FCC CFR47 PART 15 SUBPART C

NFC

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER : SM-A505FN/DS, SM-A505FN

FCC ID: A3LSMA505FN

REPORT NUMBER: 4788805437-E7V2

ISSUE DATE: FEB 11, 2019

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
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ACCREDITED
Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	02/08/19	Initial issue	Junwhan Lee
V2	02/11/19	Updated to address about the TCB's question	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC
MODEL NUMBER:	SM-A505FN/DS, SM-A505FN
SERIAL NUMBER:	R38KC0A844A (CONDUCTED, RADIATED, Original); R38KB0HB4YY (RADIATED, Spot check)
DATE TESTED:	FEB 01, 2019 - FEB 07, 2019 (Original); FEB 07, 2019 (Spot check)

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:

SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

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1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMA505FN NFC(FCC CFR 47 Part 15C).
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMA505GN shares the same enclosure and circuit board as FCC ID: A3LSMA505FN. The NFC antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMA505FN remains representative of FCC ID: A3LSMA505GN. The test data of FCC ID: A3LSMA505FN being submitted for this application to cover NFC features.

Due to difference of charger, radiated emission under 1GHz and AC line conducted test were performed newly.

1.3. SPOT CHECK VERIFICATION DATA

Band	Test Item	Frequency	Test Limit	Original model SM-A505GN/DS Results FCC ID : A3LSMA505GN	Spot check model SM-A505FN/DS Results FCC ID : A3LSMA505FN	Deviation	Remark
NFC	Fundamental	13.56 MHz	84 dBuV/m	14.88 dBuV/m	10.90 dBuV/m	-3.98 dB	
	RSE		29.5 dBuV/m	9.37 dBuV/m	9.21 dBuV/m	-0.16 dB	Noise Floor

Comparison of two models, upper deviation is within 3dB range and all test results are under FCC Technical Limits.

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1.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Type Grant/Permissive Change	Reference Application	Folder Test/RF Exposure	Report Tittle / Section
PCE	A3LSMA505F	Grant	4788805451-E1	Test	FCC Report WWAN / All sections
DTS	A3LSMA505F	Grant	4788805451-E2	Test	FCC Report DTS WLAN / All sections
			4788805451-E3	Test	FCC Report BLE All sections
DSS	A3LSMA505F	Grant	4788805451-E4	Test	FCC Report BT / All sections
NII	A3LSMA505F	Grant	4788805451-E5	Test	FCC Report UNII WLAN / All sections
DXX	A3LSMA505F	Grant	4788805451-E6	Test	FCC Report ANT+ / All sections
	A3LSMA505GN	Grant	4788805413-E7	Test	FCC Report NFC / All sections

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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. KDB 484596 D01 Referencing Test Data v01
4. ANSI C63.10-2013.

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
☒ Chamber 2
☐ Chamber 3

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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

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	2.32 dB
Radiated Disturbance, Below 1GHz	3.86 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC.
This test report addresses the DXX (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 14.88 dBuV/m which convert from 3 meter data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Z orientation was the worst-case orientation; therefore all final radiated testing was performed with the EUT in the Z orientation while generating continuous emissions.

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

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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-TA200	R37KC3B01G0RC3	N/A
Data Cable	SAMSUNG	EP-D140AWE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

TEST SETUP

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.

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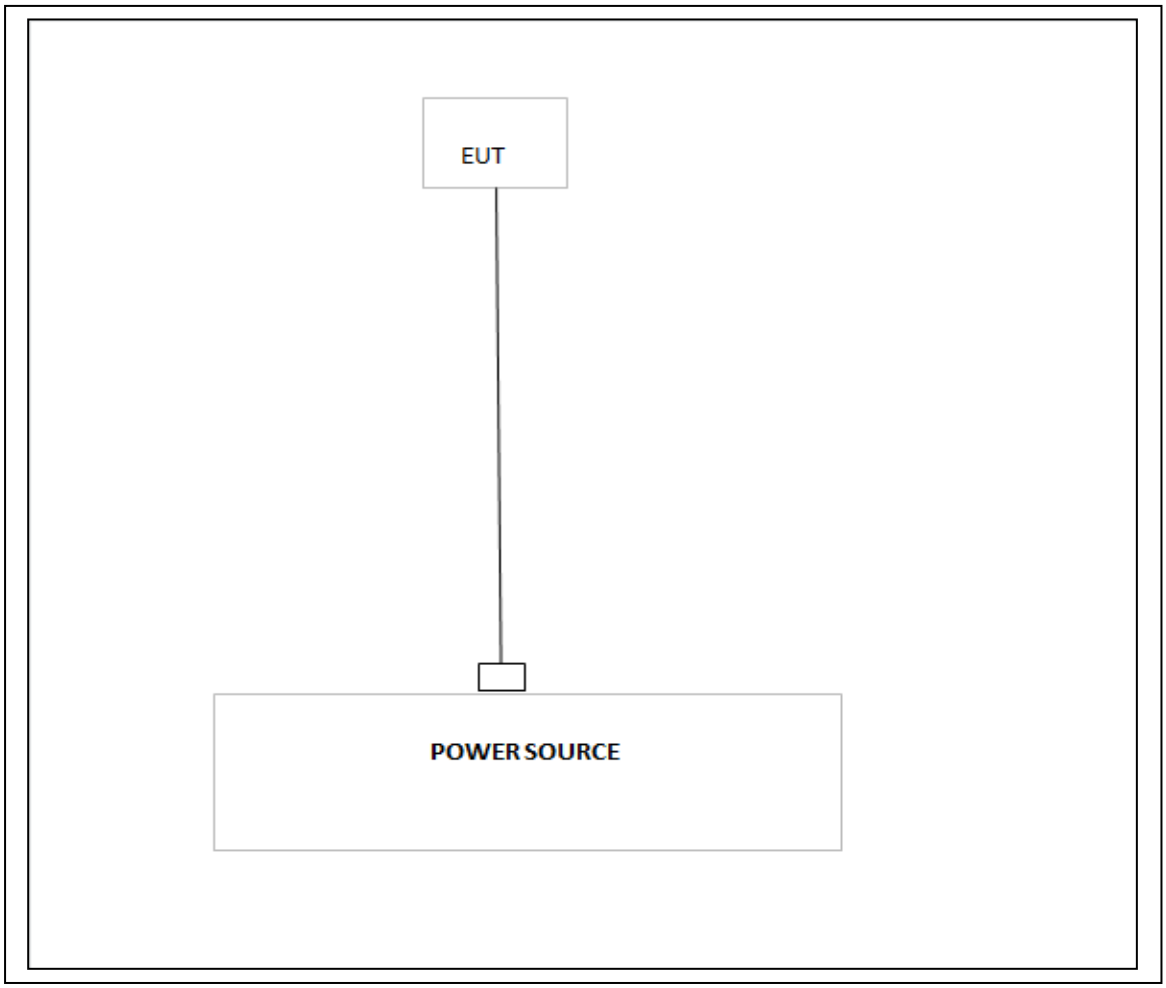
SETUP DIAGRAM FOR TESTS

Radiated Emissions Below 30 MHz:



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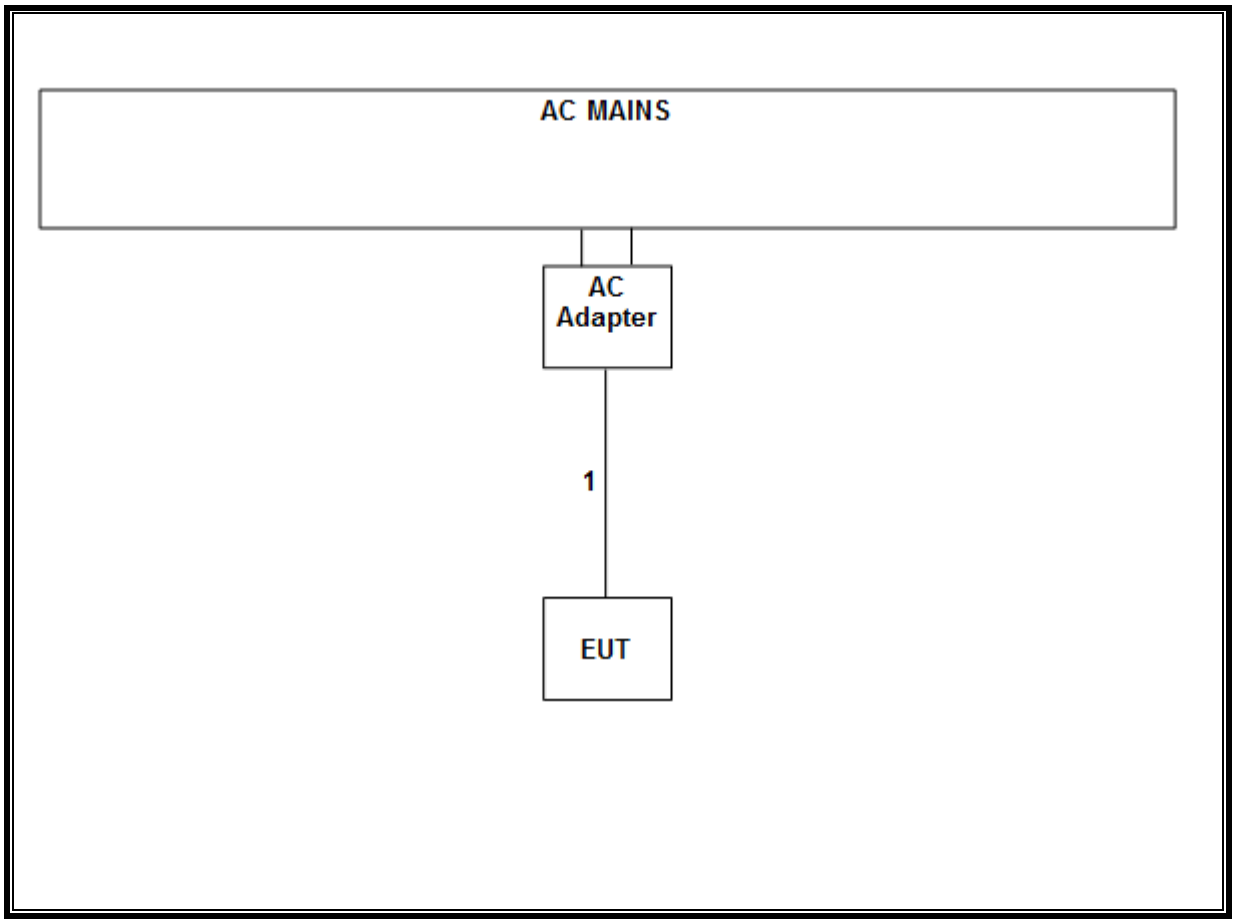
Radiated Emissions Above 30 MHz, AC Line Conducted Emissions:



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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	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-06-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	08-07-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-06-19
Temperature Chamber	ESPEC	SH-642	93001109	08-06-19
LISN	R&S	ENV216	101837	08-06-19
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

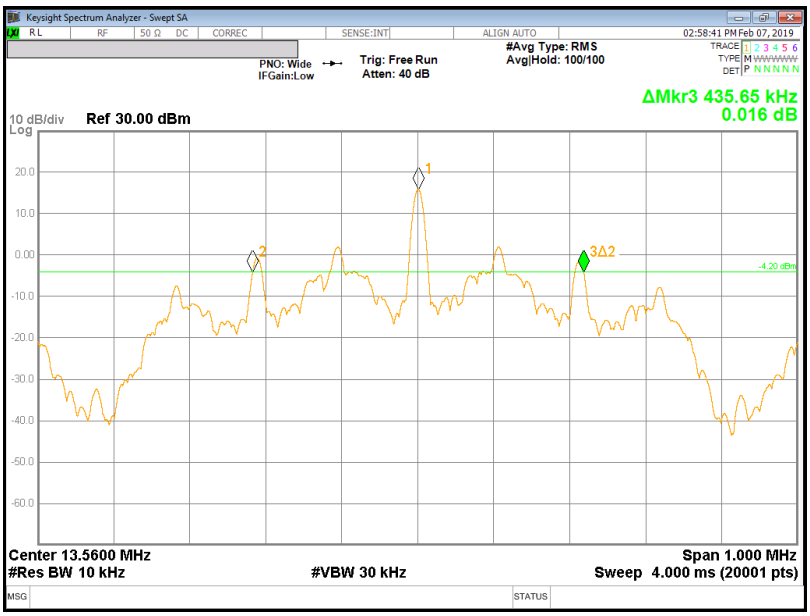
TEST PROCEDURE

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

RESULTS

Frequency [MHz]	20dB Bandwidth [KHz]
13.56	435.65

20dB Bandwidth Plot



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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)

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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:

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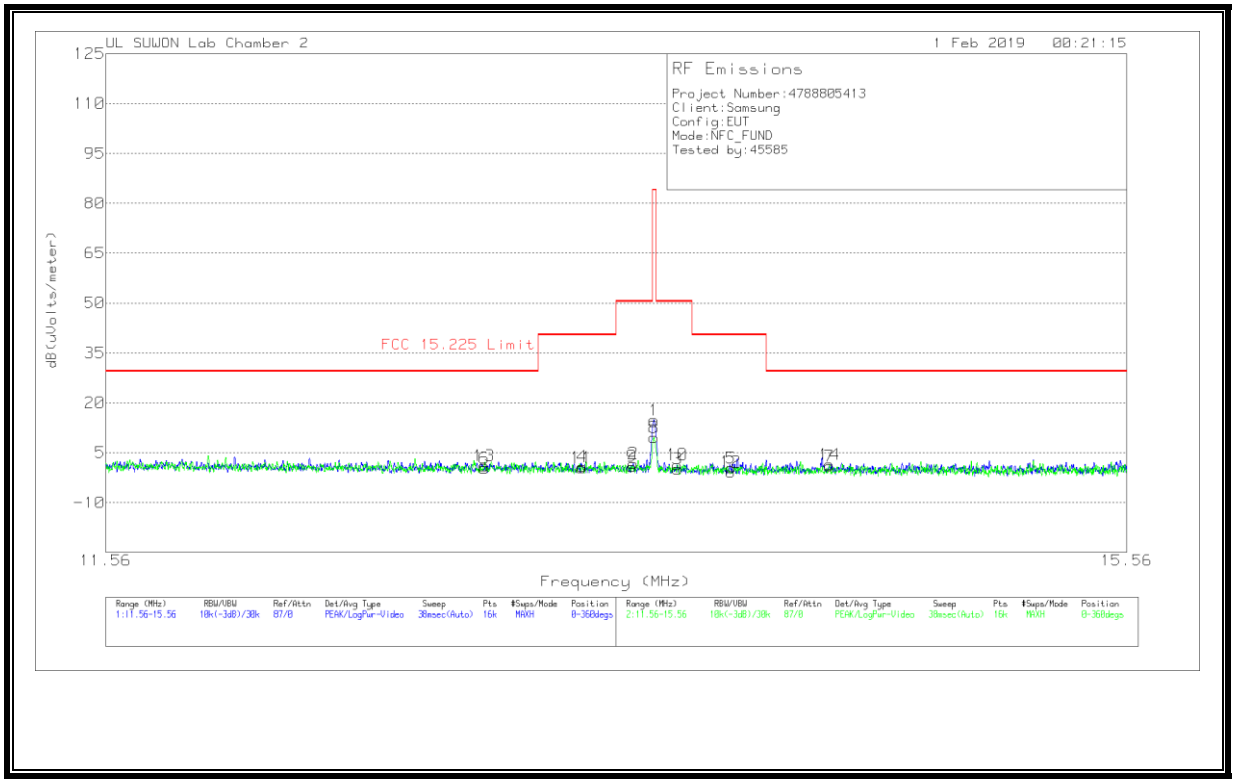
8.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)



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Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
1	13.55975	34.48	Pk	19.9	-40	.5	14.88	84	-69.12	0-360
2	13.47813	21.37	Pk	19.9	-40	.5	1.77	50.5	-48.73	0-360
3	13.65338	19.69	Pk	19.9	-40	.6	.19	50.5	-50.31	0-360
4	13.27963	20.44	Pk	19.9	-40	.5	.84	40.51	-39.67	0-360
5	13.86675	20.01	Pk	19.8	-40	.6	.41	40.51	-40.1	0-360
6	12.9065	19.98	Pk	19.9	-40	.5	.38	29.54	-29.16	0-360
7	14.26963	20.58	Pk	19.8	-40	.6	.98	29.54	-28.56	0-360

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	Margin (dB)	Azimuth (Degs)
8	13.55975	29.2	Pk	19.9	-40	.5	9.6	84	-74.4	0-360
9	13.4735	20.49	Pk	19.9	-40	.5	.89	50.5	-49.61	0-360
10	13.65288	20.92	Pk	19.9	-40	.6	1.42	50.5	-49.08	0-360
11	13.27725	20.08	Pk	19.9	-40	.5	.48	40.51	-40.03	0-360
12	13.8665	18.83	Pk	19.8	-40	.6	-.77	40.51	-41.28	0-360
13	12.9065	20.71	Pk	19.9	-40	.5	1.11	29.54	-28.43	0-360
14	14.27063	21.07	Pk	19.8	-40	.6	1.47	29.54	-28.07	0-360

Pk - Peak detector

Note : Although these tests were performed other than open area 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.

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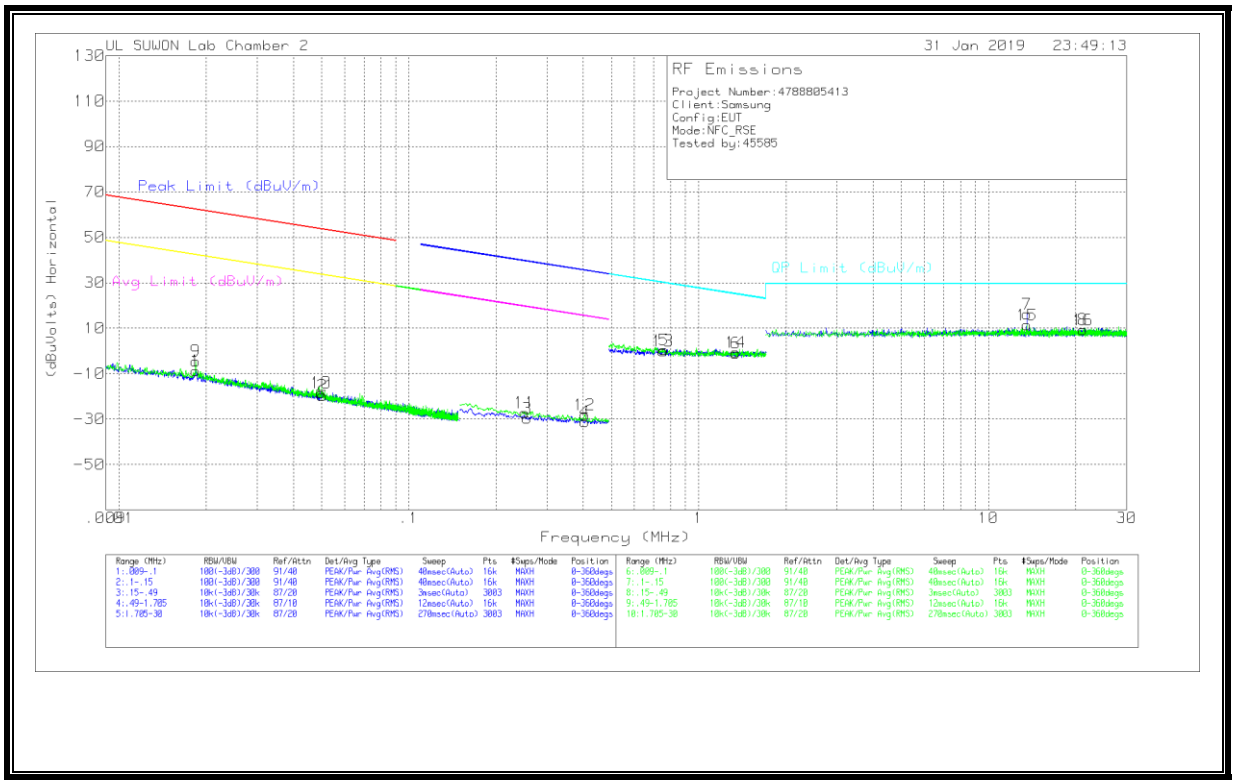
8.1.2. SPURIOUS EMISSION 0.09 TO 30 MHz



Range (MHz)	RBW/VBW	Ref/Attn	Det/Avg Type	Sweep	Pts	#Swps/Mode	Position
1:.009-.1	100(-3dB)/300	91/40	PEAK/Pwr Avg(RMS)	40msec(Auto)	16k	MAXH	0-360degs
2:.1-.15	100(-3dB)/300	91/40	PEAK/Pwr Avg(RMS)	40msec(Auto)	16k	MAXH	0-360degs
3:.15-.49	10k(-3dB)/30k	87/20	PEAK/Pwr Avg(RMS)	3msec(Auto)	3003	MAXH	0-360degs
4:.49-1.705	10k(-3dB)/30k	87/10	PEAK/Pwr Avg(RMS)	12msec(Auto)	16k	MAXH	0-360degs
5:1.705-30	10k(-3dB)/30k	87/20	PEAK/Pwr Avg(RMS)	270msec(Auto)	3003	MAXH	0-360degs

Range (MHz)	RBW/VBW	Ref/Attn	Det/Avg Type	Sweep	Pts	#Swps/Mode	Position
6:.009-.1	100(-3dB)/300	91/40	PEAK/Pwr Avg(RMS)	40msec(Auto)	16k	MAXH	0-360degs
7:.1-.15	100(-3dB)/300	91/40	PEAK/Pwr Avg(RMS)	40msec(Auto)	16k	MAXH	0-360degs
8:.15-.49	10k(-3dB)/30k	87/20	PEAK/Pwr Avg(RMS)	3msec(Auto)	3003	MAXH	0-360degs
9:.49-1.705	10k(-3dB)/30k	87/10	PEAK/Pwr Avg(RMS)	12msec(Auto)	16k	MAXH	0-360degs
10:1.705-30	10k(-3dB)/30k	87/20	PEAK/Pwr Avg(RMS)	270msec(Auto)	3003	MAXH	0-360degs

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Trace Markers

Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.0184	51.16	Pk	20	.1	-80	-8.74	62.29	-71.03	42.29	-51.03	0-360
2	.05038	40.49	Pk	19.8	.1	-80	-19.61	53.54	-73.15	33.54	-53.15	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.25599	30.74	Pk	19.5	.1	-80	-29.66	39.45	-69.11	19.45	-49.11	0-360
4	.40487	29.18	Pk	19.6	.1	-80	-31.12	35.46	-66.58	15.46	-46.58	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.75874	20.59	Pk	19.7	.2	-40	.49	30.01	-29.52	0-360
6	1.34409	19.14	Pk	19.7	.2	-40	-.96	25.06	-26.02	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
7	13.56165	35.78	Pk	19.9	.5	-40	16.18	29.5	-13.32	0-360
8	21.16763	28.97	Pk	19.7	.7	-40	9.37	29.5	-20.13	0-360

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
9	.01841	55.43	Pk	20	.1	-80	-4.47	62.28	-66.75	42.28	-46.75	0-360
10	.04975	41.69	Pk	19.8	.1	-80	-18.41	53.65	-72.06	33.65	-52.06	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
11	.25159	33.22	Pk	19.5	.1	-80	-27.18	39.6	-66.78	19.6	-46.78	0-360
12	.40448	32.17	Pk	19.6	.1	-80	-28.13	35.47	-63.6	15.47	-43.6	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
13	.75421	20.11	Pk	19.7	.2	-40	.01	30.06	-30.05	0-360
14	1.34371	19.51	Pk	19.7	.2	-40	-.59	25.06	-25.65	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
15	13.56165	31.03	Pk	19.9	.5	-40	11.43	29.5	-18.07	0-360
16	21.16763	28.89	Pk	19.7	.7	-40	9.29	29.5	-20.21	0-360

Pk - Peak detector

Note: The data for marker number 7 and 15 are the fundamental signal.
Please refer to section 8.1.1 about the fundamental level.

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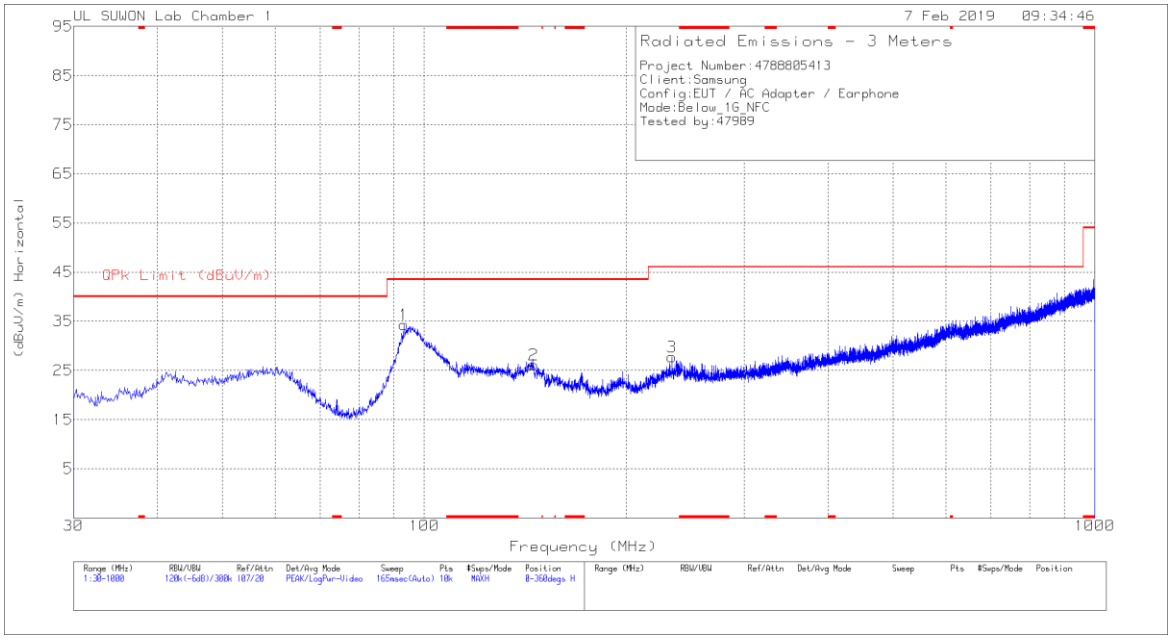
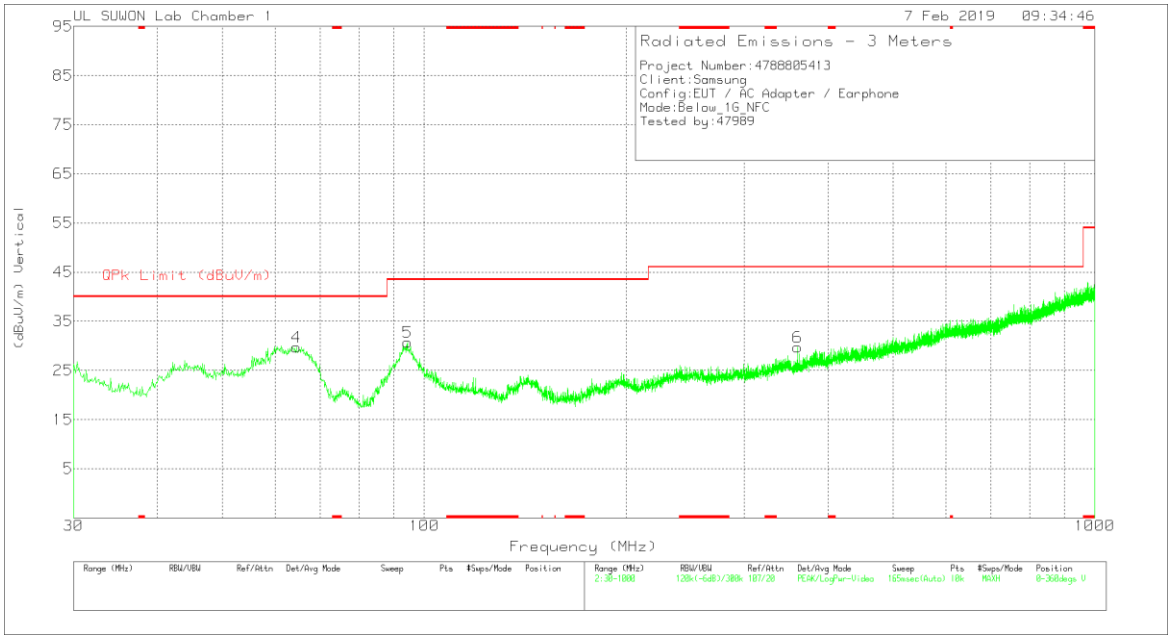
8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

HORIZONTAL



VERTICAL



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Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	93.341	47.24	Pk	16.9	-29.8	34.34	43.52	-9.18	0-360	200	H
2	145.624	41.16	Pk	14.1	-29.1	26.16	43.52	-17.36	0-360	100	H
3	233.991	37.7	Pk	18.2	-28.2	27.7	46.02	-18.32	0-360	100	H
4	64.435	42.49	Pk	17.5	-30.3	29.69	40	-10.31	0-360	100	V
5	94.408	43.19	Pk	17.2	-29.7	30.69	43.52	-12.83	0-360	100	V
6	360.479	36.62	Pk	20.3	-27.2	29.72	46.02	-16.3	0-360	300	V

Pk - Peak detector

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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:

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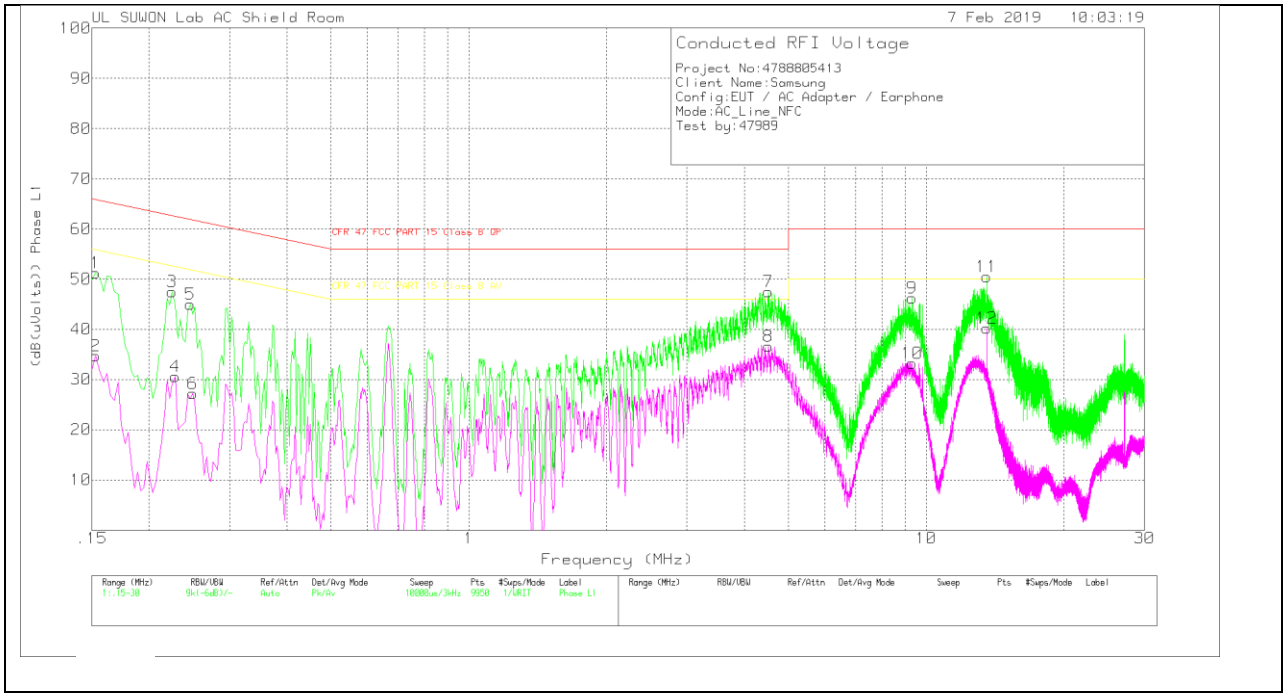
WORST EMISSIONS

LINE 1 PLOT



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LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_L1	CABLELOSS(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	41.38	Pk	9.8	.1	51.28	65.84	-14.56	-	-
2	.153	24.78	Av	9.8	.1	34.68	-	-	55.84	-21.16
3	.225	37.47	Pk	9.8	.2	47.47	62.63	-15.16	-	-
4	.228	20.6	Av	9.8	.2	30.6	-	-	52.52	-21.92
5	.246	35.07	Pk	9.7	.2	44.97	61.89	-16.92	-	-
6	.249	17.32	Av	9.7	.2	27.22	-	-	51.79	-24.57
7	4.521	37.43	Pk	9.8	.3	47.53	56	-8.47	-	-
8	4.518	26.45	Av	9.8	.3	36.55	-	-	46	-9.45
9	9.324	35.81	Pk	10	.4	46.21	60	-13.79	-	-
10	9.315	22.83	Av	10	.4	33.23	-	-	50	-16.77
11	13.563	40.02	Pk	10.1	.4	50.52	60	-9.48	-	-
12	13.56	29.77	Av	10.1	.4	40.27	-	-	50	-9.73

Pk - Peak detector
Av - Average detection

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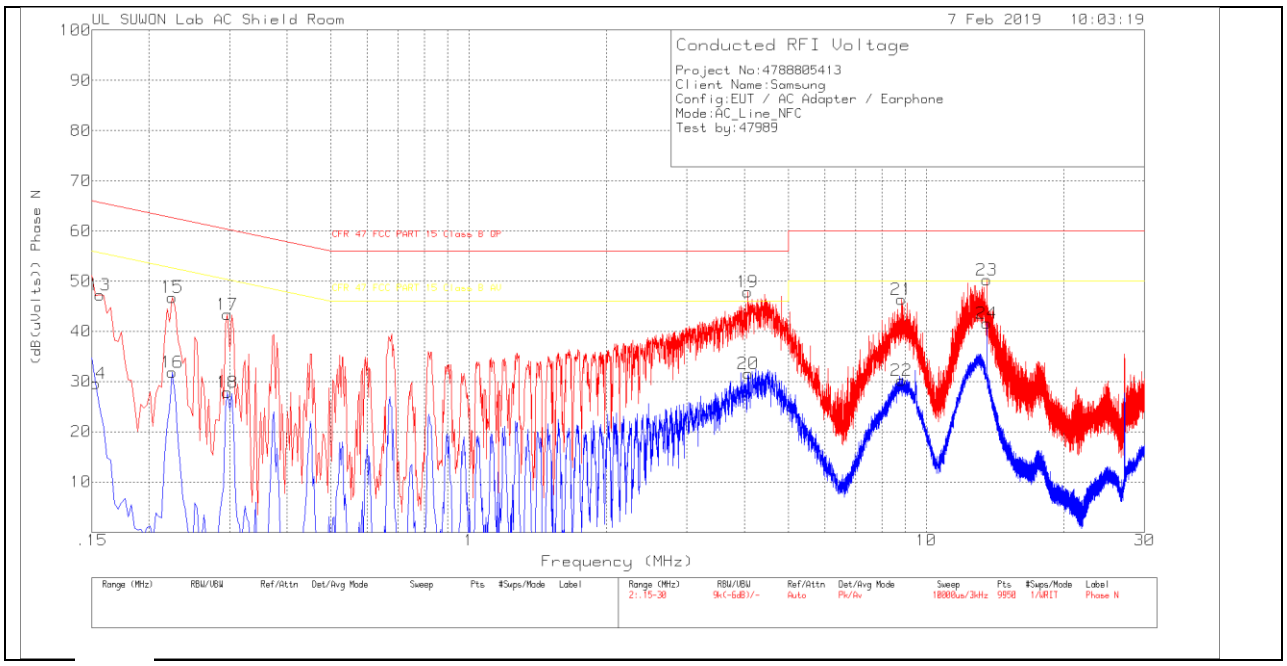
LINE 2 PLOT



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LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_101836_With ex-cord_N	CABLELOSS(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	.156	37.38	Pk	9.8	.1	47.28	65.67	-18.39	-	-
14	.153	19.66	Av	9.8	.1	29.56	-	-	55.84	-26.28
15	.225	36.8	Pk	9.8	.2	46.8	62.63	-15.83	-	-
16	.225	21.86	Av	9.8	.2	31.86	-	-	52.63	-20.77
17	.297	33.48	Pk	9.7	.2	43.38	60.33	-16.95	-	-
18	.297	17.94	Av	9.7	.2	27.84	-	-	50.33	-22.49
19	4.068	37.73	Pk	9.8	.3	47.83	56	-8.17	-	-
20	4.08	21.55	Av	9.8	.3	31.65	-	-	46	-14.35
21	8.82	36.03	Pk	9.9	.4	46.33	60	-13.67	-	-
22	8.835	19.98	Av	9.9	.4	30.28	-	-	50	-19.72
23	13.56	39.59	Pk	10.2	.4	50.19	60	-9.81	-	-
24	13.56	31.04	Av	10.2	.4	41.64	-	-	50	-8.36

Pk - Peak detector
Av - Average detection

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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

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)
3.80	50	13.560006974	-0.015	13.560006791	-0.001	13.560006552	0.016	13.560006317	0.034	100
3.80	40	13.560006462	0.023	13.560006736	0.003	13.560006916	-0.010	13.560007004	-0.017	100
3.80	30	13.560006425	0.026	13.560006408	0.027	13.560006295	0.035	13.560006213	0.041	100
3.80	***20***	***13.560006774***	***0***	***13.560006779***	0.000	***13.560006780***	0.000	***13.560006782***	-0.001	***100***
3.80	10	13.560006074	0.052	13.560006387	0.029	13.560006847	-0.005	13.560007108	-0.025	100
3.80	0	13.560007021	-0.018	13.560007170	-0.029	13.560007334	-0.041	13.560007512	-0.054	100
3.80	-10	13.560008561	-0.132	13.560009007	-0.165	13.560009333	-0.189	13.560009612	-0.209	100
3.80	-20	13.560010017	-0.239	13.560009899	-0.230	13.560009631	-0.211	13.560009295	-0.186	100
3.80	-30	13.560008556	-0.131	13.560008157	-0.102	13.560007815	-0.077	13.560007431	-0.048	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)
3.80	***20***	***13.560006774***	***0***	***13.560006779***	0.000	***13.560006780***	0.000	***13.560006782***	-0.001	***100***
4.30	20	13.560006761	0.001	***13.560006768***	0.000	***13.560006773***	0.001	***13.560006777***	0.000	100
3.60	20	13.560006767	0.001	***13.560006771***	0.000	***13.560006772***	0.001	***13.560006779***	0.000	100

No non-compliance noted.

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