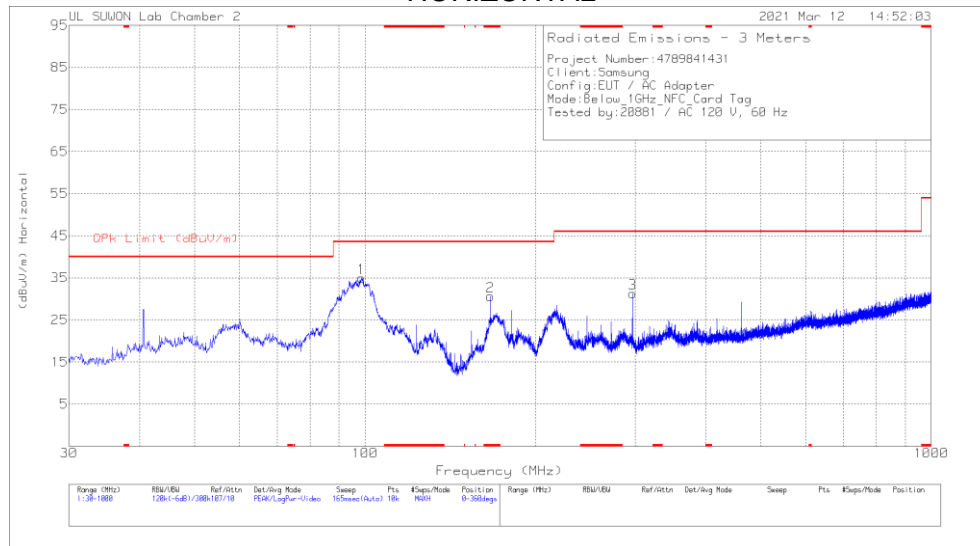
**Fundamental

Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

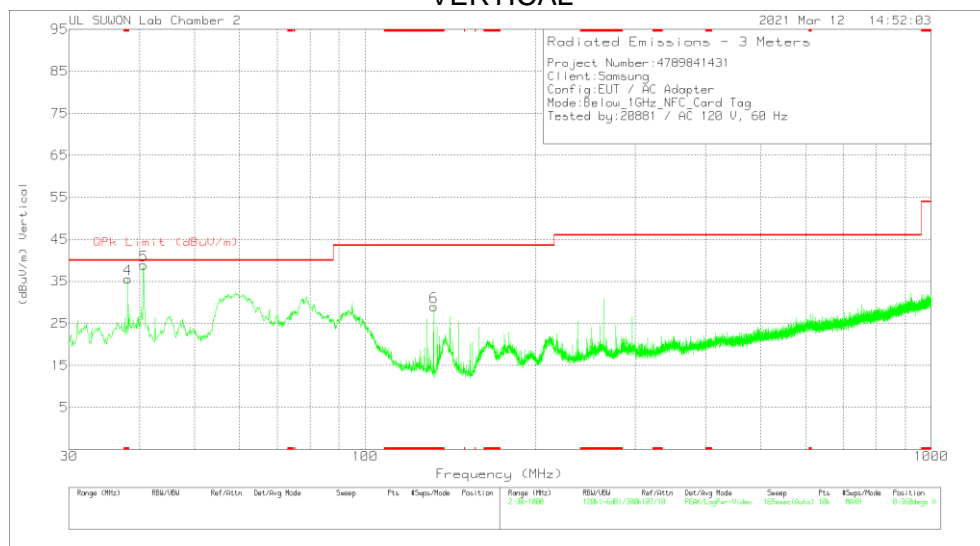
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.6. TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT with passive TAG mode]

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	98.676	48.99	Pk	17.3	-31.3	34.99	43.52	-8.53	0-360	300	H
2	* 166.576	47.02	Pk	14.5	-30.9	30.62	43.52	-12.9	0-360	200	H
3	296.944	42.51	Pk	19.1	-30.3	31.31	46.02	-14.71	0-360	100	H
4	* 38.148	49.41	Pk	18	-31.8	35.61	40	-4.39	0-360	100	V
5	40.67	51.99	Pk	18.8	-31.9	38.89	40	-1.11	0-360	100	V
6	* 132.335	46.1	Pk	14.1	-31.2	29	43.52	-14.52	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
40.67	49.61	Qp	18.8	-31.9	36.51	40	-3.49	112	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Qp - Quasi-Peak detector

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

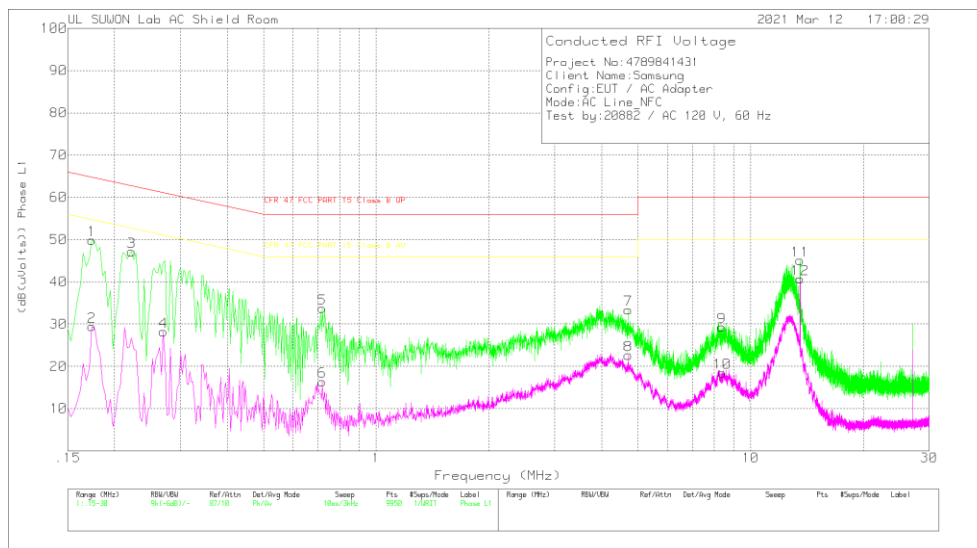
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.174	39.7	Pk	10	.2	49.9	64.77	-14.87	-	-
2	.174	19.21	Av	10	.2	29.41	-	-	54.77	-25.36
3	.222	37.13	Pk	9.8	.2	47.13	62.74	-15.61	-	-
4	.27	18.32	Av	9.7	.2	28.22	-	-	51.12	-22.9
5	.717	23.6	Pk	9.9	.2	33.7	56	-22.3	-	-
6	.717	6.32	Av	9.9	.2	16.42	-	-	46	-29.58
7	4.713	23.31	Pk	9.8	.3	33.41	56	-22.59	-	-
8	4.713	12.56	Av	9.8	.3	22.66	-	-	46	-23.34
9	8.376	19.12	Pk	9.9	.3	29.32	60	-30.68	-	-
10	8.4	8.3	Av	9.9	.3	18.5	-	-	50	-31.5
11	13.56	34.66	Pk	10	.4	45.06	60	-14.94	-	-
12	13.56	30.27	Av	10	.4	40.67	-	-	50	-9.33

Pk - Peak detector

Av - Average detection

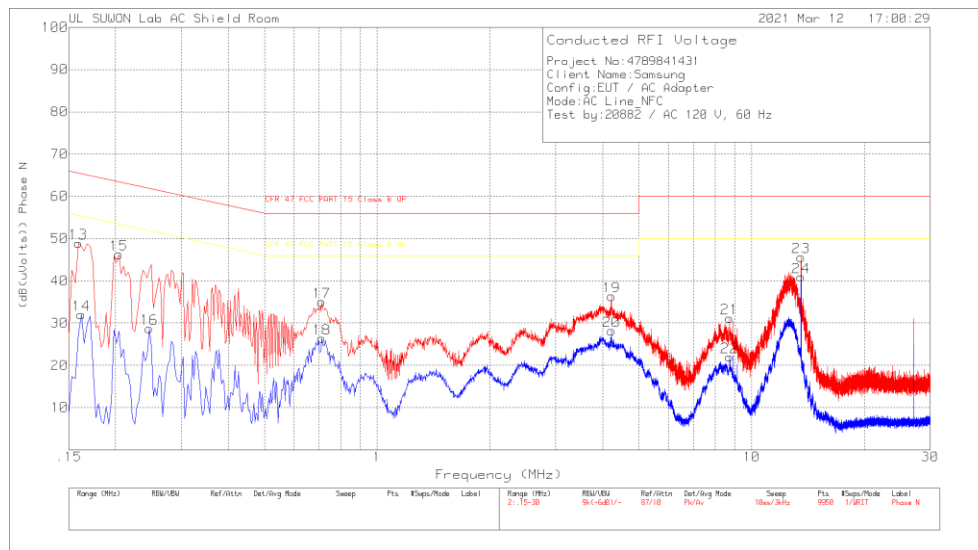
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13.5602	32.54	Qp	10	.4	42.94	60	-17.06	-	-

Qp - Quasi-Peak detector

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.159	38.93	Pk	9.9	.1	48.93	65.52	-16.59	-	-
14	.162	21.92	Av	10	.1	32.02	-	-	55.36	-23.34
15	.204	36.16	Pk	9.9	.2	46.26	63.45	-17.19	-	-
16	.246	18.83	Av	9.7	.2	28.73	-	-	51.89	-23.16
17	.711	24.93	Pk	9.9	.2	35.03	56	-20.97	-	-
18	.711	16.29	Av	9.9	.2	26.39	-	-	46	-19.61
19	4.227	26.27	Pk	9.8	.3	36.37	56	-19.63	-	-
20	4.227	18.08	Av	9.8	.3	28.18	-	-	46	-17.82
21	8.733	20.9	Pk	9.9	.4	31.2	60	-28.8	-	-
22	8.742	11.69	Av	9.9	.4	21.99	-	-	50	-28.01
23	13.56	35.14	Pk	10.1	.4	45.64	60	-14.36	-	-
24	13.56	30.43	Av	10.1	.4	40.93	-	-	50	-9.07

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13.5593	33.64	Qp	10.1	.4	44.14	60	-15.86	-	-

Qp - Quasi-Peak detector

10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI C63.10 §6.8

RESULTS

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply (Vdc)	Envir. Temp (°C)	Frequency Deviation Measured with Time Elapse								
		Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.86	50	13.559915818	3.962	13.559909004	4.464	13.559902343	4.955	13.559898101	5.268	100
3.86	40	13.559944762	1.827	13.559933533	2.655	13.559925761	3.228	13.559920643	3.606	100
3.86	30	13.559961754	0.574	13.559957951	0.855	13.559953736	1.165	13.559952538	1.254	100
3.86	20	13.559969538	0	13.559966497	0.224	13.559965376	0.307	13.559964025	0.407	100
3.86	10	13.559948241	1.571	13.559972576	-0.224	13.559989784	-1.493	13.560004876	-2.606	100
3.86	0	13.560017022	-3.502	13.560025860	-4.154	13.560031938	-4.602	13.560037843	-5.037	100
3.86	-10	13.560045208	-5.580	13.560045322	-5.589	13.560045289	-5.586	13.560045541	-5.605	100
3.86	-20	13.560042296	-5.366	13.560037558	-5.016	13.560033229	-4.697	13.560030735	-4.513	100
3.86	-30	13.560010031	-2.986	13.559997977	-2.097	13.559985274	-1.160	13.559974432	-0.361	100

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply (Vdc)	Envir. Temp (°C)	Frequency Deviation Measured with Time Elapse								
		Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.86	20	13.559968328	0	13.559965157	0.234	13.559964206	0.304	13.559962975	0.395	100
4.40	20	13.559966370	0.234	13.559965311	0.222	13.559965361	0.308	13.559964196	0.305	100
3.65	20	13.559967243	0.169	13.559966156	0.160	13.559965018	0.244	13.559964188	0.305	100

No non-compliance noted.

END OF TEST REPORT