

# CERTIFICATION TEST REPORT

**Report Number.** : 4791082054-E9V2

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

**Model** : SM-A556E, SM-A556E/DS

**FCC ID** : A3LSMA556E

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

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

**Date Of Issue:**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2024-01-12	Initial issue	Dexter(Hyunsik) Yun
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## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>5</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION.....</i>	6
4.2. <i>SAMPLE CALCULATION.....</i>	6
4.3. <i>MEASUREMENT UNCERTAINTY .....</i>	6
4.4. <i>DECISION RULE .....</i>	6
<b>5. EQUIPMENT UNDER TEST.....</b>	<b>7</b>
5.1. <i>DESCRIPTION OF EUT.....</i>	7
5.2. <i>MAXIMUM E-FIELD STRENGTH.....</i>	7
5.3. <i>WORST-CASE CONFIGURATION AND MODE .....</i>	7
5.4. <i>DESCRIPTION OF TEST SETUP .....</i>	8
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>9</b>
<b>7. 20dB BANDWIDTH .....</b>	<b>10</b>
<b>8. RADIATED EMISSION TEST RESULTS.....</b>	<b>11</b>
8.1. <i>LIMITS AND PROCEDURE .....</i>	11
8.1.1. <i>FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) .....</i>	13
8.1.2. <i>SPURIOUS EMISSION 0.009 TO 30 MHz.....</i>	14
8.1.3. <i>TX SPURIOUS EMISSION 30 TO 1000 MHz .....</i>	15
8.1.4. <i>FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz) [EUT without passive TAG mode] .....</i>	15
8.1.5. <i>SPURIOUS EMISSION 0.09 TO 30 MHz [EUT without passive TAG mode].....</i>	17
8.1.6. <i>TX SPURIOUS EMISSION 30 TO 1000 MHz [EUT without passive TAG mode] ...</i>	18
<b>9. AC MAINS LINE CONDUCTED EMISSIONS.....</b>	<b>19</b>
<b>10. FREQUENCY STABILITY .....</b>	<b>24</b>

# 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, and NFC

**MODEL NUMBER:** SM-A556E, SM-A556E/DS

**SERIAL NUMBER:** R3CWB0A1BAL, R3CWB0FCVHD, R3CWB0A1AYP, R3CWB0A1A3B, R3CWB0A1DBF, R3CWB0A14XD, R3CWB0A14WV (RADIATED);

**DATE TESTED:** 2023-11-24 ~ 2024-01-12

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	
<input type="checkbox"/>	Chamber 1(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	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:

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

$$\begin{aligned} \text{Corrected Reading (dBuV)} &= \text{Meter Reading (dBuV)} + \text{External Cable (dB)} + \\ &\text{Cableloss (dB)} \\ 46.62 \text{ dBuV} + 9.8 \text{ dB} + 0.1 \text{ dB} &= 56.52 \text{ dBuV} \end{aligned}$$

### 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	2.80 dB
Radiated Disturbance, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 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 115:2021.

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

Representative model	Difference	Derivative model
		SM-A556E/DS
SM-A556E	Hardware	Different SIM tray SM-A556E/DS has dual sim tray
	Software	Same as SM-A556E

Thus, SM-A556E 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 16.18 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 case of antenna axis:

NFC with tag mode	NFC without tag mode
Y	Z

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

- 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.

## 5.4. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37W61WENTASEA	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02117A	N/A

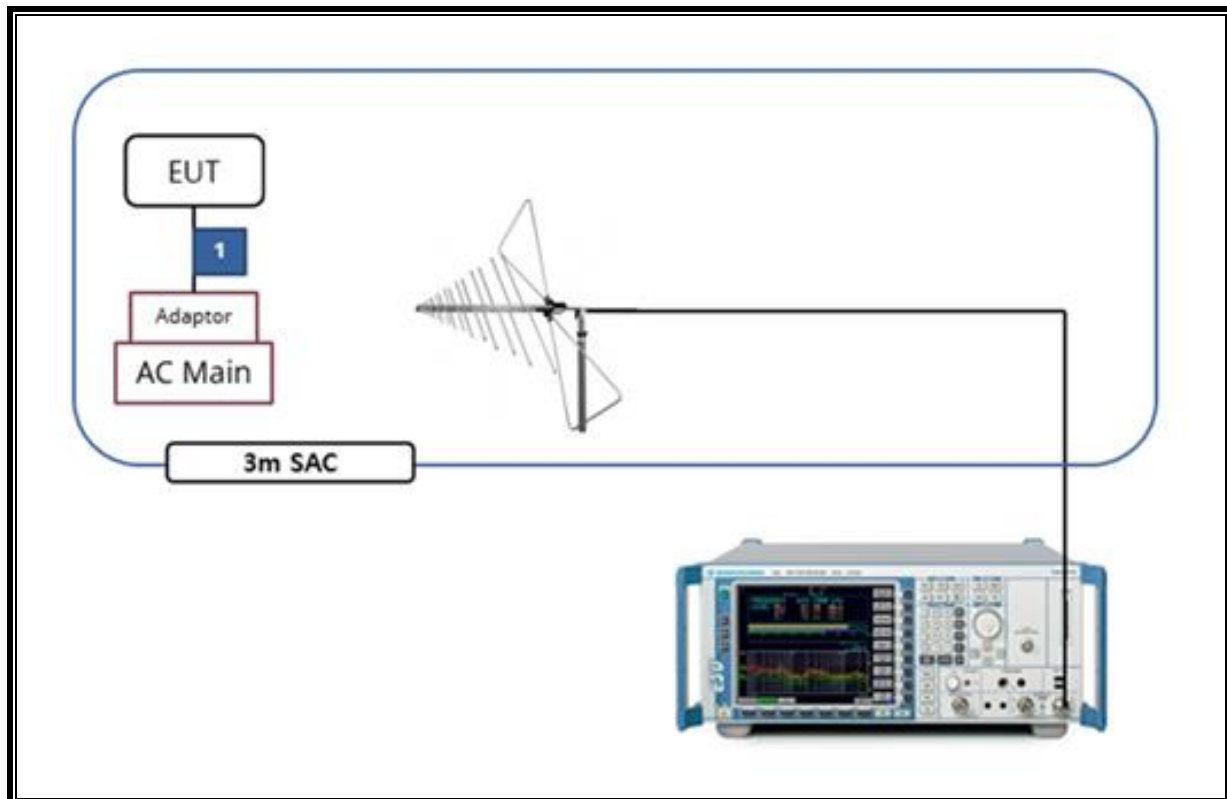
### I/O CABLE

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	

## 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	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 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**

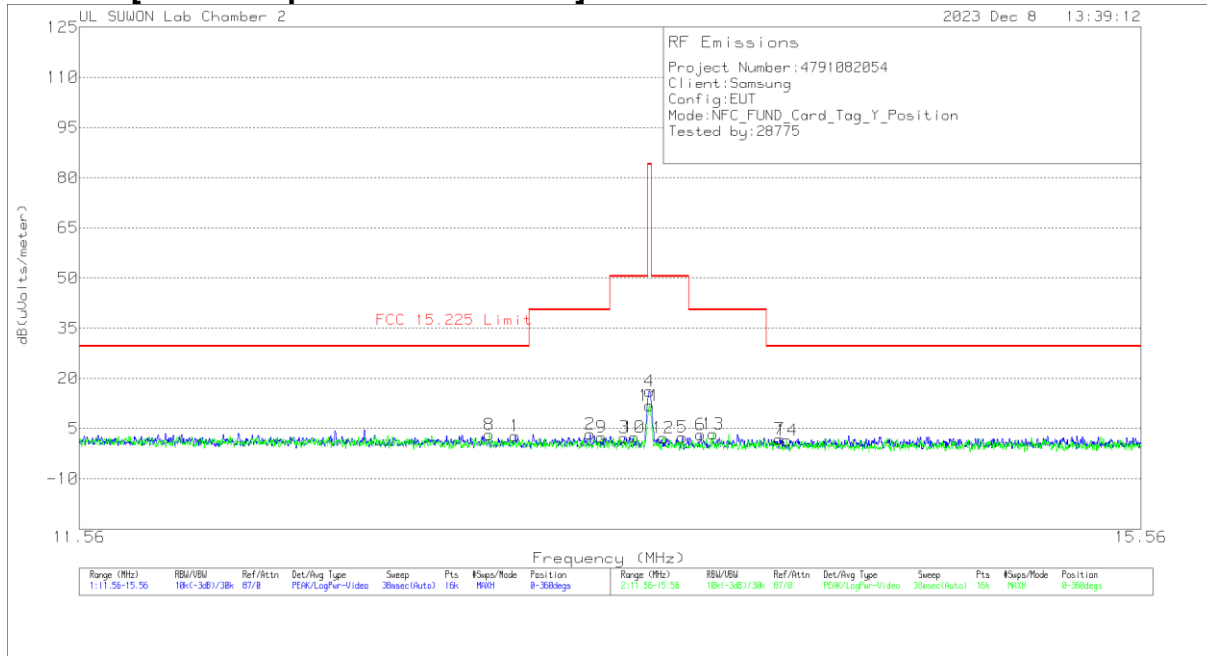
ANSI C63.10-2013

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 10<sup>th</sup> 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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
1	13.06038	22.24	Pk	20.1	-40	.5	2.84	29.54	-26.7	0-360
2	13.33713	22.74	Pk	20.1	-40	.5	3.34	40.51	-37.17	0-360
3	13.46588	21.72	Pk	20.1	-40	.5	2.32	50.5	-48.18	0-360
**4	13.56063	35.58	Pk	20.1	-40	.5	16.18	84	-67.82	0-360
5	13.68613	21.69	Pk	20.1	-40	.6	2.39	50.5	-48.11	0-360
6	13.75613	22.4	Pk	20.1	-40	.6	3.1	40.51	-37.41	0-360
7	14.06388	21.11	Pk	20.1	-40	.6	1.81	29.54	-27.73	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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
8	12.966	22.52	Pk	20.1	-40	.5	3.12	29.54	-26.42	0-360
9	13.379	21.73	Pk	20.1	-40	.5	2.33	40.51	-38.18	0-360
10	13.50213	21.81	Pk	20.1	-40	.5	2.41	50.5	-48.09	0-360
**11	13.56038	31.3	Pk	20.1	-40	.5	11.9	84	-72.1	0-360
12	13.61288	21.55	Pk	20.1	-40	.6	2.25	50.5	-48.25	0-360
13	13.80513	22.7	Pk	20.1	-40	.6	3.4	40.51	-37.11	0-360
14	14.09188	20.73	Pk	20.1	-40	.6	1.43	29.54	-28.11	0-360

Pk - Peak detector

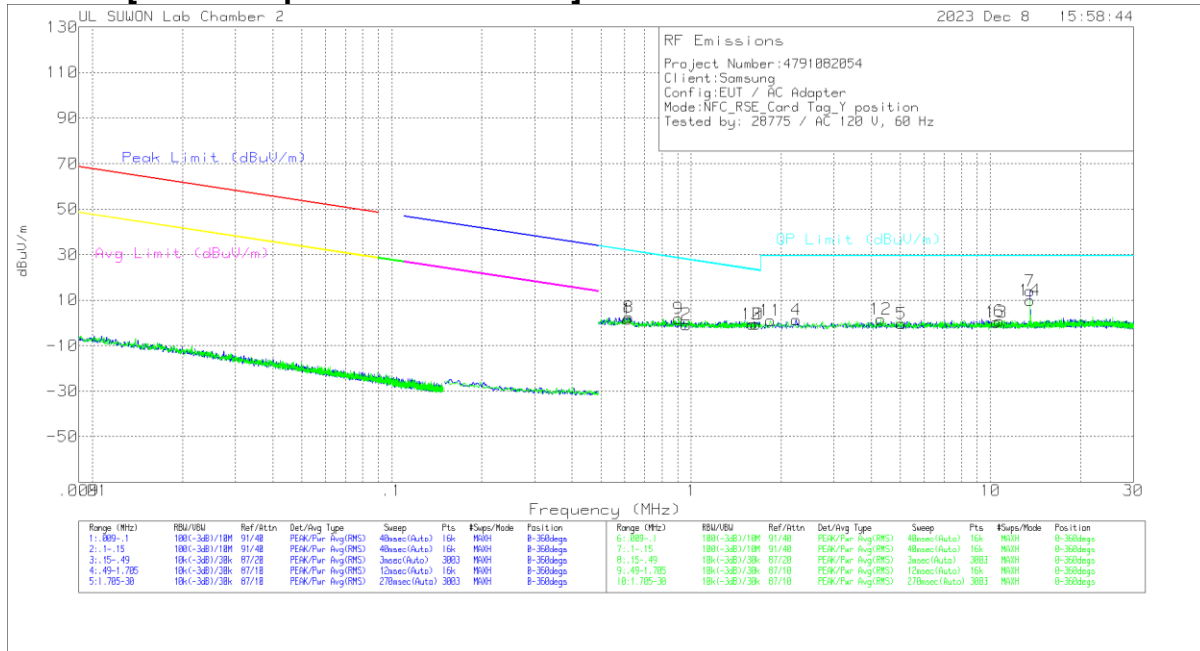
\*\*Fundamental

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	.61456	21.59	Pk	20	.1	-40	1.69	31.84	-30.15	0-360
2	.96264	19.11	Pk	20	.2	-40	-.69	27.95	-28.64	0-360
3	1.64554	19.13	Pk	20.1	.2	-40	-.57	23.31	-23.88	0-360
4	2.24223	21.18	Pk	20.1	.2	-40	1.48	29.5	-28.02	0-360
5	5.04145	19.3	Pk	20.2	.3	-40	-.2	29.5	-29.7	0-360
6	10.6776	20.11	Pk	20.2	.5	-40	.81	29.5	-28.69	0-360
**7	13.56165	33.33	Pk	20.1	.5	-40	13.93	29.5	-15.57	0-360

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	.61795	22.48	Pk	20	.1	-40	2.58	31.79	-29.21	0-360
9	.90773	21.82	Pk	20	.2	-40	2.02	28.46	-26.44	0-360
10	1.60424	19.12	Pk	20.1	.2	-40	-.58	23.53	-24.11	0-360
11	1.83695	20.9	Pk	20.1	.2	-40	1.2	29.5	-28.3	0-360
12	4.3063	21.08	Pk	20.2	.3	-40	1.58	29.5	-27.92	0-360
13	10.46083	19.67	Pk	20.2	.5	-40	.37	29.5	-29.13	0-360
**14	13.56165	29.26	Pk	20.1	.5	-40	9.86	29.5	-19.64	0-360

Pk - Peak detector

\*\*Fundamental

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

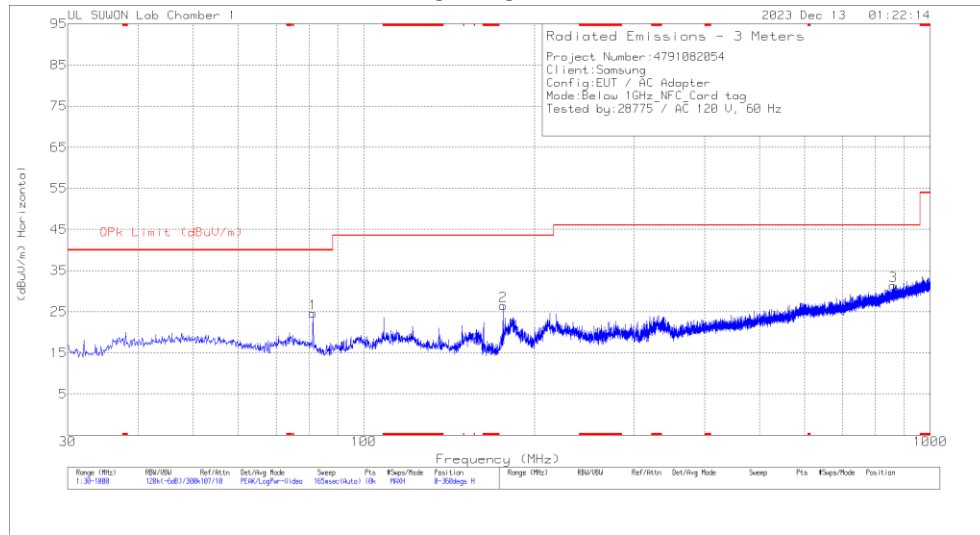
Please refer to section 8.1.1 about the fundamental level.

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

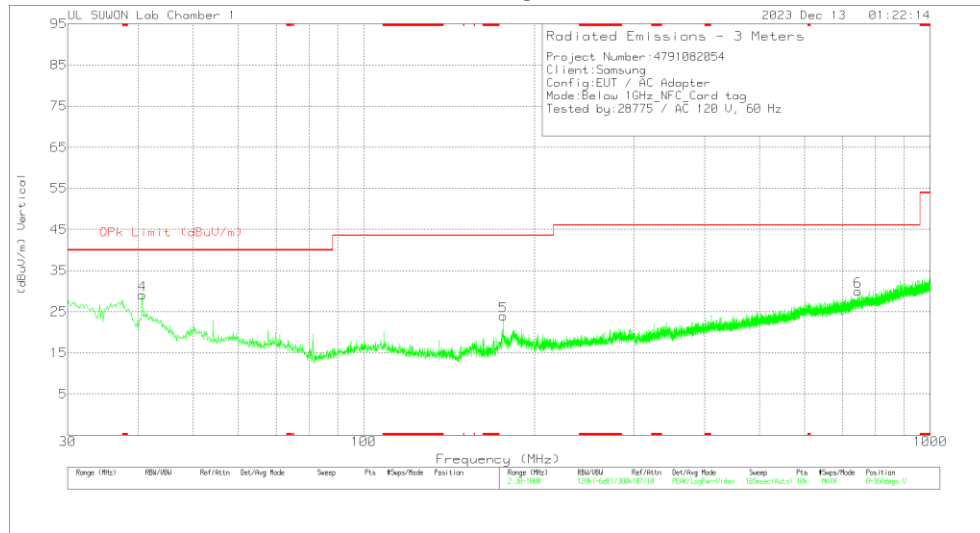
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

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

#### HORIZONTAL



#### VERTICAL

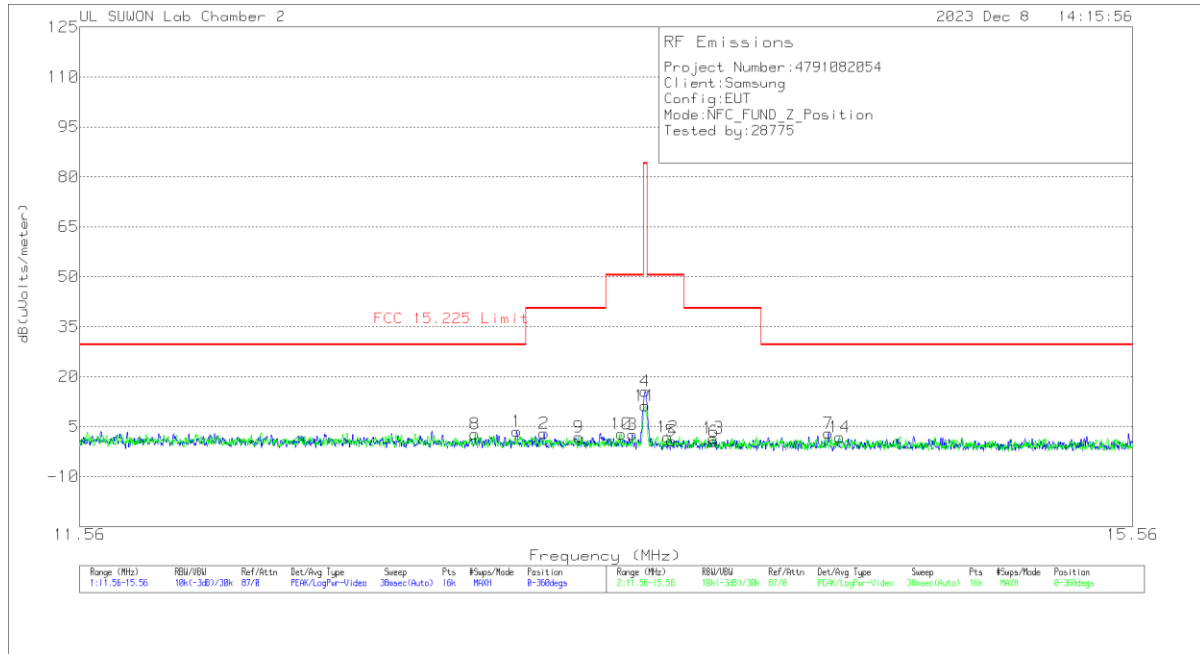


#### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	OPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.313	42.16	Pk	13	-30.5	0	24.66	40	-15.34	0-360	100	H
2	176.276	41.21	Pk	14.8	-29.5	0	26.51	43.52	-17.01	0-360	100	H
3	859.835	30.45	Pk	26.6	-25.7	0	31.35	46.02	-14.67	0-360	200	H
4	40.67	41.58	Pk	18.6	-31.1	0	29.08	40	-10.92	0-360	200	V
5	176.276	38.74	Pk	14.8	-29.5	0	24.04	43.52	-19.48	0-360	200	V
6	745.763	30.9	Pk	25.6	-26.5	0	30	46.02	-16.02	0-360	300	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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
1	13.07763	22.94	Pk	20.1	-40	.5	3.54	29.54	-26	0-360
2	13.17913	22.31	Pk	20.1	-40	.5	2.91	40.51	-37.6	0-360
3	13.51188	22	Pk	20.1	-40	.5	2.6	50.5	-47.9	0-360
**4	13.56088	34.92	Pk	20.1	-40	.5	15.52	84	-68.48	0-360
5	13.66013	19.96	Pk	20.1	-40	.6	.66	50.5	-49.84	0-360
6	13.82688	19.88	Pk	20.1	-40	.6	.58	40.51	-39.93	0-360
7	14.2815	22.24	Pk	20.1	-40	.6	2.94	29.54	-26.6	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 (dBuVolts/meter)	FCC 15.225 Limit (dBuVolts/meter)	Margin (dB)	Azimuth (Degs)
8	12.92538	22.19	Pk	20.1	-40	.5	2.79	29.54	-26.75	0-360
9	13.30838	21.33	Pk	20.1	-40	.5	1.93	40.51	-38.58	0-360
10	13.46888	22.2	Pk	20.1	-40	.5	2.8	50.5	-47.7	0-360
**11	13.56025	30.7	Pk	20.1	-40	.5	11.3	84	-72.7	0-360
12	13.64725	21.21	Pk	20.1	-40	.6	1.91	50.5	-48.59	0-360
13	13.82313	20.86	Pk	20.1	-40	.6	1.56	40.51	-38.95	0-360
14	14.32538	21.15	Pk	20.1	-40	.6	1.85	29.54	-27.69	0-360

Pk - Peak detector  
 \*\*Fundamental

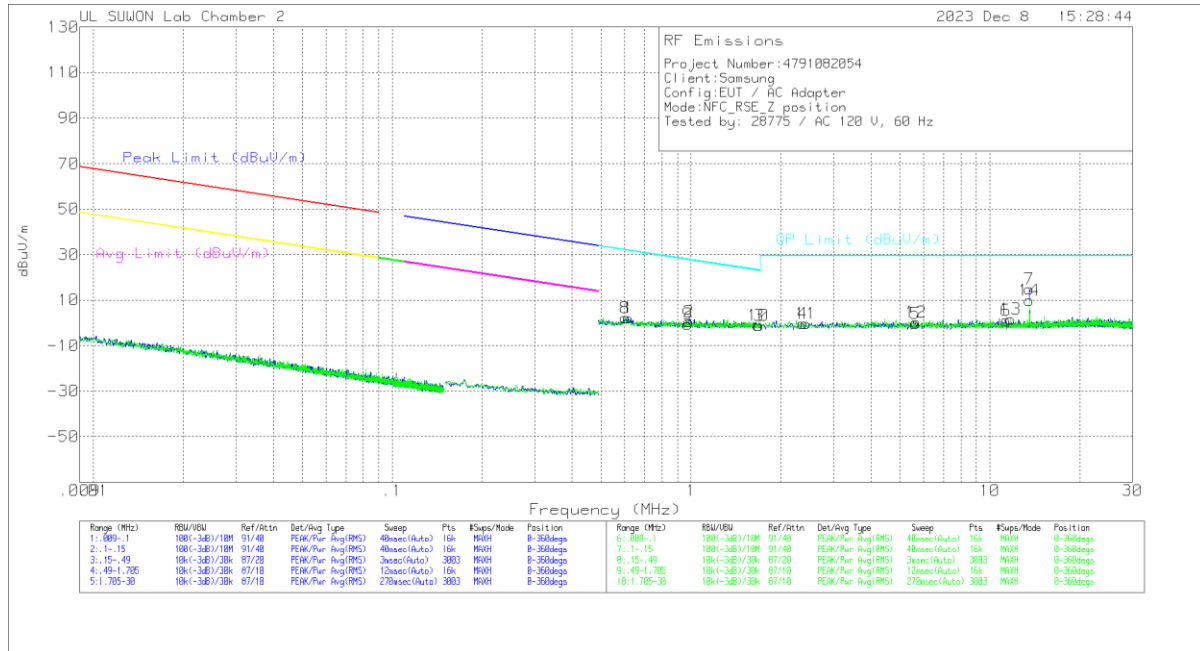
Note 1: Although these tests were performed other than open filed test site, adequate comparison measurements were confirmed against 30 m open are test site.

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)	Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.61513	22.02	Pk	20	.1	-40	2.12	31.83	-29.71	0-360
2	.98453	20.4	Pk	20	.2	-40	.6	27.76	-27.16	0-360
3	1.68571	18.55	Pk	20.1	.2	-40	-1.15	23.1	-24.25	0-360
4	2.36475	19.35	Pk	20.1	.2	-40	-.35	29.5	-29.85	0-360
5	5.63523	19.19	Pk	20.2	.4	-40	-.21	29.5	-29.71	0-360
6	11.3185	20.27	Pk	20.2	.5	-40	.97	29.5	-28.53	0-360
**7	13.56165	34.38	Pk	20.1	.5	-40	14.98	29.5	-14.52	0-360

Face off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	Dist Corr 30m(dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.60085	22.07	Pk	20	.1	-40	2.17	32.03	-29.86	0-360
9	.97651	19.16	Pk	20	.2	-40	-.64	27.83	-28.47	0-360
10	1.67609	18.68	Pk	20.1	.2	-40	-1.02	23.15	-24.17	0-360
11	2.4213	19.52	Pk	20.1	.2	-40	-.18	29.5	-29.68	0-360
12	5.6635	19.69	Pk	20.2	.4	-40	-.29	29.5	-29.21	0-360
13	11.70493	20.91	Pk	20.2	.5	-40	1.61	29.5	-27.89	0-360
**14	13.56165	29.4	Pk	20.1	.5	-40	10	29.5	-19.5	0-360

Pk - Peak detector

\*\*Fundamental

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

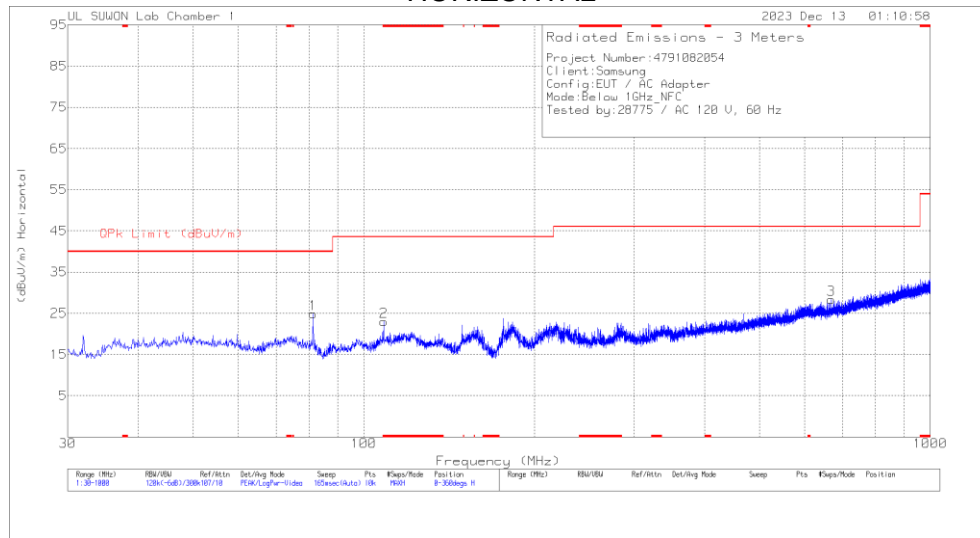
Please refer to section 8.1.4 about the fundamental level.

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

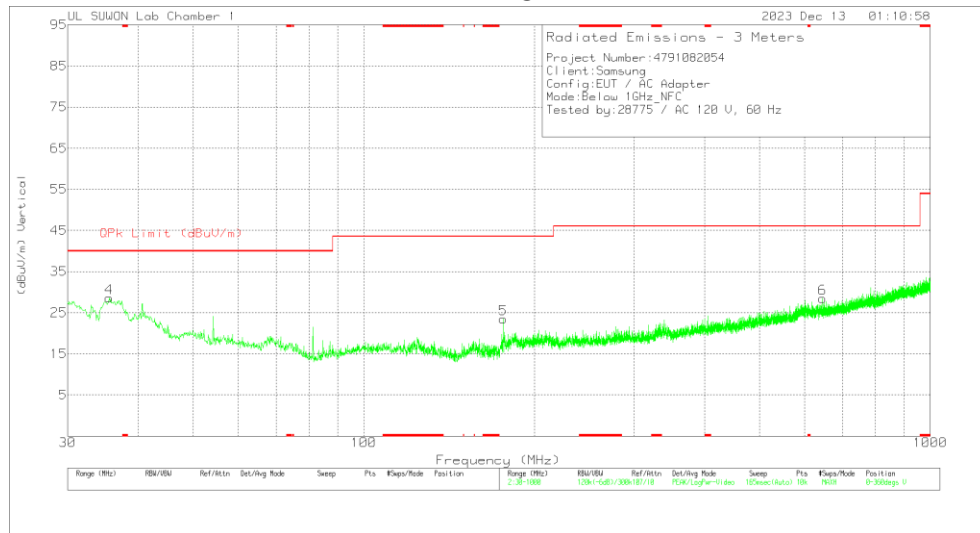
Note 2: Radiated test were investigated with three receiving antenna axes: Face-on, Face-off and horizontal (parallel to the ground plane) and the worse orientations of Face-on and Face-off were set for final test.

### 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 Correction Factor (dB/m)	Loss (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	OPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.313	42.32	Pk	13	-30.5	0	24.82	40	-15.18	0-360	300	H
2	* 108.376	35.84	Pk	17.4	-30.2	0	23.04	43.52	-20.48	0-360	200	H
3	669.424	30.85	Pk	24.5	-27	0	28.35	46.02	-17.67	0-360	200	H
4	35.529	43.05	Pk	16.7	-31.1	0	28.65	40	-11.35	0-360	200	V
5	176.276	38.15	Pk	14.8	-29.5	0	23.45	43.52	-20.07	0-360	200	V
6	645.853	31.23	Pk	24.3	-27	0	28.53	46.02	-17.49	0-360	400	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 50 $\mu$ 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 $\mu$ 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.

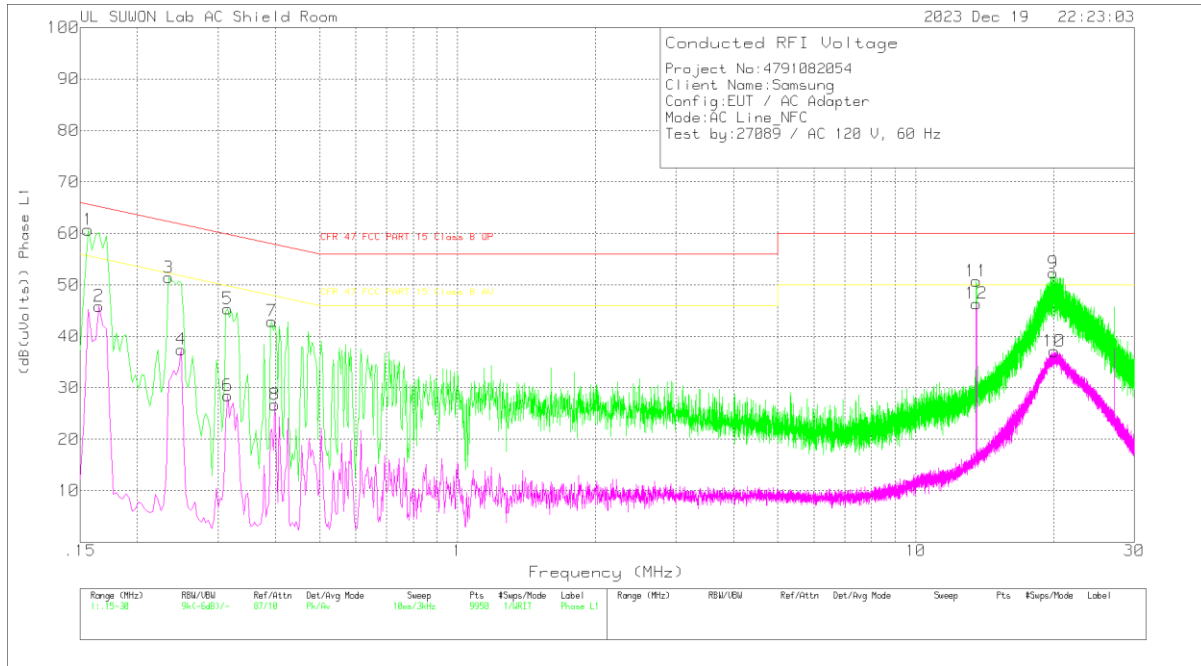
Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

No non-compliance noted:

**WORST EMISSIONS(non-Terminated)**

**LINE 1 PLOT**



**LINE 1 RESULTS**

**Trace Markers**

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
1	.156	51.09	Pk	9.5	.1	60.69	65.67	-4.98	-	-
2	.165	36.26	Av	9.5	.1	45.86	-	-	55.21	-9.35
3	.234	41.72	Pk	9.5	.2	51.42	62.31	-10.89	-	-
4	.249	27.74	Av	9.5	.2	37.44	-	-	51.79	-14.35
5	.315	35.64	Pk	9.5	.2	45.34	59.84	-14.5	-	-
6	.315	18.8	Av	9.5	.2	28.5	-	-	49.84	-21.34
7	.393	33.24	Pk	9.5	.2	42.94	58	-15.06	-	-
8	.399	17	Av	9.5	.2	26.7	-	-	47.87	-21.17
9	19.95	42.31	Pk	9.6	.4	52.31	60	-7.69	-	-
10	20.049	27.11	Av	9.6	.4	37.11	-	-	50	-12.89
11	13.557	40.72	Pk	9.6	.4	50.72	60	-9.28	-	-
12	13.56	36.37	Av	9.6	.4	46.37	-	-	50	-3.63

Pk - Peak detector

Av - Average detection

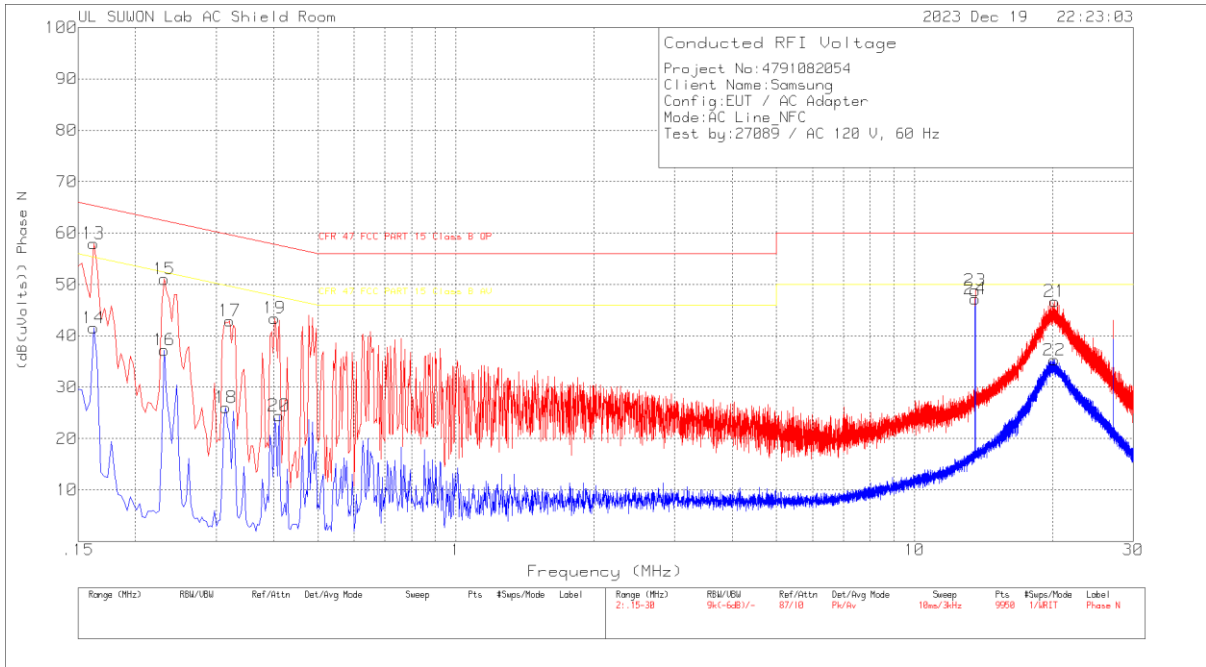
**Quasi-Peak Emissions**

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.15675	44.94	Qp	9.5	.1	54.54	65.63	-11.09	-	-
.16425	44.46	Qp	9.5	.1	54.06	65.25	-11.19	-	-
19.9502	31.18	Qp	9.6	.4	41.18	60	-18.82	-	-

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_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
13	.162	48.36	Pk	9.5	.1	57.96	65.36	-7.4	-	-
14	.162	31.94	Av	9.5	.1	41.54	-	-	55.36	-13.82
15	.231	41.33	Pk	9.5	.2	51.03	62.41	-11.38	-	-
16	.231	27.51	Av	9.5	.2	37.21	-	-	52.41	-15.2
17	.321	33.21	Pk	9.5	.2	42.91	59.68	-16.77	-	-
18	.315	16.34	Av	9.5	.2	26.04	-	-	49.84	-23.8
19	.402	33.73	Pk	9.5	.2	43.43	57.81	-14.38	-	-
20	.411	14.74	Av	9.5	.2	24.44	-	-	47.63	-23.19
21	20.205	36.71	Pk	9.6	.4	46.71	60	-13.29	-	-
22	20.187	25.28	Av	9.6	.4	35.28	-	-	50	-14.72
23	13.56	38.83	Pk	9.6	.4	48.83	60	-11.17	-	-
24	13.56	37.19	Av	9.6	.4	47.19	-	-	50	-2.81

Pk - Peak detector

Av - Average detection

#### Quasi-Peak Emissions

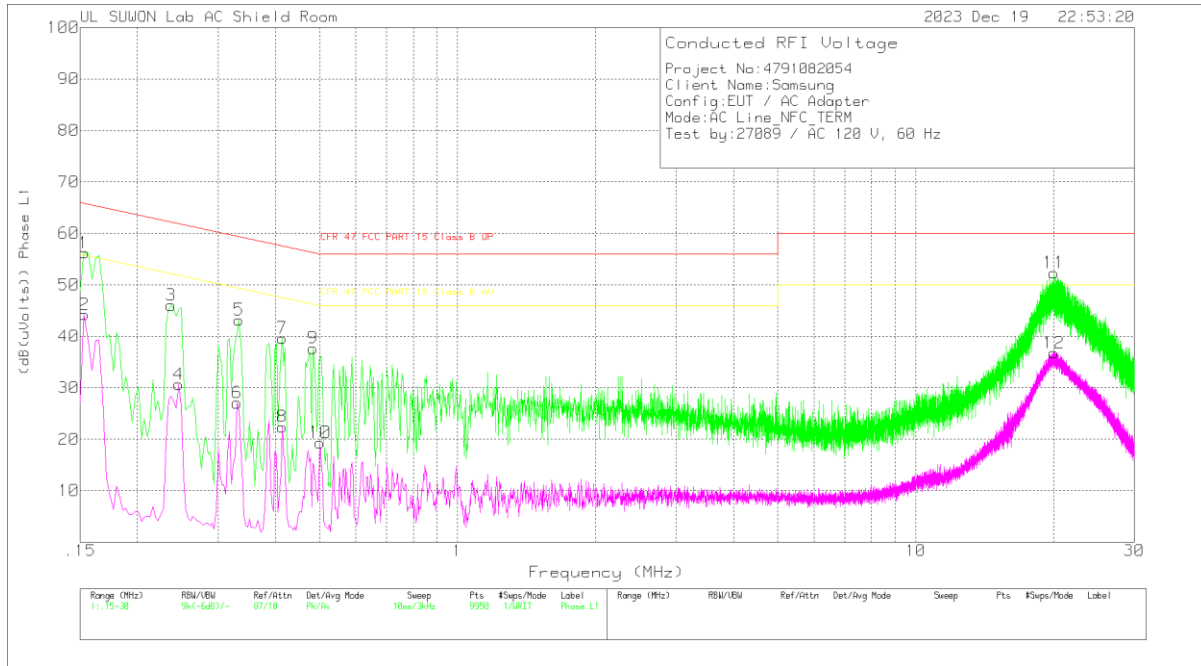
Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.16125	42.52	Qp	9.5	.1	52.12	65.4	-13.28	-	-

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_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
1	.153	46.61	Pk	9.5	.1	56.21	65.84	-9.63	-	-
2	.153	34.61	Av	9.5	.1	44.21	-	-	55.84	-11.63
3	.237	36.33	Pk	9.5	.2	46.03	62.2	-16.17	-	-
4	.246	20.95	Av	9.5	.2	30.65	-	-	51.89	-21.24
5	.333	33.47	Pk	9.5	.2	43.17	59.38	-16.21	-	-
6	.33	17.37	Av	9.5	.2	27.07	-	-	49.45	-22.38
7	.414	29.91	Pk	9.5	.2	39.61	57.57	-17.96	-	-
8	.414	12.71	Av	9.5	.2	22.41	-	-	47.57	-25.16
9	.483	27.99	Pk	9.5	.2	37.69	56.29	-18.6	-	-
10	.501	9.54	Av	9.6	.2	19.34	-	-	46	-26.66
11	20.013	42.32	Pk	9.6	.4	52.32	60	-7.68	-	-
12	20.013	26.75	Av	9.6	.4	36.75	-	-	50	-13.25

Pk - Peak detector

Av - Average detection

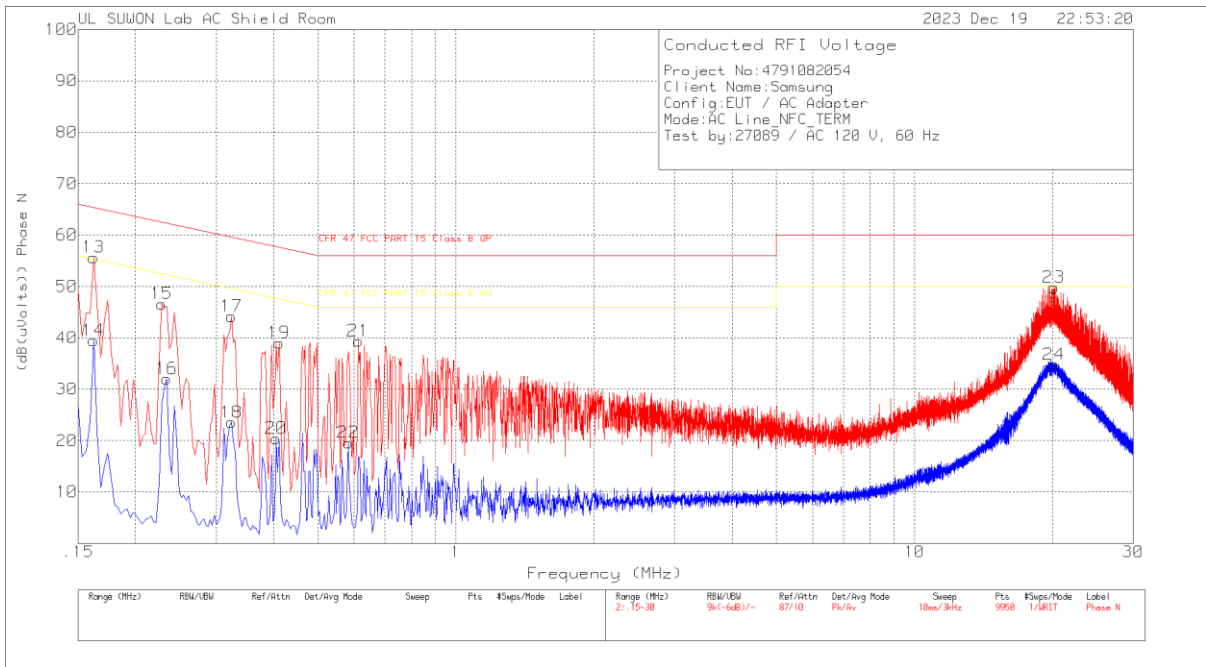
**Quasi-Peak Emissions**

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_L1[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.15375	42.97	Qp	9.5	.1	52.57	65.79	-13.22	-	-
20.0123	33.75	Qp	9.6	.4	43.75	60	-16.25	-	-

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_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
13	.162	46.06	Pk	9.5	.1	55.66	65.36	-9.7	-	-
14	.162	29.88	Av	9.5	.1	39.48	-	-	55.36	-15.88
15	.228	36.92	Pk	9.5	.2	46.62	62.52	-15.9	-	-
16	.234	22.35	Av	9.5	.2	32.05	-	-	52.31	-20.26
17	.324	34.48	Pk	9.5	.2	44.18	59.6	-15.42	-	-
18	.324	13.86	Av	9.5	.2	23.56	-	-	49.6	-26.04
19	.411	29.31	Pk	9.5	.2	39.01	57.63	-18.62	-	-
20	.405	10.72	Av	9.5	.2	20.42	-	-	47.75	-27.33
21	.612	29.57	Pk	9.6	.2	39.37	56	-16.63	-	-
22	.582	9.8	Av	9.6	.2	19.6	-	-	46	-26.4
23	20.118	39.82	Pk	9.6	.4	49.82	60	-10.18	-	-
24	20.133	24.8	Av	9.6	.4	34.8	-	-	50	-15.2

Pk - Peak detector

Av - Average detection

#### Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_AU TO_With EX_N[dB]	CABLELOS S[dB]	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP (dB(uVolts))	Margin (dB)	CFR 47 FCC PART 15 Class B AV (dB(uVolts))	Margin (dB)
.16275	42.72	Qp	9.5	.1	52.32	65.32	-13	-	-

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

Test Date	2024-1-10
Test Engineer	25546

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: $\pm 100$ 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)
4.20	50	13.559946827	-2.027	13.559942502	-2.346	13.559939754	-2.549	13.559932572	-3.078	100
4.20	40	13.559973240	-0.079	13.559965713	-0.634	13.559959545	-1.089	13.559953927	-1.503	100
4.20	30	13.559996084	1.606	13.559992218	1.321	13.559986410	0.892	13.559978331	0.296	100
4.20	<b>20</b>	<b>13.559974312</b>	<b>0.000</b>	<b>13.559971531</b>	<b>-0.205</b>	<b>13.559967465</b>	<b>-0.505</b>	<b>13.559959941</b>	<b>-1.060</b>	<b>100</b>
4.20	10	13.559993407	1.408	13.560008457	2.518	13.560011157	2.717	13.560015388	3.029	100
4.20	0	13.560029433	4.065	13.560034261	4.421	13.560039921	4.838	13.560044293	5.161	100
4.20	-10	13.560051611	5.701	13.560052634	5.776	13.560054176	5.890	13.560054920	5.945	100
4.20	-20	13.560051773	5.712	13.560047506	5.398	13.560044858	5.203	13.560043226	5.082	100
4.20	-30	13.560029110	4.041	13.560027647	3.933	13.560022977	3.589	13.560019994	3.369	100

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: $\pm 100$ 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)
3.80	20	13.560012127	2.789	13.560011333	2.730	13.560009306	2.581	13.560005888	2.329	100
<b>4.20</b>	<b>20</b>	<b>13.559974312</b>	<b>0.000</b>	<b>13.559971531</b>	<b>-0.205</b>	<b>13.559967465</b>	<b>-0.505</b>	<b>13.559959941</b>	<b>-1.060</b>	<b>100</b>
4.40	20	13.560005277	2.284	13.560004811	2.249	13.560003022	2.117	13.560006600	2.381	100

No non-compliance noted.

## END OF TEST REPORT