



CERTIFICATION TEST REPORT

Report Number. : 4790357232-E7V1

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

Model : SM-F721B

FCC ID : A3LSMF721B

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,
NFC and WPT

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

Date Of Issue:

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ACCREDITED

Testing Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2022-06-14	Initial issue	Dexter(Hyunsik) Yun

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT
MODEL NUMBER: SM-F721B
SERIAL NUMBER: R3CT40SS6FB, R3CT504WY2D (RADIATED);
DATE TESTED: 2022-05-18 ~ 2022-06-14

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:



Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Dexter(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. KDB 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	3.02 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.72 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 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 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT. This test report addresses the DX (NFC) operational mode.

5.2. MAXIMUM E-FIELD STRENGTH

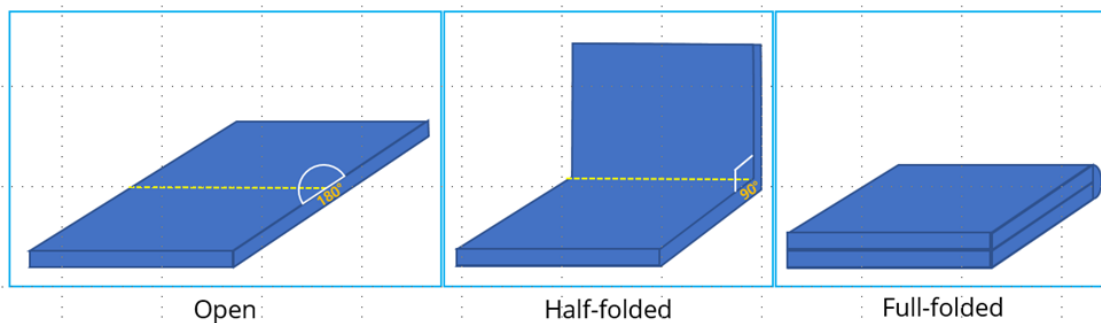
The testing was performed at 3 meter. The transmitter maximum E-field at 30m distance is 18.13 dBuV/m which convert from 3 meter data.

5.3. WORST-CASE CONFIGURATION AND MODE

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

- Worst condition

Axis & Foldable condition	NFC
Axis	Z
Foldable condition	Half-folded



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-TA800	R37R38J49R8SE3	N/A
Data Cable	SAMSUNG	EP-DN980	N/A	N/A

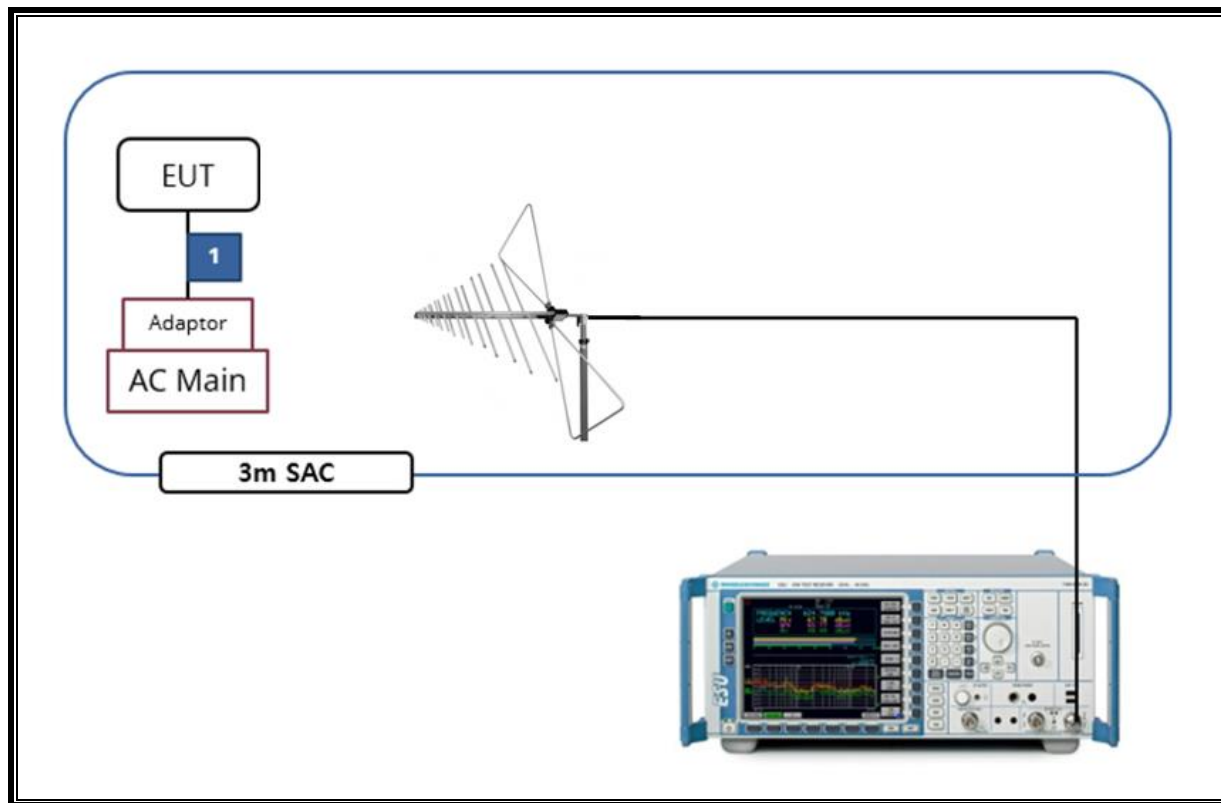
I/O CABLE

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	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
DC Power Supply	Agilent / HP	E3640A	MY54226395	2022-08-02
Temperature Chamber	ESPEC	SH-642	93001109	2022-08-02
LISN	R&S	ENV216	101837	2022-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
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

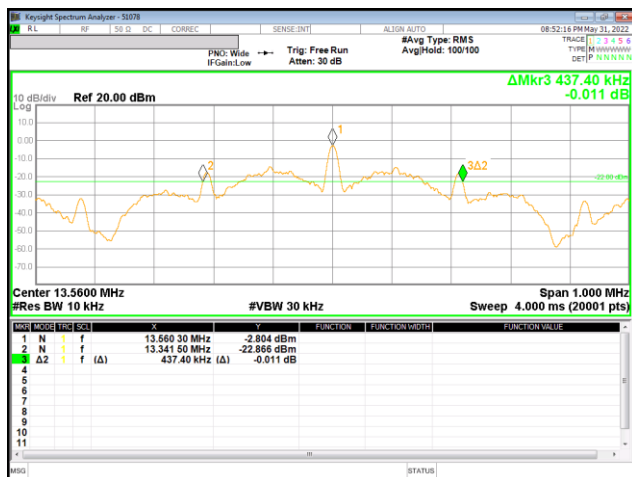
TEST PROCEDURE

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	437.40

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 filed strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/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

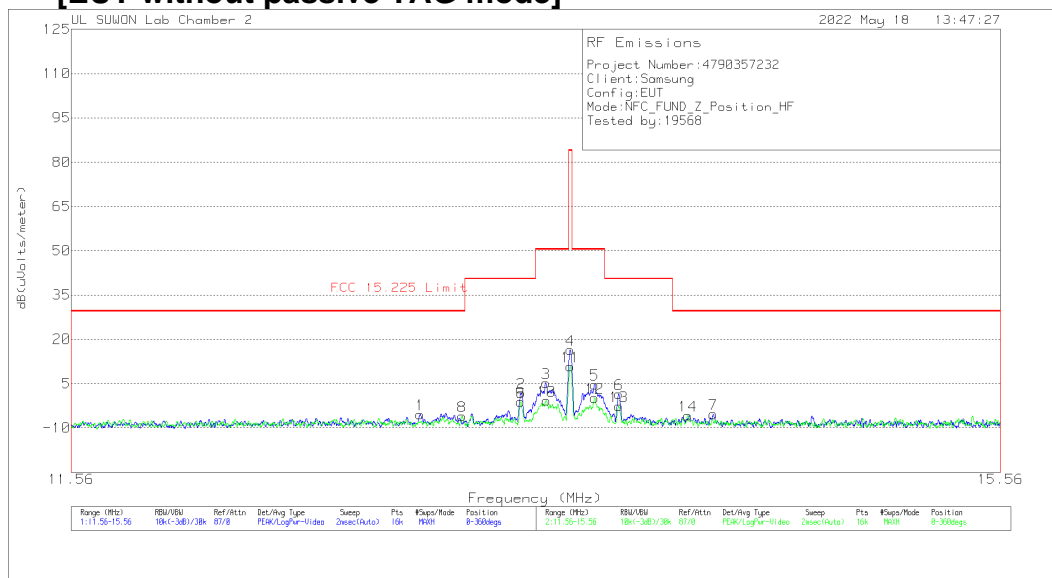
ANSI C63.10-2013

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) [EUT without 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	12.92538	14.15	Pk	20	-40	.5	-5.35	29.54	-34.89	0-360
2	13.348	21.42	Pk	20	-40	.5	1.92	40.51	-38.59	0-360
3	13.4545	24.8	Pk	20	-40	.5	5.3	50.5	-45.2	0-360
**4	13.55988	35.87	Pk	20	-40	.5	16.37	84	-67.63	0-360
5	13.66613	24.15	Pk	20	-40	.6	4.75	50.5	-45.75	0-360
6	13.77213	20.91	Pk	20	-40	.6	1.51	40.51	-39	0-360
7	14.19538	14.06	Pk	20	-40	.6	-5.34	29.54	-34.88	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	13.09963	13.47	Pk	20	-40	.5	-6.03	29.54	-35.57	0-360
9	13.34763	18.41	Pk	20	-40	.5	-1.09	40.51	-41.6	0-360
10	13.45675	18.7	Pk	20	-40	.5	-.8	50.5	-51.3	0-360
**11	13.56025	30.39	Pk	20	-40	.5	10.89	84	-73.11	0-360
12	13.66613	19.55	Pk	20	-40	.6	.15	50.5	-50.35	0-360
13	13.77175	16.74	Pk	20	-40	.6	-2.66	40.51	-43.17	0-360
14	14.08013	13.67	Pk	20	-40	.6	-5.73	29.54	-35.27	0-360

Pk - Peak detector

**Fundamental

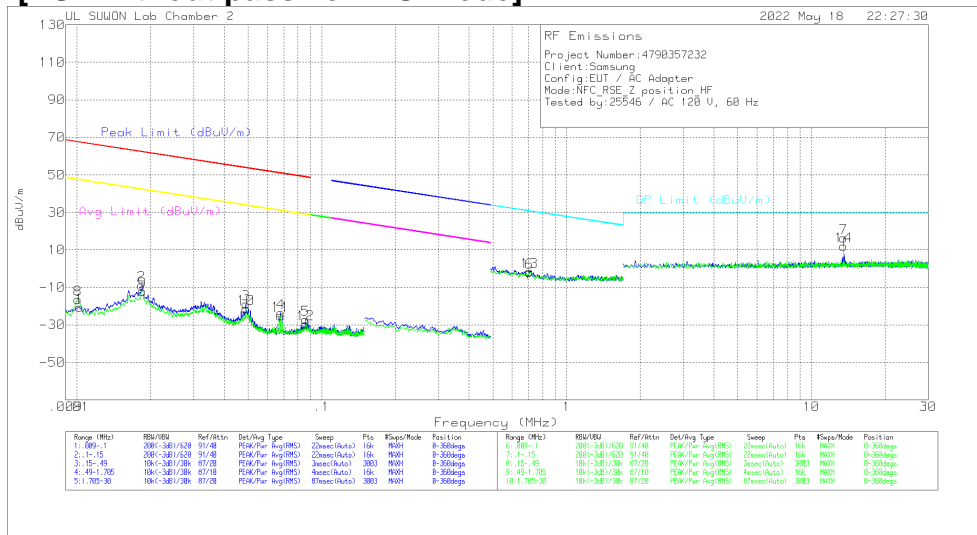
Note 1 : Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

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

[EUT without passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01024	39.09	Pk	20.3	.1	-80	-20.51	67.38	-87.89	47.38	-67.89	0-360
2	.01839	50.83	Pk	20.2	.1	-80	-8.87	62.29	-71.16	42.29	-51.16	0-360
3	.04899	41.08	Pk	19.9	.1	-80	-18.92	53.78	-72.7	33.78	-52.7	0-360
4	.06795	36.4	Pk	19.9	.1	-80	-23.6	50.94	-74.54	30.94	-54.54	0-360
5	.08574	33.05	Pk	19.8	.1	-80	-27.05	48.92	-75.97	28.92	-55.97	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)
6	.7069	18.37	Pk	19.7	.1	-40	-1.83	30.63	-32.46	0-360
**7	13.56165	35.98	Pk	20	.5	-40	16.48	29.5	-13.02	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.01009	43.14	Pk	20.3	.1	-80	-16.46	67.51	-83.97	47.51	-63.97	0-360
9	.01854	47.78	Pk	20.2	.1	-80	-11.92	62.22	-74.14	42.22	-54.14	0-360
10	.04897	38.73	Pk	19.9	.1	-80	-21.27	53.79	-75.06	33.79	-55.06	0-360
11	.06794	34.99	Pk	19.9	.1	-80	-25.01	50.94	-75.95	30.94	-55.95	0-360
12	.0858	30.49	Pk	19.8	.1	-80	-29.61	48.92	-78.53	28.92	-58.53	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)
13	.70607	18.61	Pk	19.7	.1	-40	-1.59	30.64	-32.23	0-360
**14	13.56165	31.43	Pk	20	.5	-40	11.93	29.5	-17.57	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.

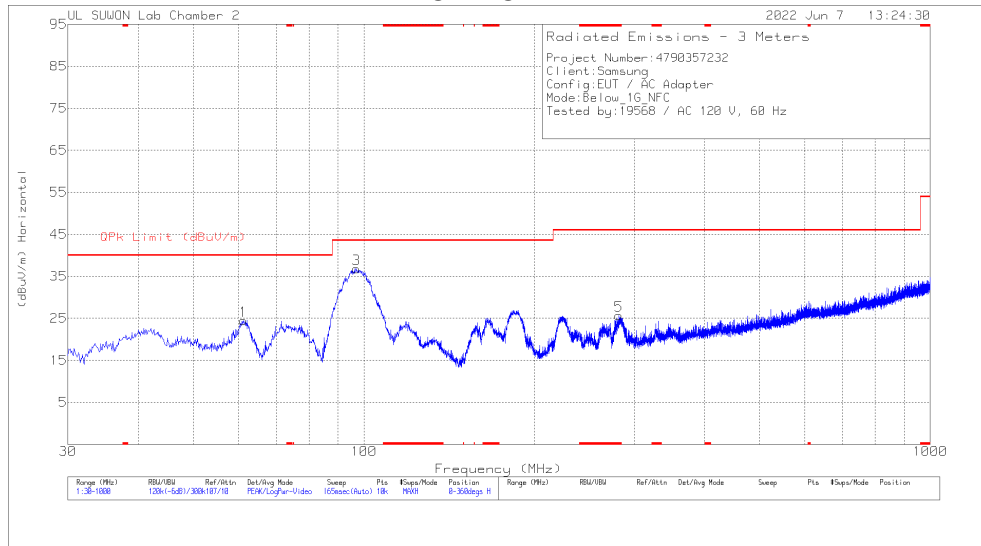
Frequency range 0.009MHz ~ 0.490MHz, only noise floor level and more than 20dB margin.

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.

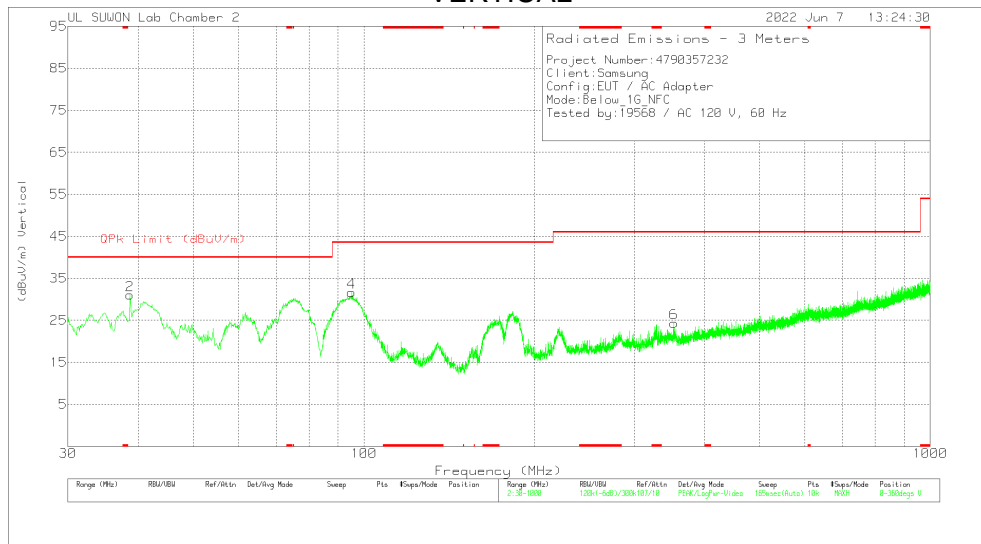
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

[EUT without 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	61.234	37.38	Pk	18.2	-31.1	24.48	40	-15.52	0-360	300	H
3	97.027	50.5	Pk	17	-30.7	36.8	43.52	-6.72	0-360	200	H
5	* 282.2	36	Pk	18.8	-29.1	25.7	46.02	-20.32	0-360	100	H
2	38.633	44.22	Pk	18.2	-31.4	31.02	40	-8.98	0-360	100	V
4	95.087	45.66	Pk	16.5	-30.5	31.66	43.52	-11.86	0-360	100	V
6	352.913	32.07	Pk	21	-28.7	24.37	46.02	-21.65	0-360	100	V

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

Pk - Peak detector

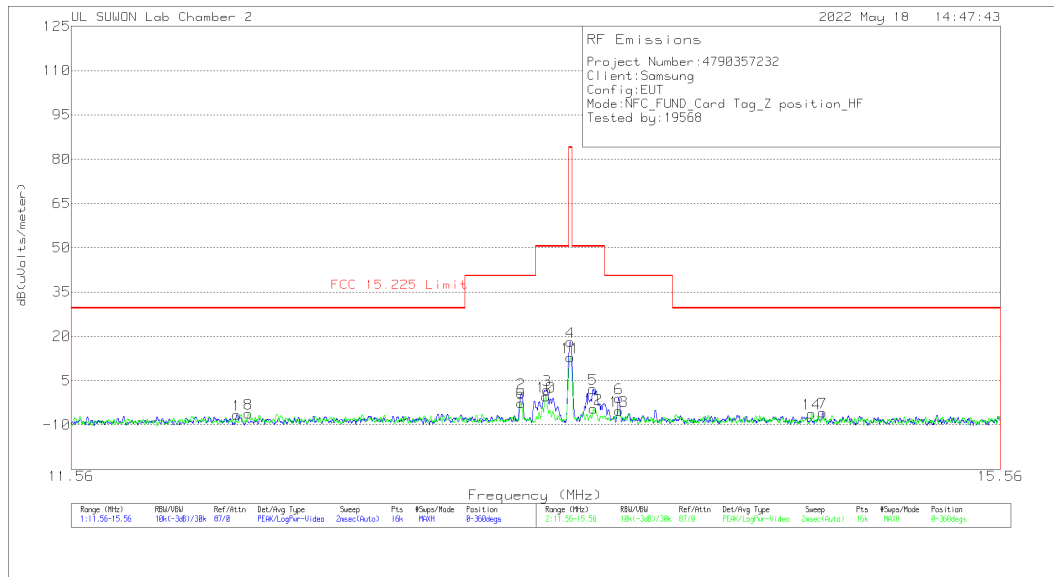
Radiated Emissions

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
97.027	44.36	Qp	17	-30.7	30.66	43.52	-12.86	171	296	H

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

Qp - Quasi-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	12.18938	13	Pk	20	-40	.5	-6.5	29.54	-36.04	0-360
2	13.34963	20.15	Pk	20	-40	.5	.65	40.51	-39.86	0-360
3	13.45938	21.35	Pk	20	-40	.5	1.85	50.5	-48.65	0-360
**4	13.56	37.63	Pk	20	-40	.5	18.13	84	-65.87	0-360
5	13.65988	21.54	Pk	20	-40	.6	2.14	50.5	-48.36	0-360
6	13.77188	18.43	Pk	20	-40	.6	-.97	40.51	-41.48	0-360
7	14.70113	13.51	Pk	20	-40	.6	-5.89	29.54	-35.43	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	12.23363	13.27	Pk	20	-40	.5	-6.23	29.54	-35.77	0-360
9	13.34813	16.85	Pk	20	-40	.5	-2.65	40.51	-43.16	0-360
10	13.45488	19.15	Pk	20	-40	.5	-.35	50.5	-50.85	0-360
**11	13.56025	32.3	Pk	20	-40	.5	12.8	84	-71.2	0-360
12	13.66138	14.88	Pk	20	-40	.6	-4.52	50.5	-55.02	0-360
13	13.77363	14.22	Pk	20	-40	.6	-5.18	40.51	-45.69	0-360
14	14.64888	13.26	Pk	20	-40	.6	-6.14	29.54	-35.68	0-360

Pk - Peak detector

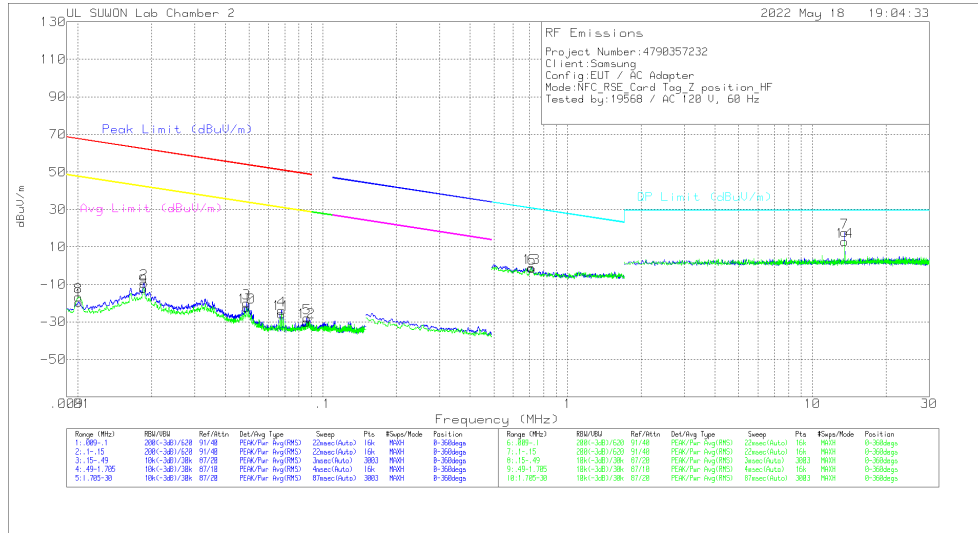
**Fundamental

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.

8.1.5. SPURIOUS EMISSION 0.09 TO 30 MHz [EUT with passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01008	40.16	Pk	20.3	.1	-80	-19.44	67.52	-86.96	47.52	-66.96	0-360
2	.0186	50.43	Pk	20.2	.1	-80	-9.27	62.19	-71.46	42.19	-51.46	0-360
3	.04891	40.12	Pk	19.9	.1	-80	-19.88	53.8	-73.68	33.8	-53.68	0-360
4	.06794	36.26	Pk	19.9	.1	-80	-23.74	50.94	-74.68	30.94	-54.68	0-360
5	.08605	32.26	Pk	19.8	.1	-80	-27.84	48.89	-76.73	28.89	-56.73	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)
6	.71405	18.96	Pk	19.7	.1	-40	-1.24	30.54	-31.78	0-360
**7	13.56165	37.36	Pk	20	.5	-40	17.86	29.5	-11.64	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	HFH2-Z2_Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading dBuV/m	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.01007	42.89	Pk	20.3	.1	-80	-16.71	67.52	-84.23	47.52	-64.23	0-360
9	.01853	47.64	Pk	20.2	.1	-80	-12.06	62.23	-74.29	42.23	-54.29	0-360
10	.04883	37.93	Pk	19.9	.1	-80	-22.07	53.81	-75.88	33.81	-55.88	0-360
11	.06793	34.29	Pk	19.9	.1	-80	-25.71	50.94	-76.65	30.94	-56.65	0-360
12	.08601	30.13	Pk	19.8	.1	-80	-29.97	48.89	-78.86	28.89	-58.86	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)
13	.71067	19.04	Pk	19.7	.1	-40	-1.16	30.58	-31.74	0-360
**14	13.56165	32.28	Pk	20	.5	-40	12.78	29.5	-16.72	0-360

Pk - Peak detector

**Fundamental

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

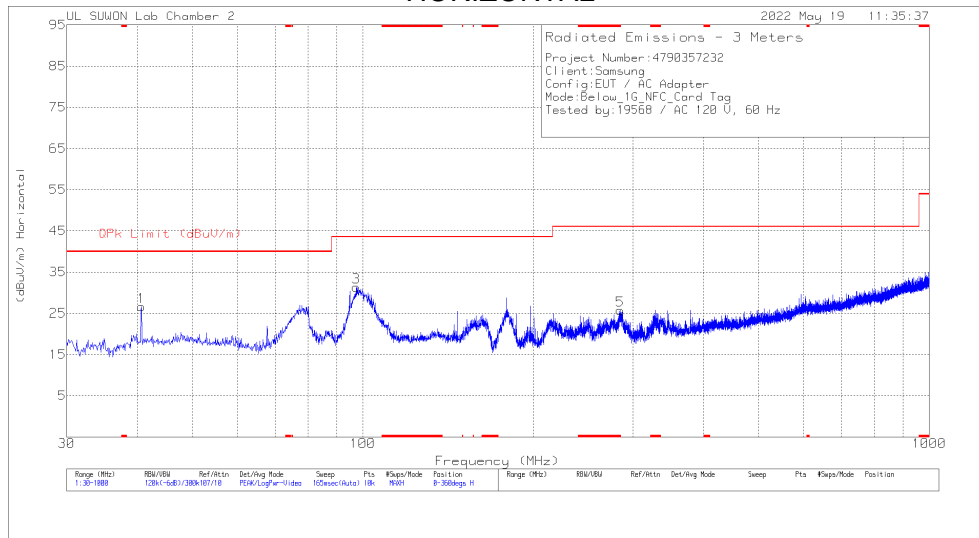
Please refer to section 8.1.4 about the fundamental level.

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

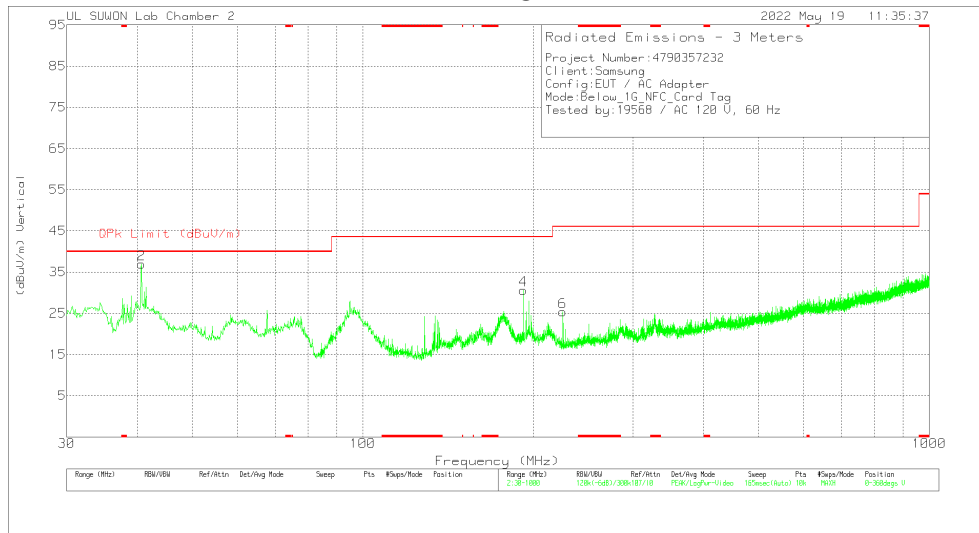
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.6. 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	40.67	39.17	Pk	18.8	-31.4	26.57	40	-13.43	0-360	200	H
3	97.415	44.81	Pk	17.1	-30.6	31.31	43.52	-12.21	0-360	200	H
5	* 284.819	35.93	Pk	18.9	-29.1	25.73	46.02	-20.29	0-360	100	H
2	40.67	49.52	Pk	18.8	-31.4	36.92	40	-3.08	0-360	100	V
4	192.087	43.76	Pk	16.7	-29.8	30.66	43.52	-12.86	0-360	100	V
6	225.552	37.54	Pk	17.3	-29.5	25.34	46.02	-20.68	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	48.2	Qp	18.8	-31.4	35.6	40	-4.4	87	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.

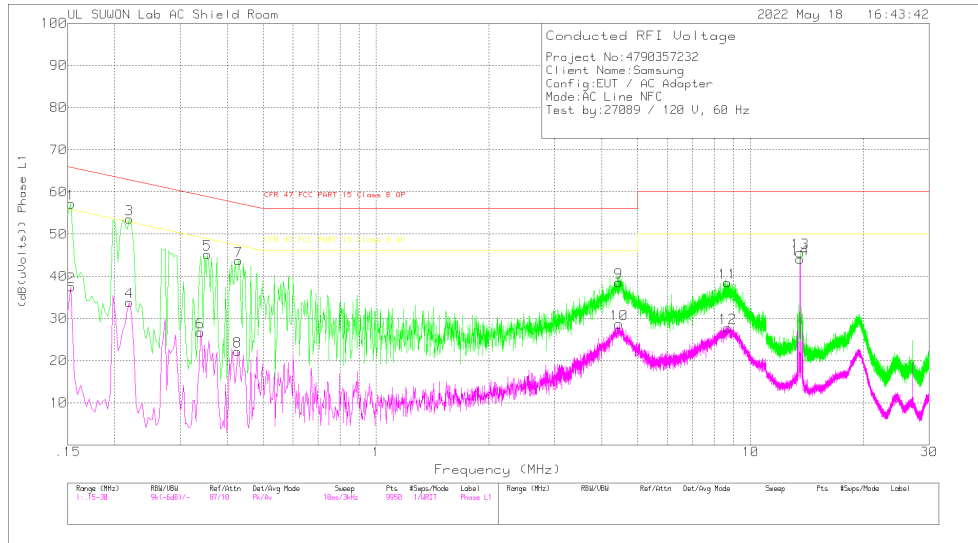
Line conducted data is recorded for both NEUTRAL and HOT lines.

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_With 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	.153	47.3	Pk	9.8	.1	57.2	65.84	-8.64	-	-
2	.153	27.64	Av	9.8	.1	37.54	-	-	55.84	-18.3
3	.219	43.66	Pk	9.7	.2	53.56	62.86	-9.3	-	-
4	.219	24	Av	9.7	.2	33.9	-	-	52.86	-18.96
5	.354	35.22	Pk	9.8	.2	45.22	58.87	-13.65	-	-
6	.339	16.74	Av	9.8	.2	26.74	-	-	49.23	-22.49
7	.429	33.7	Pk	9.8	.2	43.7	57.27	-13.57	-	-
8	.426	12.2	Av	9.8	.2	22.2	-	-	47.33	-25.13
9	4.443	28.55	Pk	9.7	.3	38.55	56	-17.45	-	-
10	4.452	18.69	Av	9.7	.3	28.69	-	-	46	-17.31
11	8.667	28.28	Pk	9.8	.4	38.48	60	-21.52	-	-
12	8.691	17.57	Av	9.8	.4	27.77	-	-	50	-22.23
13	13.56	35.21	Pk	10	.4	45.61	60	-14.39	-	-
14	13.56	33.71	Av	10	.4	44.11	-	-	50	-5.89

Pk - Peak detector

Av - Average detection

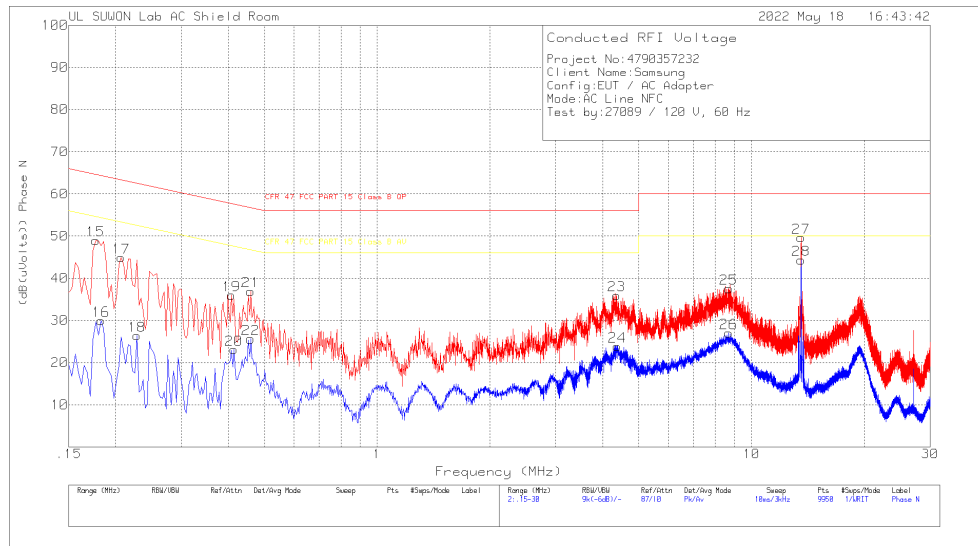
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With 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)
.15225	36.87	Qp	9.7	.1	46.67	65.88	-19.21	-	-
.21825	32.65	Qp	9.7	.2	42.55	62.89	-20.34	-	-
13.5602	32.48	Qp	10	.4	42.88	60	-17.12	-	-

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_With 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)
15	.177	38.9	Pk	9.9	.2	49	64.63	-15.63	-	-
16	.183	19.86	Av	9.9	.2	29.96	-	-	54.35	-24.39
17	.207	34.92	Pk	9.8	.2	44.92	63.32	-18.4	-	-
18	.228	16.49	Av	9.7	.2	26.39	-	-	52.52	-26.13
19	.408	25.99	Pk	9.8	.2	35.99	57.69	-21.7	-	-
20	.414	13.1	Av	9.8	.2	23.1	-	-	47.57	-24.47
21	.459	26.85	Pk	9.9	.2	36.95	56.71	-19.76	-	-
22	.459	15.55	Av	9.9	.2	25.65	-	-	46.71	-21.06
23	4.359	25.97	Pk	9.7	.3	35.97	56	-20.03	-	-
24	4.38	13.88	Av	9.7	.3	23.88	-	-	46	-22.12
25	8.688	27.38	Pk	9.8	.4	37.58	60	-22.42	-	-
26	8.688	16.86	Av	9.8	.4	27.06	-	-	50	-22.94
27	13.56	39.28	Pk	10	.4	49.68	60	-10.32	-	-
28	13.56	33.98	Av	10	.4	44.38	-	-	50	-5.62

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With 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)
13.5602	35.02	Qp	10	.4	45.42	60	-14.58	-	-

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)
3.88	50	13.559903330	-4.011	13.559899984	-4.258	13.559897525	-4.439	13.559895997	-4.552	100
3.88	40	13.559922078	-2.629	13.559918450	-2.896	13.559913857	-3.235	13.559911459	-3.412	100
3.88	30	13.559955899	-0.134	13.559947798	-0.732	13.559940244	-1.289	13.559934657	-1.701	100
3.88	20	13.559957722	0	13.559957590	-0.010	13.559956832	-0.066	13.559962405	0.345	100
3.88	10	13.560008226	3.724	13.560008632	3.754	13.560009180	3.795	13.560009408	3.812	100
3.88	0	13.560013111	4.085	13.560013674	4.126	13.560026358	5.062	13.560026358	5.062	100
3.88	-10	13.560076059	8.727	13.560076104	8.730	13.560076119	8.731	13.560076139	8.733	100
3.88	-20	13.560078033	8.873	13.560076965	8.794	13.560075081	8.655	13.560073666	8.550	100
3.88	-30	13.560059535	7.508	13.560053118	7.035	13.560047282	6.605	13.560041591	6.185	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)
3.88	20	13.560074107	0	13.560080945	0.504	13.560085599	0.847	13.560087890	1.016	100
4.40	20	13.560050997	-1.704	13.560065185	-0.658	13.560074582	0.035	13.560075358	0.092	100
3.70	20	13.560048278	-1.905	13.560068989	-0.377	13.560006815	-4.963	13.560004157	-5.159	100

No non-compliance noted.

END OF TEST REPORT