CERTIFICATION TEST REPORT

Report Number. : 4791196626-E10V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-F956B, SM-F956B/DS
FCC ID	:	A3LSMF956B
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2024-05-14

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IAS ACCREDITED Testing Laboratory TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-05-02	Initial issue	Dexter(Hyunsik) Yun
V2	2024-05-14	Updated to address TCB's question	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, WPT and UWB
MODEL NUMBER:	SM-F956B, SM-F956B/DS
SERIAL NUMBER:	R3CX10SANYE, R3CX10SANMD, R3CX403N9CM (RADIATED);
DATE TESTED:	2024-02-20 ~ 2024-05-02

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies

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
☐ Chamber 1(3m semi-anechoic chamber)
☒ Chamber 2(3m semi-anechoic chamber)
☐ Chamber 3(3m semi-anechoic chamber)
☐ Chamber 4(3m Full-anechoic chamber)
☐ Chamber 5(3m Full-anechoic chamber)

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

Corrected Reading (dBuV) = Meter Reading (dBuV) + External Cable (dB) + Cableloss (dB)
46.62 dBuV + 9.8 dB + 0.1 dB = 56.52 dBuV

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	2.79 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.07 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 Clause 4.4.3 in IEC Guide 115:2023.

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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, WPT and UWB. This test report addresses the DXX (NFC) operational mode.

Representative model	Difference	Derivative model
		SM-F956B/DS
SM-F956B	Hardware	Different Sim Tray
	Software	Same as SM-F956B

The model SM-F956B was used for final testing and is representative of the test results in this report.

5.2. MAXIMUM E-FIELD STRENGTH

The testing was performed at 3 meter. The transmitter maximum E-field at 30m distance is 19.56 dBuV/m which convert from 3 meter data.

Foldable conditions	NFC with tag mode [dBuV/m]	NFC without tag mode [dBuV/m]
Open	**19.56**	18.04
Harf-folded	19.43	**18.48**
Full-folded	19.24	17.97

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5.3. WORST-CASE CONFIGURATION AND MODE

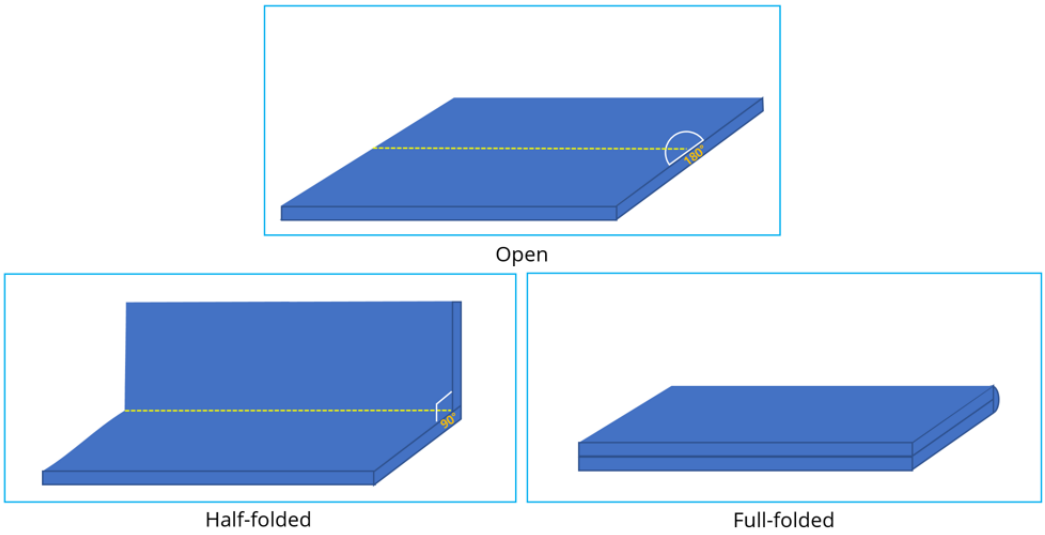
The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz.

i. Worst case of antenna axis:

NFC with tag mode	NFC without tag mode
Y	

ii. Foldable condition

NFC with tag mode	NFC without tag mode
Open	Harf-folded



The fundamental level of the EUT was investigated each type and bitrate.
All test was performed worst case condition below.

- ISO/IEC 14443-A(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.

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

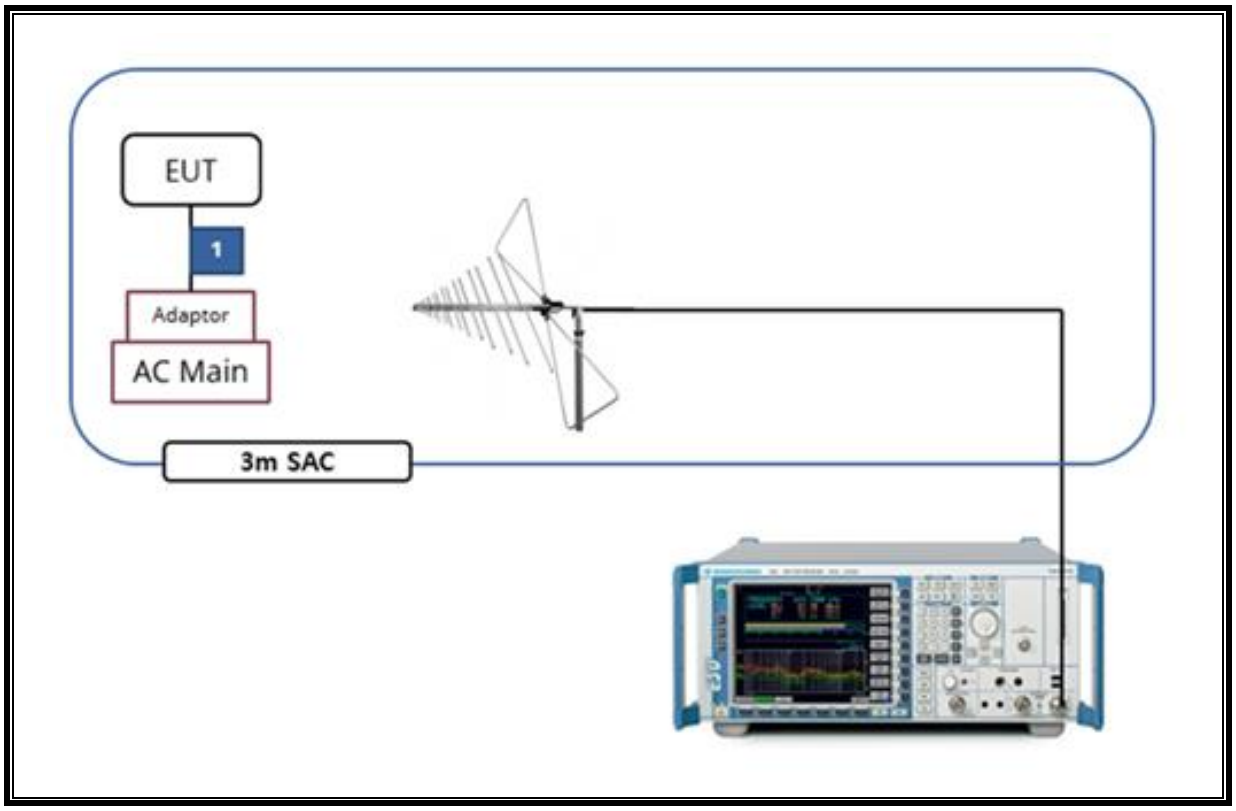
Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37N9QP6H09DK3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02111A	N/A

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	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	2024-07-24
Preamplifier, 1000 MHz	Sonoma	310N	351741	2024-07-24
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2024-07-23
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030A	MY54170614	2024-07-24
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2024-07-23
DC Power Supply	Agilent / HP	E3640A	MY54226395	2024-07-24
Temperature Chamber	ESPEC	SH-642	93001109	2024-07-24
LISN	R&S	ENV-216	101836	2024-07-23
LISN	R&S	ENV-216	101837	2024-07-23
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-06
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

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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

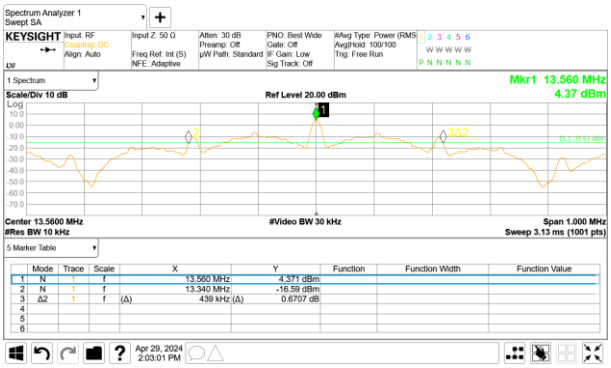
TEST PROCEDURE

The spectrum analyzer connected receive antenna and the EUT placed on near the receive antenna. The RBW is set to 1-5% of emission BW. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

Frequency [MHz]	20 dB Bandwidth [kHz]
13.56	439

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

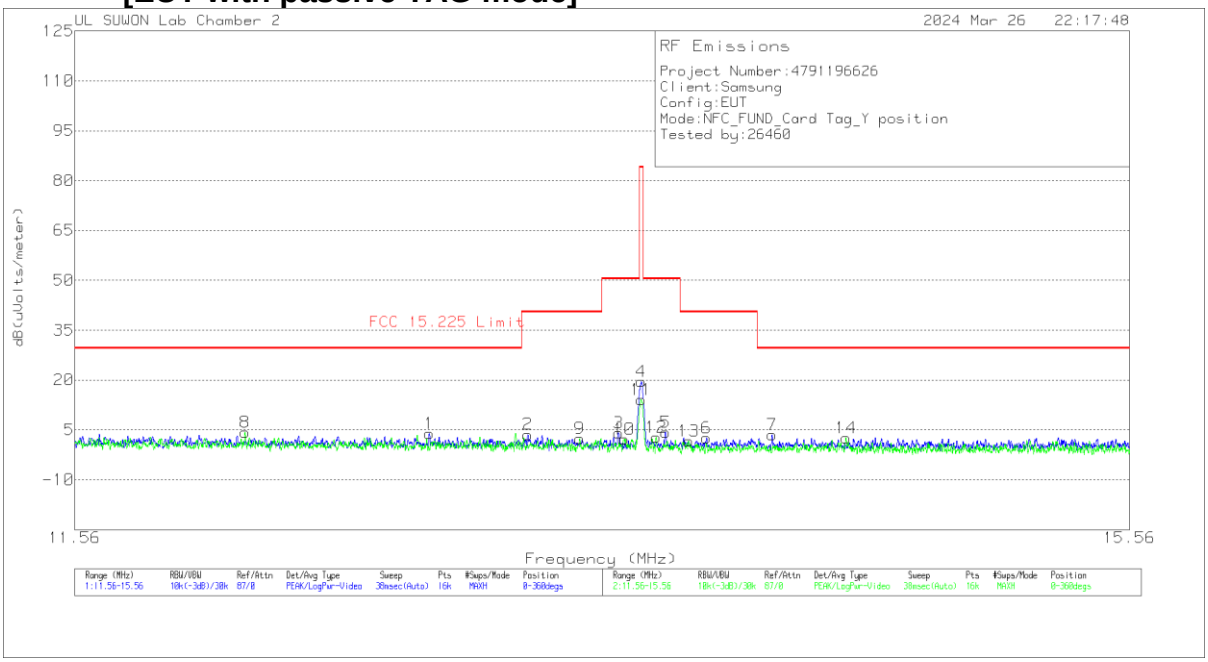
The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

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

[EUT with passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m(dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	12.77438	23.28	Pk	20.1	-40	.5	3.88	29.54	-25.66	0-360
2	13.13413	23.04	Pk	20.1	-40	.5	3.64	40.51	-36.87	0-360
3	13.47388	23.51	Pk	20.1	-40	.5	4.11	50.5	-46.39	0-360
**4	13.56038	38.96	Pk	20.1	-40	.5	19.56	84	-64.44	0-360
5	13.65313	23.59	Pk	20.1	-40	.6	4.29	50.5	-46.21	0-360
6	13.81175	21.88	Pk	20.1	-40	.6	2.58	40.51	-37.93	0-360
7	14.06963	22.84	Pk	20.1	-40	.6	3.54	29.54	-26	0-360

Face off

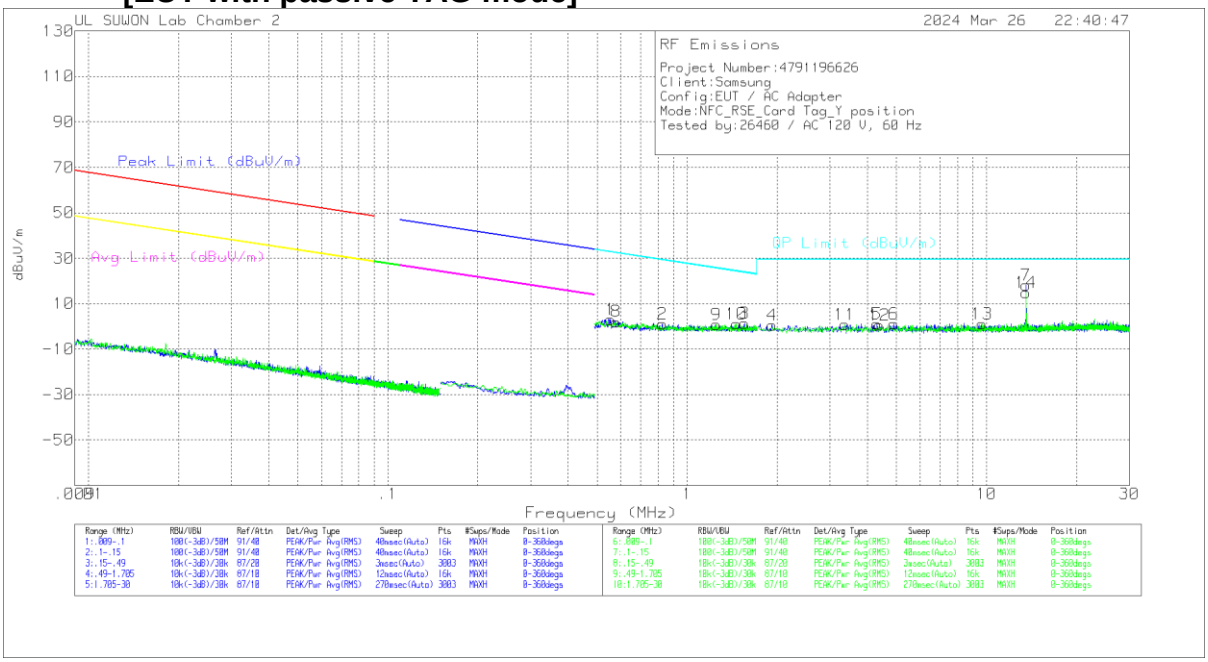
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m(dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	12.12813	23.59	Pk	20.2	-40	.5	4.29	29.54	-25.25	0-360
9	13.32675	21.8	Pk	20.1	-40	.5	2.4	40.51	-38.11	0-360
10	13.4955	21.6	Pk	20.1	-40	.5	2.2	50.5	-48.3	0-360
**11	13.56	33.57	Pk	20.1	-40	.5	14.17	84	-69.83	0-360
12	13.61738	22.11	Pk	20.1	-40	.6	2.81	50.5	-47.69	0-360
13	13.74263	20.94	Pk	20.1	-40	.6	1.64	40.51	-38.87	0-360
14	14.36538	21.89	Pk	20.1	-40	.6	2.59	29.54	-26.95	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 with passive TAG mode]



Trace Markers
Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.55342	22.94	Pk	19.9	.1	-40	2.94	32.75	-29.81	0-360
2	.82596	21.02	Pk	19.9	.2	-40	1.12	29.28	-28.16	0-360
3	1.55252	21.12	Pk	20	.2	-40	1.32	23.81	-22.49	0-360
4	1.92178	20.47	Pk	20	.2	-40	.67	29.5	-28.83	0-360
5	4.29688	20.65	Pk	20.1	.3	-40	1.05	29.5	-28.45	0-360
6	4.89065	20.75	Pk	20.1	.3	-40	1.15	29.5	-28.35	0-360
**7	13.56165	37.7	Pk	20	.5	-40	18.2	29.5	-11.3	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.57903	22.07	Pk	19.9	.1	-40	2.07	32.35	-30.28	0-360
9	1.24977	20.7	Pk	19.9	.2	-40	.8	25.69	-24.89	0-360
10	1.45873	20.99	Pk	19.9	.2	-40	1.09	24.35	-23.26	0-360
11	3.3638	20.45	Pk	20.1	.3	-40	.85	29.5	-28.65	0-360
12	4.3817	20.21	Pk	20.1	.3	-40	.61	29.5	-28.89	0-360
13	9.67855	20.71	Pk	20	.5	-40	1.21	29.5	-28.29	0-360
**14	13.56165	34.33	Pk	20	.5	-40	14.83	29.5	-14.67	0-360

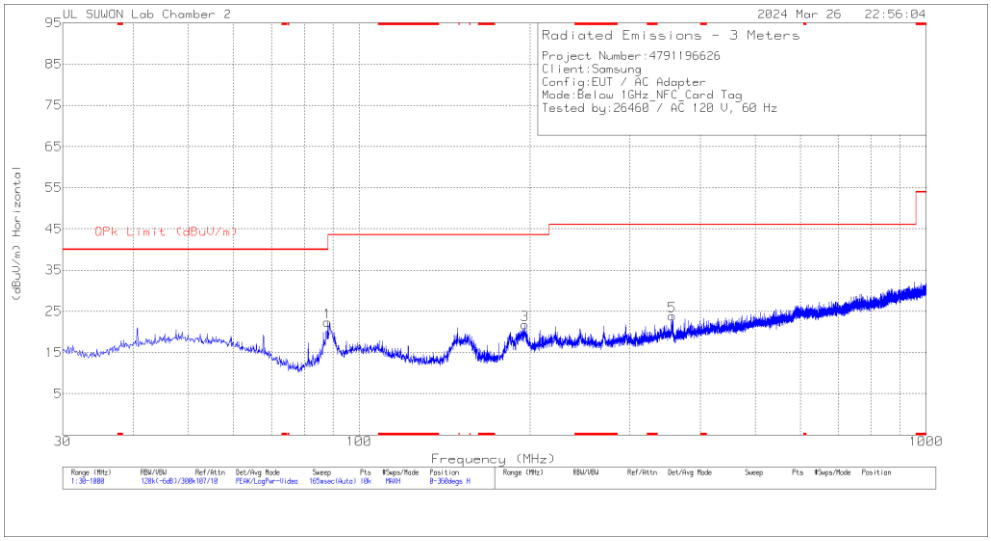
Pk - Peak detector
**Fundamental

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.

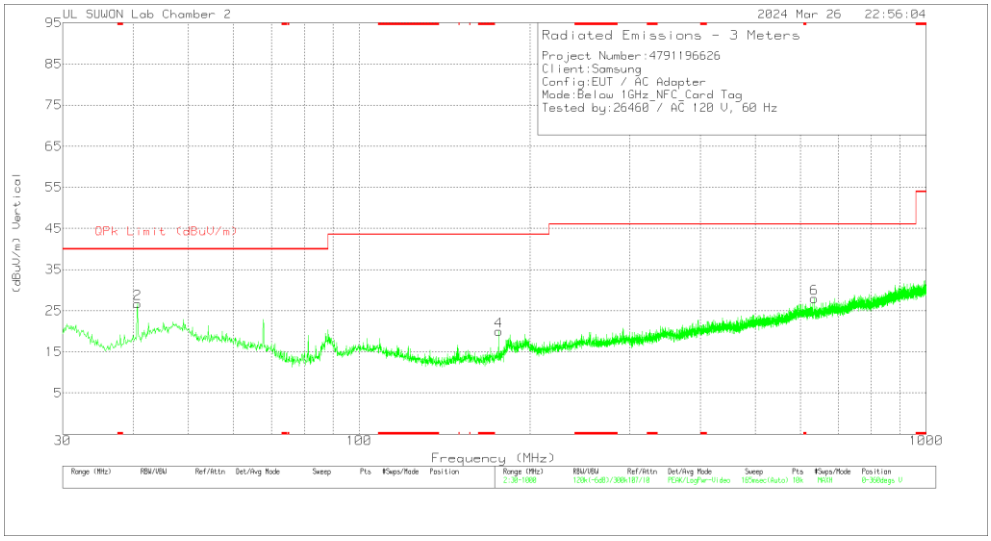
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

[EUT with passive TAG mode]

HORIZONTAL



VERTICAL

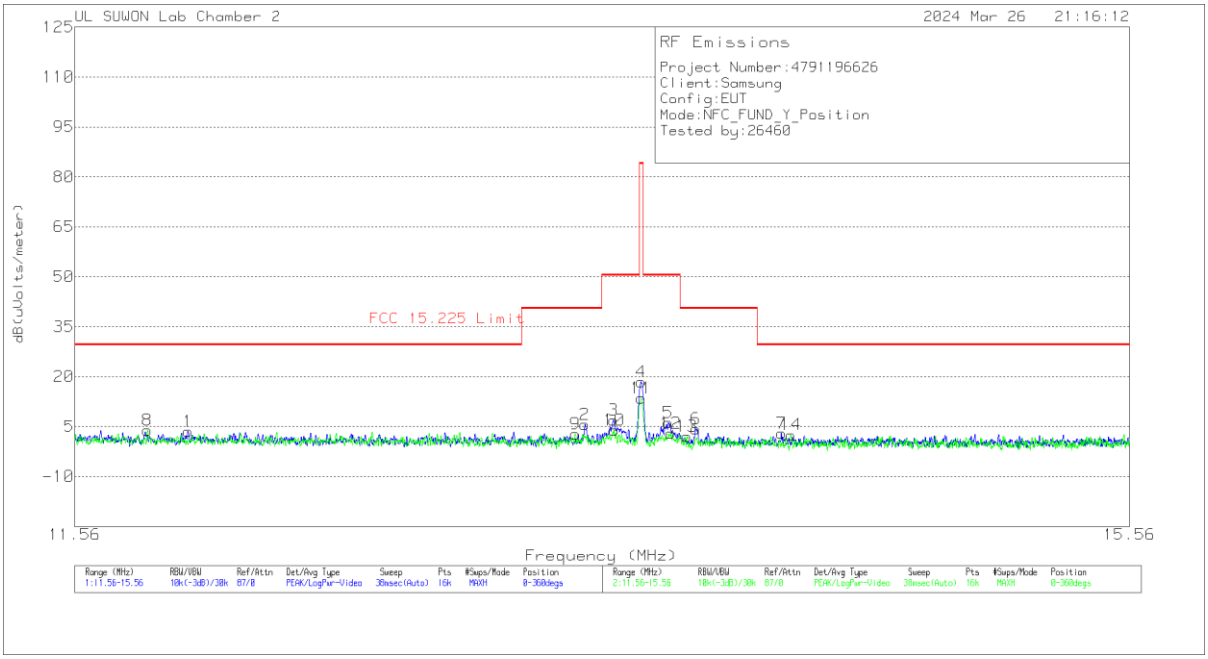


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna_749_Factor(dB)	Below_1G_Path Loss(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	87.909	38.42	Pk	15.3	-31.3	22.42	40	-17.58	0-360	200	H
3	196.064	34.55	Pk	17.8	-30.6	21.75	43.52	-21.77	0-360	100	H
5	356.793	33.62	Pk	20.2	-29.9	23.92	46.02	-22.1	0-360	100	H
2	40.67	39.58	Pk	18.9	-31.8	26.68	40	-13.32	0-360	100	V
4	176.276	35.72	Pk	15	-30.7	20.02	43.52	-23.5	0-360	100	V
6	635.28	32.3	Pk	24.8	-29.1	28	46.02	-18.02	0-360	100	V

Pk - Peak detector

8.1.4. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [EUT without passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m(dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	11.93438	22.87	Pk	20.2	-40	.5	3.57	29.54	-25.97	0-360
2	13.34738	25.02	Pk	20.1	-40	.5	5.62	40.51	-34.89	0-360
3	13.45463	26.28	Pk	20.1	-40	.5	6.88	50.5	-43.62	0-360
**4	13.55938	37.88	Pk	20.1	-40	.5	18.48	84	-65.52	0-360
5	13.66438	25.43	Pk	20.1	-40	.6	6.13	50.5	-44.37	0-360
6	13.77038	23.54	Pk	20.1	-40	.6	4.24	40.51	-36.27	0-360
7	14.10638	22.35	Pk	20.1	-40	.6	3.05	29.54	-26.49	0-360

Face off

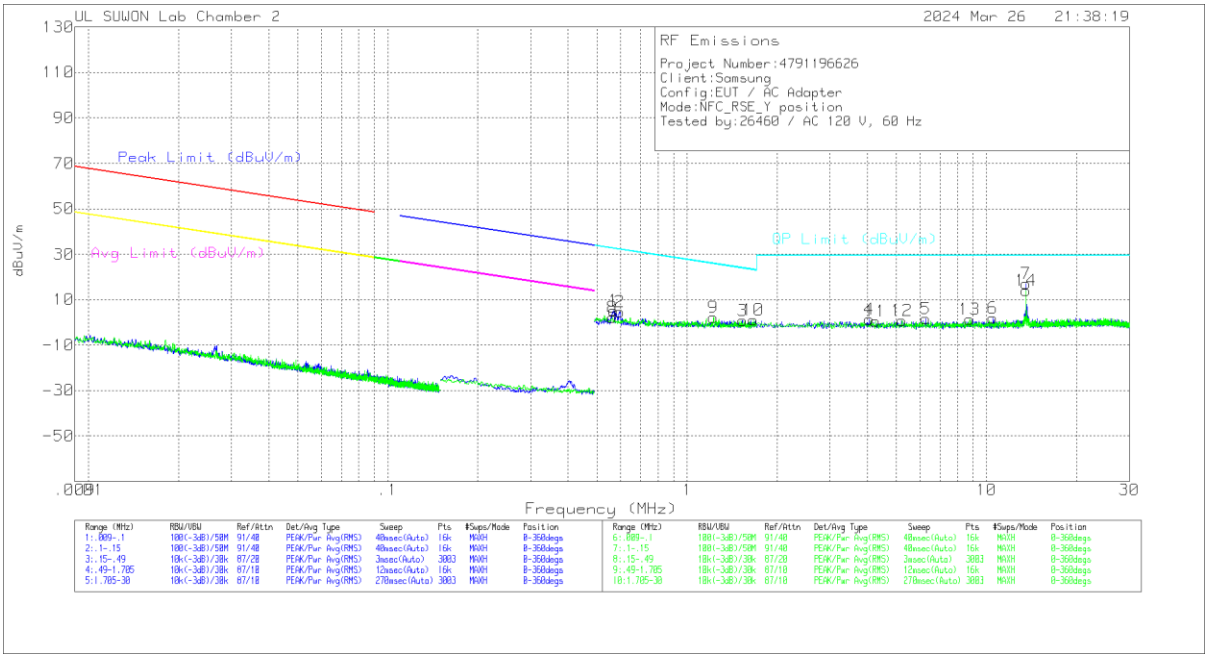
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Dist Corr 30m(dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	11.79938	23.16	Pk	20.2	-40	.5	3.86	29.54	-25.68	0-360
9	13.31113	22.18	Pk	20.1	-40	.5	2.78	40.51	-37.73	0-360
10	13.45688	23.28	Pk	20.1	-40	.5	3.88	50.5	-46.62	0-360
**11	13.56025	32.91	Pk	20.1	-40	.5	13.51	84	-70.49	0-360
12	13.67238	22.32	Pk	20.1	-40	.6	3.02	50.5	-47.48	0-360
13	13.73688	21.29	Pk	20.1	-40	.6	1.99	40.51	-38.52	0-360
14	14.14425	21.81	Pk	20.1	-40	.6	2.51	29.54	-27.03	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 without passive TAG mode]



Trace Markers

Face on

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.56862	25.29	Pk	19.9	.1	-40	5.29	32.51	-27.22	0-360
2	.59499	24.75	Pk	19.9	.1	-40	4.75	32.12	-27.37	0-360
3	1.52949	20.61	Pk	20	.2	-40	.81	23.94	-23.13	0-360
4	4.06125	20.91	Pk	20.1	.3	-40	1.31	29.5	-28.19	0-360
5	6.25728	21.06	Pk	20.1	.4	-40	1.56	29.5	-27.94	0-360
6	10.50795	21.52	Pk	20	.5	-40	2.02	29.5	-27.48	0-360
**7	13.56165	36.57	Pk	20	.5	-40	17.07	29.5	-12.43	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Cable Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.56224	22.15	Pk	19.9	.1	-40	2.15	32.61	-30.46	0-360
9	1.2245	22.12	Pk	19.9	.2	-40	2.22	25.87	-23.65	0-360
10	1.66279	20.96	Pk	20	.2	-40	1.16	23.22	-22.06	0-360
11	4.25918	20.08	Pk	20.1	.3	-40	.48	29.5	-29.02	0-360
12	5.2111	20.42	Pk	20.1	.3	-40	.82	29.5	-28.68	0-360
13	8.7926	21.08	Pk	20	.4	-40	1.48	29.5	-28.02	0-360
**14	13.56165	33.68	Pk	20	.5	-40	14.18	29.5	-15.32	0-360

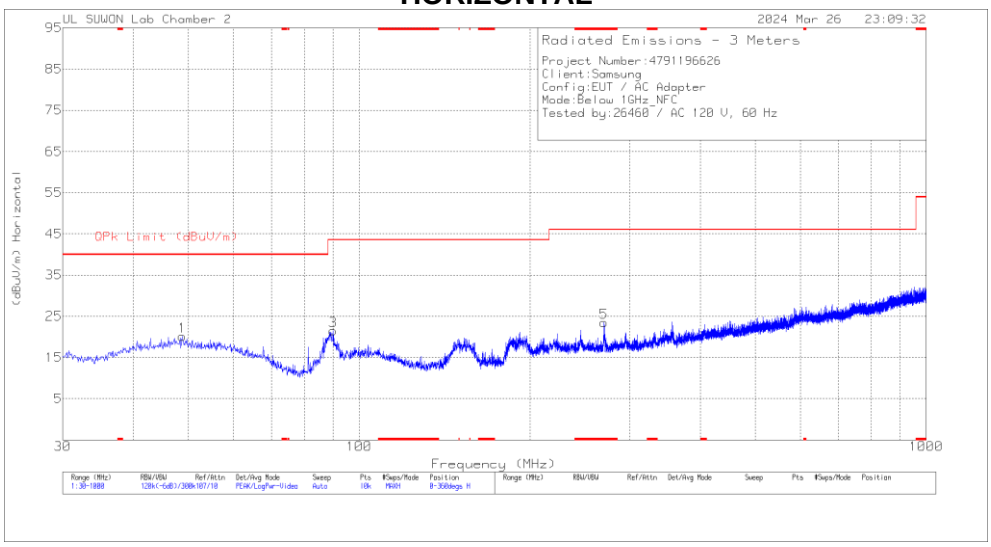
Pk - Peak detector
**Fundamental

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.

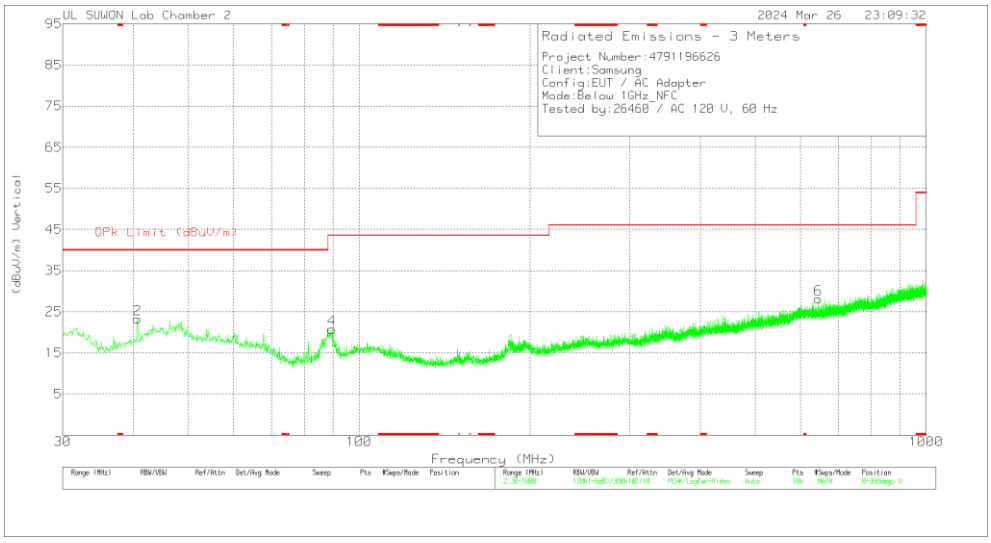
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

8.1.6. TX SPURIOUS EMISSION 30 TO 1000 MHz
[EUT without passive TAG mode]

HORIZONTAL



VERTICAL



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna_749_Factor(dB)	Below_1G_Path Loss(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.721	31.71	Pk	20.1	-31.7	20.11	40	-19.89	0-360	200	H
3	89.946	36.91	Pk	15.9	-31.3	21.51	43.52	-22.01	0-360	100	H
5	* 270.463	35.35	Pk	18.4	-30.3	23.45	46.02	-22.57	0-360	100	H
2	40.67	36.1	Pk	18.9	-31.8	23.2	40	-16.8	0-360	100	V
4	89.558	36.2	Pk	15.8	-31.3	20.7	43.52	-22.82	0-360	100	V
6	645.174	32.5	Pk	24.8	-29.2	28.1	46.02	-17.92	0-360	300	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - 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 50µH/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 (dBµV)	
	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.

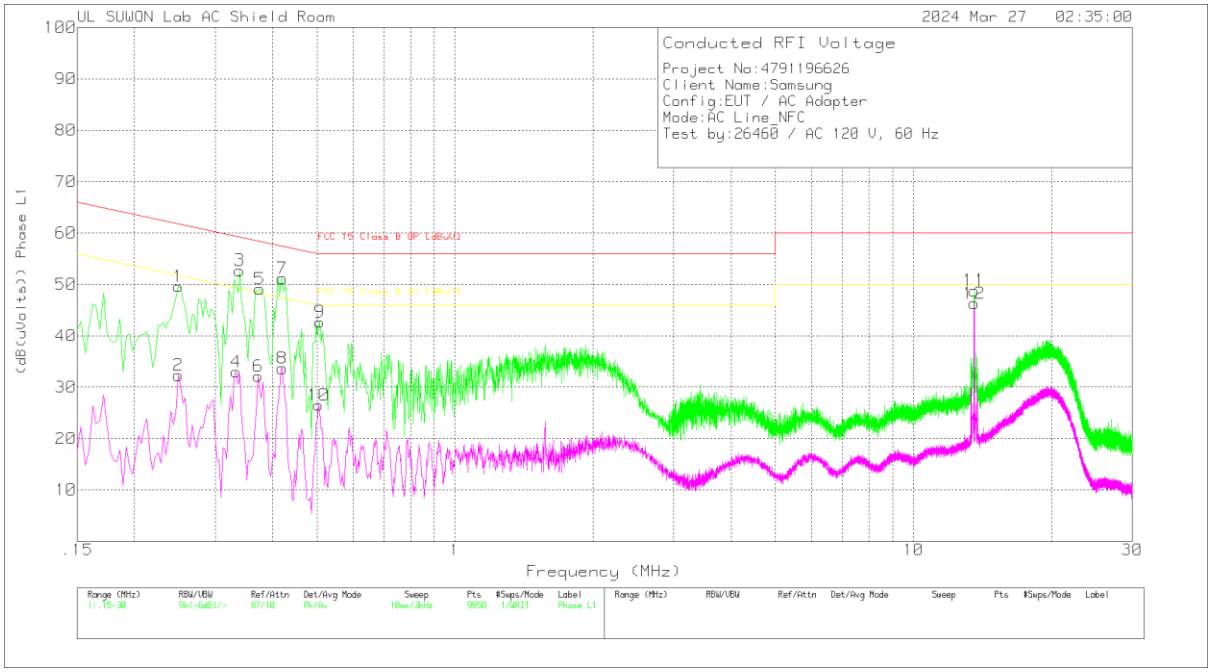
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

WORST EMISSIONS(non-Terminated)

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]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.249	39.89	Pk	9.6	.1	49.59	61.79	-12.2	-	-
2	.249	22.63	Av	9.6	.1	32.33	-	-	51.79	-19.46
3	.339	42.82	Pk	9.8	.1	52.72	59.23	-6.51	-	-
4	.333	23.19	Av	9.7	.1	32.99	-	-	49.38	-16.39
5	.375	39.21	Pk	9.8	.1	49.11	58.39	-9.28	-	-
6	.372	22.23	Av	9.8	.1	32.13	-	-	48.46	-16.33
7	.42	41.26	Pk	9.8	.1	51.16	57.45	-6.29	-	-
8	.42	23.77	Av	9.8	.1	33.67	-	-	47.45	-13.78
9	.507	32.68	Pk	9.9	.1	42.68	56	-13.32	-	-
10	.504	16.51	Av	9.9	.1	26.51	-	-	46	-19.49
11	13.56	38.49	Pk	10	.3	48.79	60	-11.21	-	-
12	13.56	35.99	Av	10	.3	46.29	-	-	50	-3.71

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

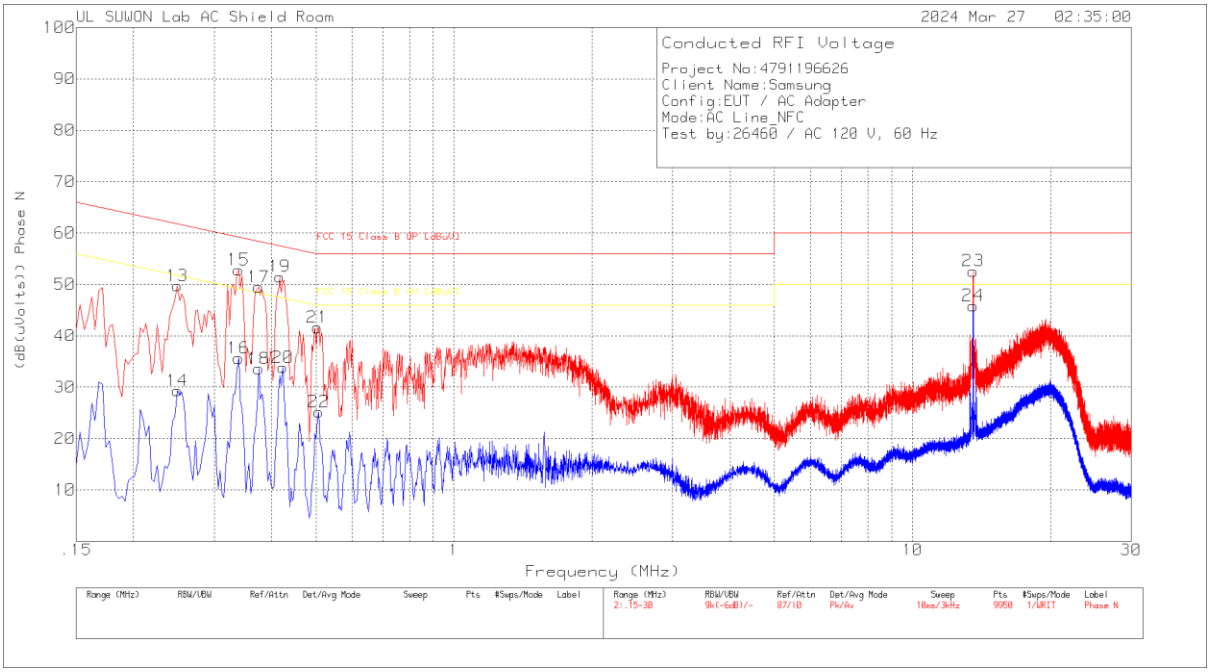
Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.33825	40.49	Qp	9.8	.1	50.39	59.25	-8.86	-	-
.37575	37.87	Qp	9.8	.1	47.77	58.37	-10.6	-	-
.42075	39.29	Qp	9.8	.1	49.19	57.43	-8.24	-	-

Qp - Quasi-Peak detector

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_15C(05)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.249	40.02	Pk	9.6	.1	49.72	61.79	-12.07	-	-
14	.249	19.62	Av	9.6	.1	29.32	-	-	51.79	-22.47
15	.339	42.91	Pk	9.8	.1	52.81	59.23	-6.42	-	-
16	.339	25.74	Av	9.8	.1	35.64	-	-	49.23	-13.59
17	.375	39.57	Pk	9.8	.1	49.47	58.39	-8.92	-	-
18	.375	23.68	Av	9.8	.1	33.58	-	-	48.39	-14.81
19	.417	41.6	Pk	9.8	.1	51.5	57.51	-6.01	-	-
20	.423	23.93	Av	9.8	.1	33.83	-	-	47.39	-13.56
21	.504	31.61	Pk	9.9	.1	41.61	56	-14.39	-	-
22	.507	15.19	Av	9.9	.1	25.19	-	-	46	-20.81
23	13.56	42.31	Pk	10	.3	52.61	60	-7.39	-	-
24	13.56	35.56	Av	10	.3	45.86	-	-	50	-4.14

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

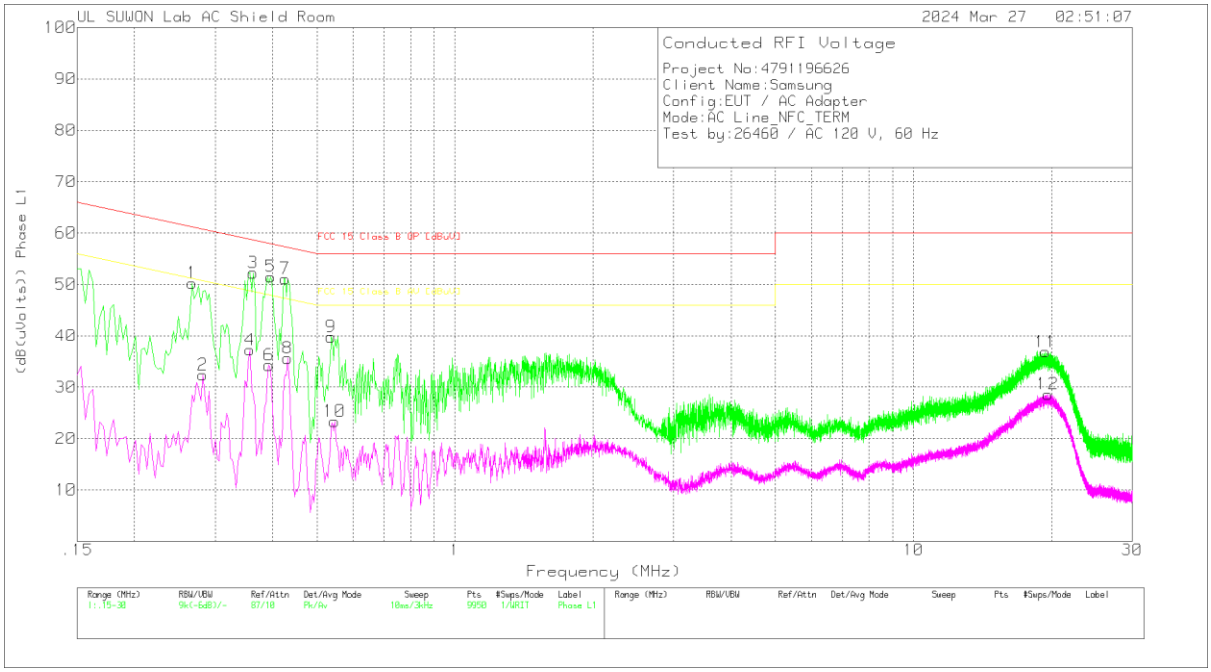
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.33915	40.45	Qp	9.8	.1	50.35	59.22	-8.87	-	-
.37425	37.18	Qp	9.8	.1	47.08	58.41	-11.33	-	-
.41775	38.28	Qp	9.8	.1	48.18	57.49	-9.31	-	-

Qp - Quasi-Peak detector

WORST EMISSIONS(Terminated)

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]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
1	.267	40.58	Pk	9.6	.1	50.28	61.21	-10.93	-	-
2	.282	22.58	Av	9.7	.1	32.38	-	-	50.76	-18.38
3	.363	42.35	Pk	9.8	.1	52.25	58.66	-6.41	-	-
4	.357	27.34	Av	9.8	.1	37.24	-	-	48.8	-11.56
5	.396	41.61	Pk	9.8	.1	51.51	57.94	-6.43	-	-
6	.393	24.39	Av	9.8	.1	34.29	-	-	48	-13.71
7	.426	41.2	Pk	9.8	.1	51.1	57.33	-6.23	-	-
8	.432	25.74	Av	9.8	.1	35.64	-	-	47.21	-11.57
9	.537	29.8	Pk	9.9	.1	39.8	56	-16.2	-	-
10	.546	13.37	Av	9.9	.1	23.37	-	-	46	-22.63
11	19.41	26.39	Pk	10.2	.3	36.89	60	-23.11	-	-
12	19.629	18.14	Av	10.2	.3	28.64	-	-	50	-21.36

Pk - Peak detector
Av - Average detection

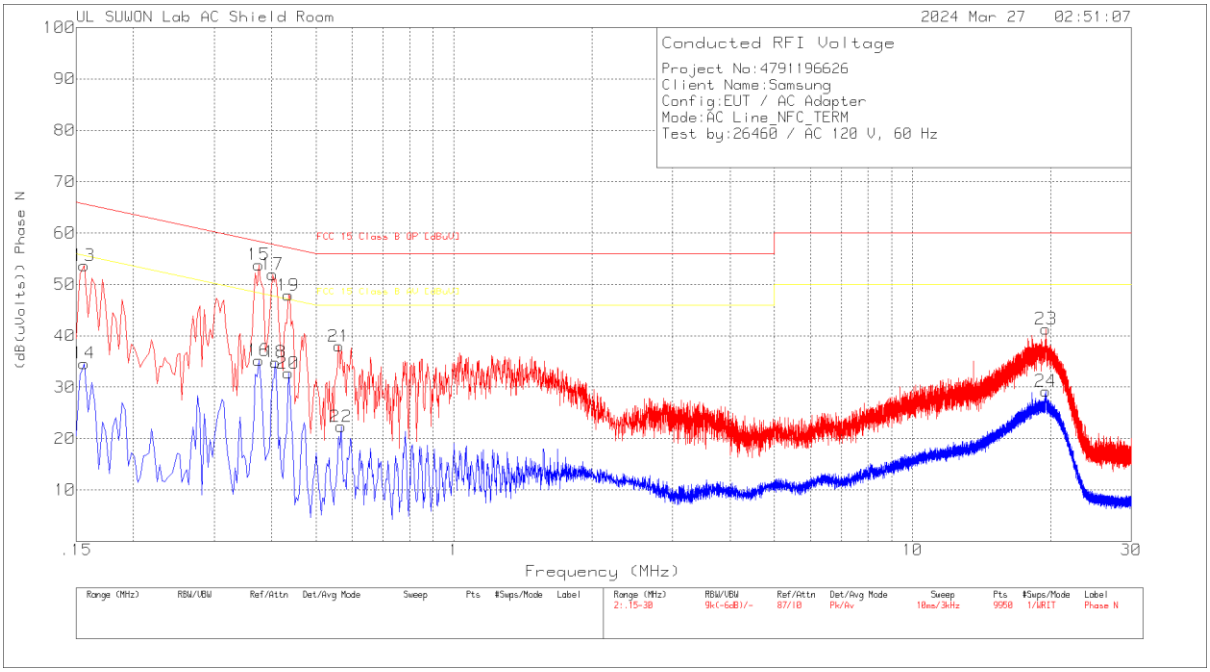
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1 [dB]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.36375	28.64	Qp	9.8	.1	38.54	58.64	-20.1	-	-
.39615	41.78	Qp	9.8	.1	51.68	57.93	-6.25	-	-
.42525	31.48	Qp	9.8	.1	41.38	57.34	-15.96	-	-

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]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
13	.156	43.79	Pk	9.8	.1	53.69	65.67	-11.98	-	-
14	.156	24.73	Av	9.8	.1	34.63	-	-	55.67	-21.04
15	.375	43.93	Pk	9.8	.1	53.83	58.39	-4.56	-	-
16	.375	25.3	Av	9.8	.1	35.2	-	-	48.39	-13.19
17	.402	42.08	Pk	9.8	.1	51.98	57.81	-5.83	-	-
18	.408	24.98	Av	9.8	.1	34.88	-	-	47.69	-12.81
19	.435	38	Pk	9.8	.1	47.9	57.16	-9.26	-	-
20	.435	22.82	Av	9.8	.1	32.72	-	-	47.16	-14.44
21	.561	28.09	Pk	9.8	.1	37.99	56	-18.01	-	-
22	.567	12.43	Av	9.8	.1	22.33	-	-	46	-23.67
23	19.542	30.81	Pk	10.2	.3	41.31	60	-18.69	-	-
24	19.533	18.71	Av	10.2	.3	29.21	-	-	50	-20.79

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]	Cable Loss [dB]	Corrected Reading (dB(uVolts))	FCC 15 Class B QP [dBuV]	Margin (dB)	FCC 15 Class B AV [dBuV]	Margin (dB)
.37575	33.01	Qp	9.8	.1	42.91	58.37	-15.46	-	-
.40275	42.09	Qp	9.8	.1	51.99	57.8	-5.81	-	-
.43425	24.74	Qp	9.8	.1	34.64	57.17	-22.53	-	-

Qp - Quasi-Peak detector

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_15C(05)
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10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±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

Test Date	2024-4-29
Test Engineer	51078

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir.	Frequency Deviation Measureed with Time Elapse								
(Vdc)	Temp (°C)	Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.88	50	13.559954624	-0.526	13.559950721	-0.814	13.559948945	-0.945	13.559947703	-1.037	100
3.88	40	13.559954558	-0.531	13.559955633	-0.452	13.559955268	-0.479	13.559953094	-0.639	100
3.88	30	13.559991494	2.193	13.559990638	2.129	13.559989495	2.045	13.559988165	1.947	100
3.88	***20***	***13.559961763***	***0.000***	***13.559960255***	***-0.111***	***13.559959925***	***-0.136***	***13.559959369***	***-0.177***	***100***
3.88	10	13.560037814	5.608	13.560036811	5.535	13.560037831	5.610	13.560033514	5.291	100
3.88	0	13.560068418	7.865	13.560058274	7.117	13.560067978	7.833	13.560067882	7.826	100
3.88	-10	13.560076217	8.441	13.560075272	8.371	13.560075283	8.372	13.560075392	8.380	100
3.88	-20	13.560063583	7.509	13.560063704	7.518	13.560063807	7.525	13.560063932	7.535	100
3.88	-30	13.560027641	4.858	13.560028787	4.943	13.560025944	4.733	13.560027859	4.874	100

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir.	Frequency Deviation Measureed with Time Elapse								
(Vdc)	Temp (°C)	Start up (MHz)	Delta (ppm)	@ 2mins (MHz)	Delta (ppm)	@ 5mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.70	20	13.559958907	-0.211	13.559958702	-0.226	13.559958691	-0.016	13.559958510	-0.029	100
3.88	***20***	***13.559961763***	***0.000***	***13.559960255***	***-0.111***	***13.559959925***	***0.075***	***13.559959369***	***0.034***	***100***
4.45	20	13.559957607	-0.306	13.559957442	-0.319	13.559957422	-0.110	13.559957233	-0.123	100

No non-compliance noted.

END OF TEST REPORT