CERTIFICATION TEST REPORT

Report Number. : 12810836-E7V2

Applicant	:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
Model	:	SM-A705YN
FCC ID	:	A3LSMA705YN
EUT Description	:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 9

Date Of Issue:
April 29, 2019

Prepared by:
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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/22/2019	Initial Issue	
V2	4/29/2019	Updated Section 2 and repaced the report with orginal MN data.	K.Kedida

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Samsung Electronics Co., Ltd. 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 16677, Korea
EUT DESCRIPTION:	GSM/WCDMA/LTE phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC
MODEL:	SM-A705YN
SERIAL NUMBER:	Radiated: R38M10NPL4X and R38M10NPSMK (Original) Radiated: R38M4046MZN (Spot Check)
DATE TESTED:	March 13 – April 4, 2019 (Original) April 11, 2019 (Spot Check)

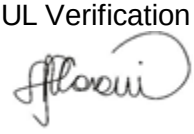
APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



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2. INTRODUCTION OF TEST DATA REUSE

2.1. INTRODUCTION

According to the manufacturer, FCC ID: A3LSMA705MN and FCC ID: A3LSMA705YN non-licensed radios are electrically identical. The FCC ID: A3LSMA705MN test data shall remain representative of FCC ID: A3LSMA705YN.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID.

2.2. DIFFERENCES

The FCC ID: A3LSMA705MN, shares the same enclosure and circuit board as FCC ID: A3LSMA705YN. The NFC antennas and surrounding circuitry and layout are identical between two models.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMA705MN remains representative of FCC ID: A3LSMA705YN. The test data of FCC ID: A3LSMA705MN being submitted for this application to cover NFC features.

2.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device A3LSMA705YN for radiated fundamental. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device in accordance to FCC public KDB 484596 D01 as shown in the summary below.

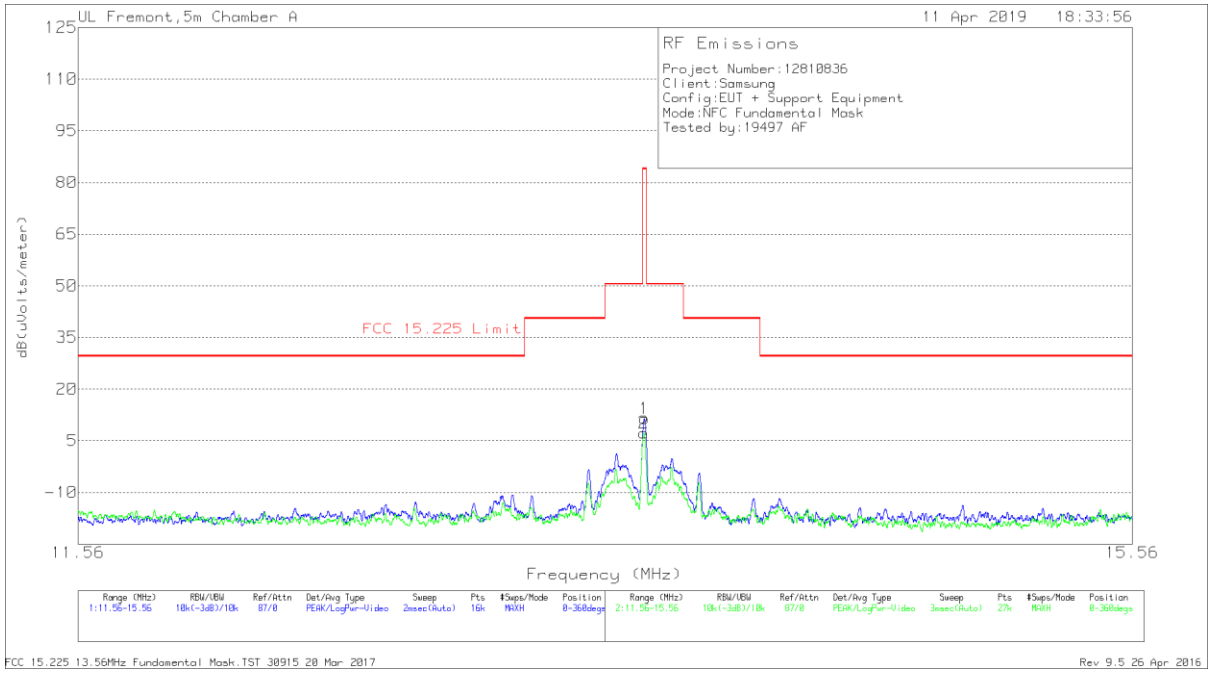
A3LSMA705YN SPOT CHECK RESULTS						
Technology	Mode	Test Item	Measured Frequency	Original Model	Spot check model	Delta (dB)
				SM-A705MN/DS	SM-A705YN	
				A3LSMA705MN	A3LSMA705YN	
				Peak	Peak	Peak
NFC	Fundamental		13.56MHz	12.98	11.41	-1.57
	Spurious Emissions		30.0442 MHz	37.65 QP	37.69	0.04

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

2.3.1. SPOT CHECK DATA

2.3.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.09 - 1000 MHz)

FUNDAMENTAL EMISSION MASK - TYPE A, 106Kbps (11.56 – 15.56 MHz)



FACE ON AND FACE OFF

NOTE: All data rate Field Strength was investigated and Type A, 106k found to have the highest Field Strength results and represents as the worst case data rate.

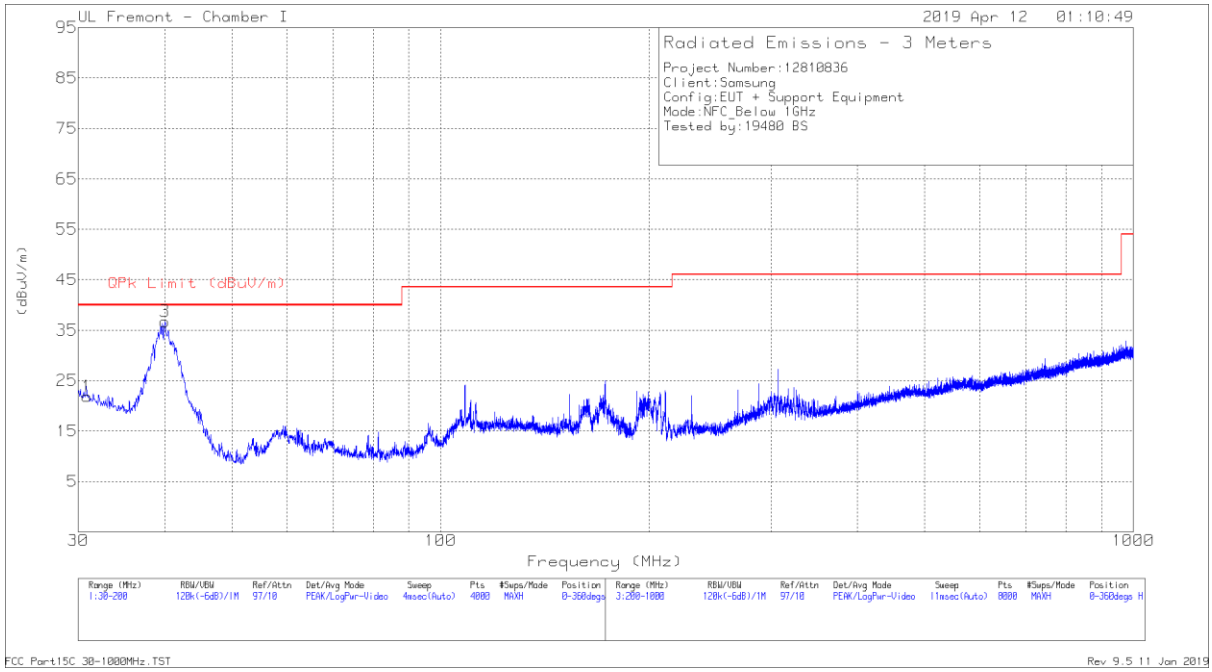
DATA

Trace Markers

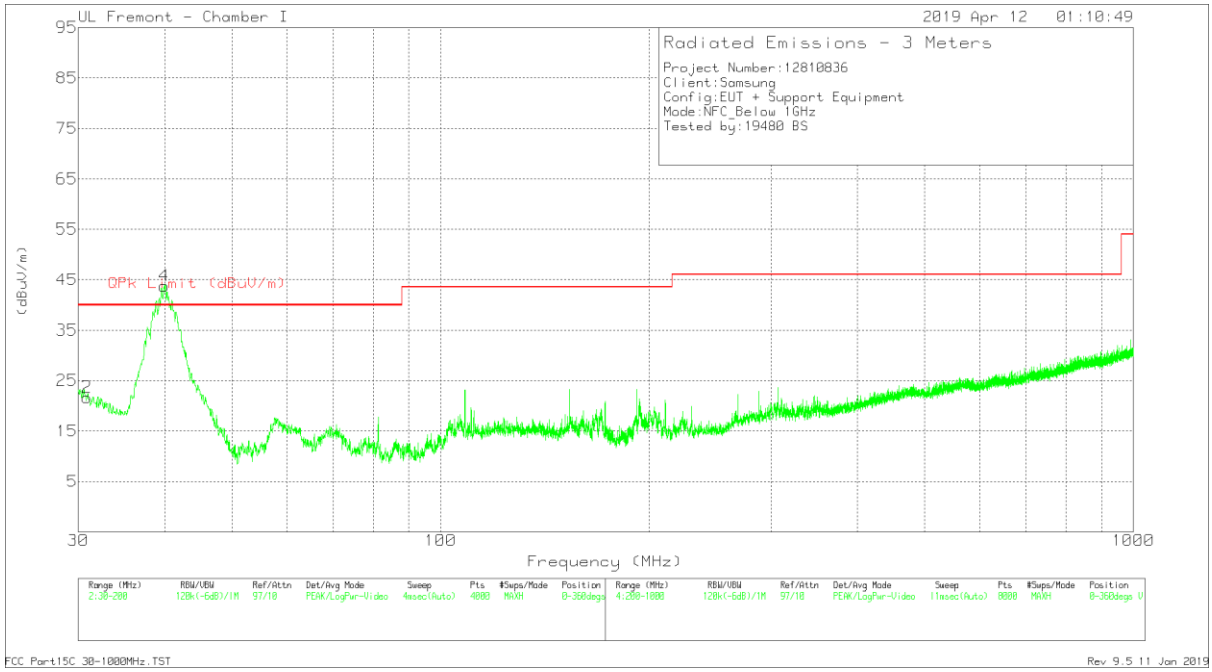
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 30m	Corrected Reading dB(uVolts/ meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
2	13.55807	36.08	Pk	10.7	.5	-40	7.28	84	-76.72	0-360
1	13.55988	40.21	Pk	10.7	.5	-40	11.41	84	-72.59	0-360

Pk - Peak detector

SPURIOUS EMISSIONS - TYPE A, 106kbps (30 – 1000MHz)



HORIZONTAL



VERTICAL

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
30.7196	29.59	Pk	25.9	-31.3	24.19	-	-	266	245	H
30.7196	22.48	Qp	25.9	-31.3	17.08	40	-22.92	266	245	H
40.0542	49.97	Pk	19.7	-31.2	38.47	-	-	101	324	H
40.0542	46.25	Qp	19.7	-31.2	34.75	40	-5.25	101	324	H
31.109	29.35	Pk	25.7	-31.3	23.75	-	-	209	290	V
31.109	22.54	Qp	25.7	-31.3	16.94	40	-23.06	209	290	V
40.0921	53.37	Pk	19.6	-31.2	41.77	-	-	348	158	V
40.0921	49.29	Qp	19.6	-31.2	37.69	40	-2.31	348	158	V

Pk - Peak detector
Qp - Quasi-Peak detector

2.4. 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 Title/Section
DXX (NFC)	A3LSMA705MN	Grant	12726919-E7	Test	FCC Report NFC / All sections

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 484596 D01 Referencing Test Data v01.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)	☐ Chamber I (IC: 2324A-5)
☒ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☐ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☐ Chamber H (IC:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. SAMPLE CALCULATION

RADIATED EMISSIONS

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE phone with BT,DTS/UNII a/b/g/n/ac, ANT+ and NFC

6.2. MAXIMUM FIELD STRENGTH

The testing was performed at 3 meters. The transmitter maximum E-field at 30 meter distance was 12.98 dBuV/m, which was converted from the 3 meter data.

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the loop antenna.

6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was A705MN.001.

6.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under three orthogonal orientations X (Flatbed), Y (Landscape), and Z (Portrait). The Z (Portrait) orientation was determined to be the worst-case orientation.

Although these tests were performed other than open filed site, adequate comparison measurements were confirmed against 30 m open filed 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: The EUT pre-scanned in three NFC type A, B & F. The worst type is A, and data rate of 106kbps was recorded to this report.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Samsung	EP-TA50EWE	DW3J719AS/A-E	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	RF	Shielded	0.2	To PSA
2	USB	1	USB	Un-shielded	1	EUT to AC Mains

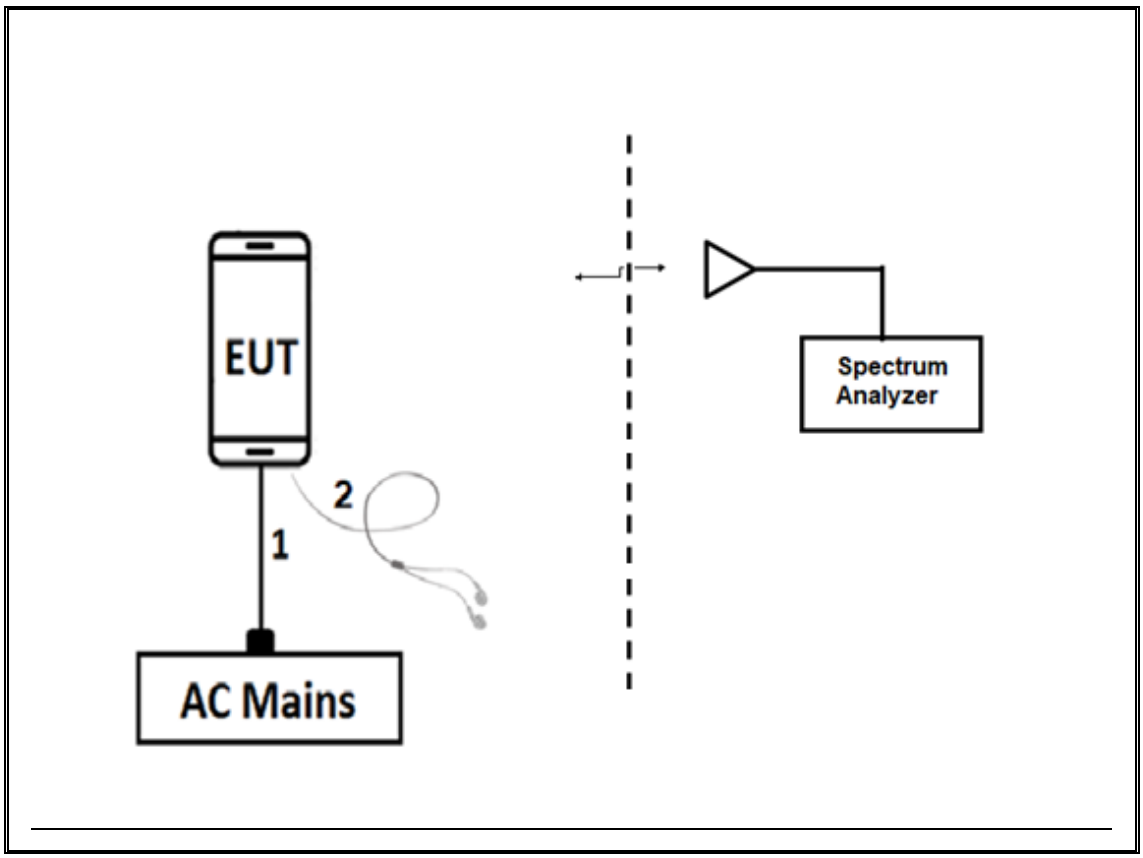
I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Shielded	1	N/A
2	earphone	1	3.5mm	Un-shielded	1	N/A

TEST SETUP

The EUT is a stand alone. Test software exercised the radio card.

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



TEST SETUP

For radiated tests: EUT has support equipment. The test software exercises the radio.

7. 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**	**ID Num**	**Cal Due**	**Last Cal**
Antenna, Active Loop 9kHz-30MHz	ETS-Lindgren	6502	T757	09/25/2019	09/25/2018
Antenna, Passive Loop 30Hz – 1MHz	Electro-Metrics	EM-6871	PRE0179465	05/22/2019	05/22/2018
Antenna, Passive Loop 100kHz – 30MHz	Electro_Metrics	EM-6872	PRE0179467	05/23/2019	05/23/2018
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179375	05/08/2019	05/08/2018
Temp Chamber	Thermotron Industries	SE-600-10-10	T80	05/01/2019	11/01/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/23/2020	01/23/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1450	01/24/2020	01/24/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/25/2020	01/25/2019
Amplifier, 9kHz to 1GHz, 32 dB	Sonoma Instrument	310	175953	12/13/2019	12/13/2018
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184052	10/24/2019	10/24/2018
AC Line Conducted					
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/14/2020	02/14/2019
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	06/15/2019	06/15/2018
Test Software List					
Radiated Software	UL	UL EMC		Ver 9.5, June 22, 2018	
Antenna Port Software	UL	UL RF		Ver 9.3.2, Jan. 07, 2019	
AC Line Conducted Software	UL	UL EMC		Ver 9.5, May 26, 2015	

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

8. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 10kHz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

Note: Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

RESULTS

99% and 20dB BW

Type A (CE Mode)

Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
424	13.56	21.623	24.91
212	13.56	22.374	24.93
106	13.56	24.700	24.80

TYPE B

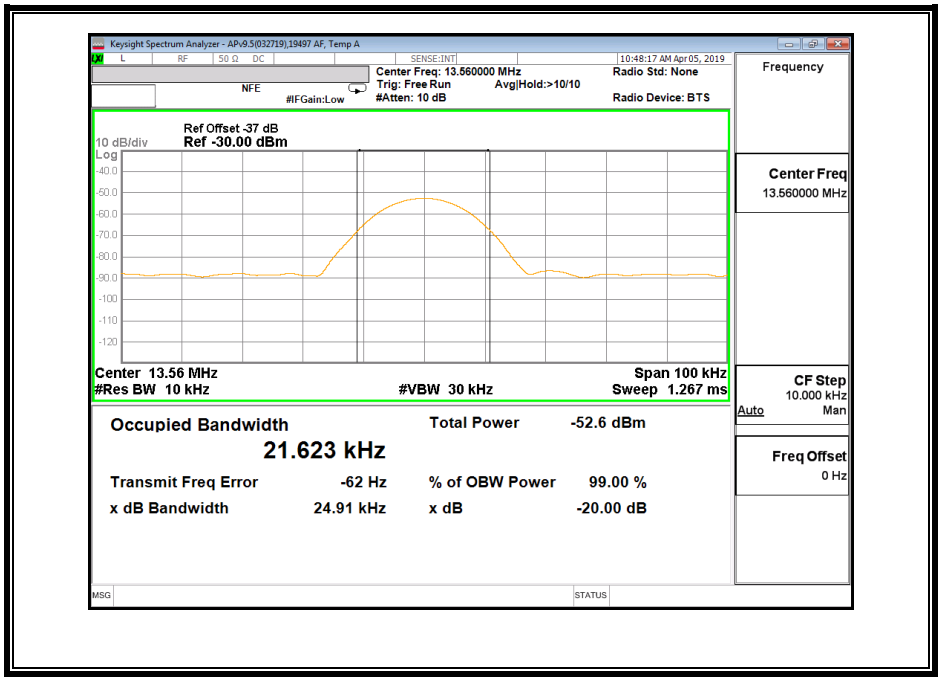
Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
424	13.56	21.588	24.87
212	13.56	22.284	24.97
106	13.56	25.030	25.22

TYPE F

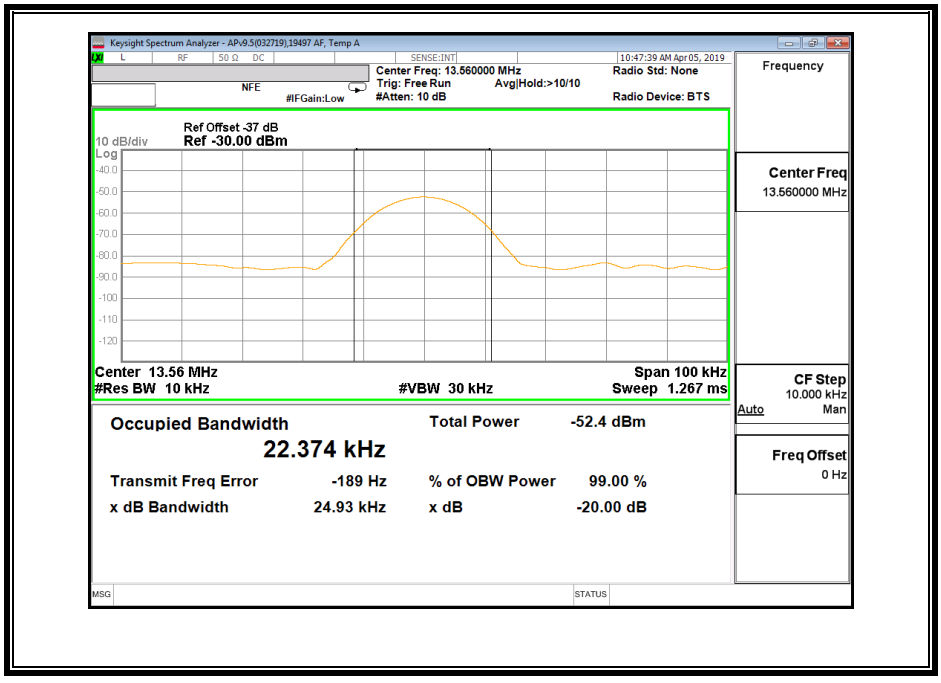
Mode Kbps	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
424	13.56	21.149	24.94
212	13.56	21.220	24.94

8.1. Type A

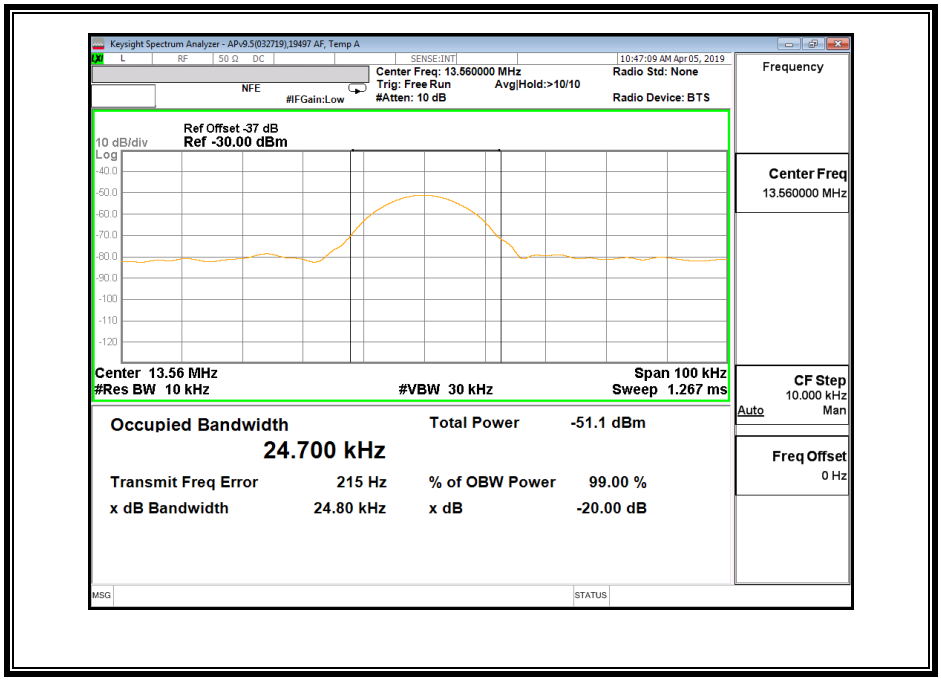
424Kbps



212Kbps

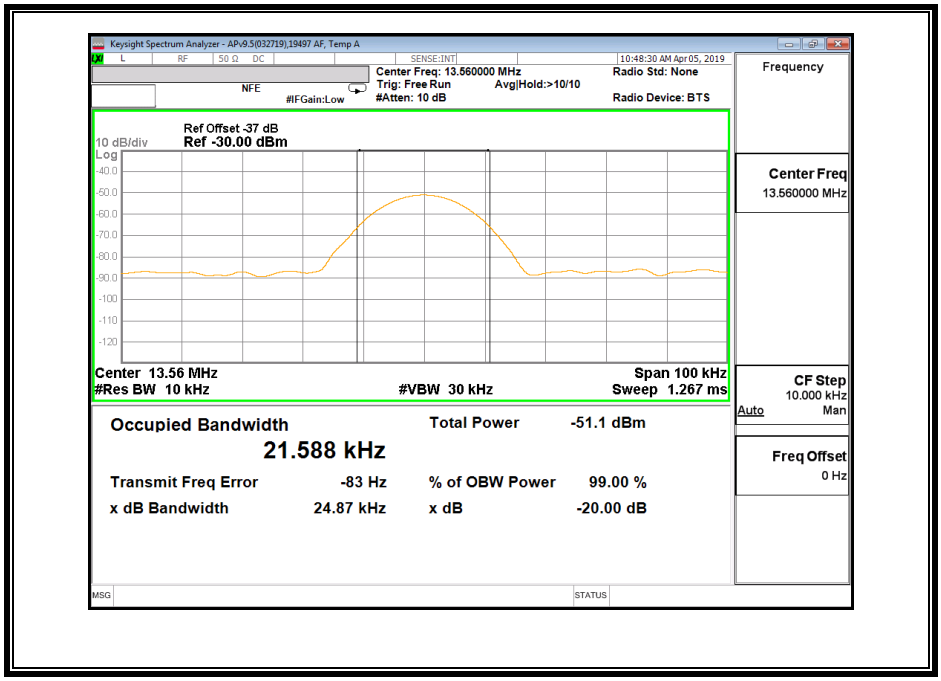


106Kbps

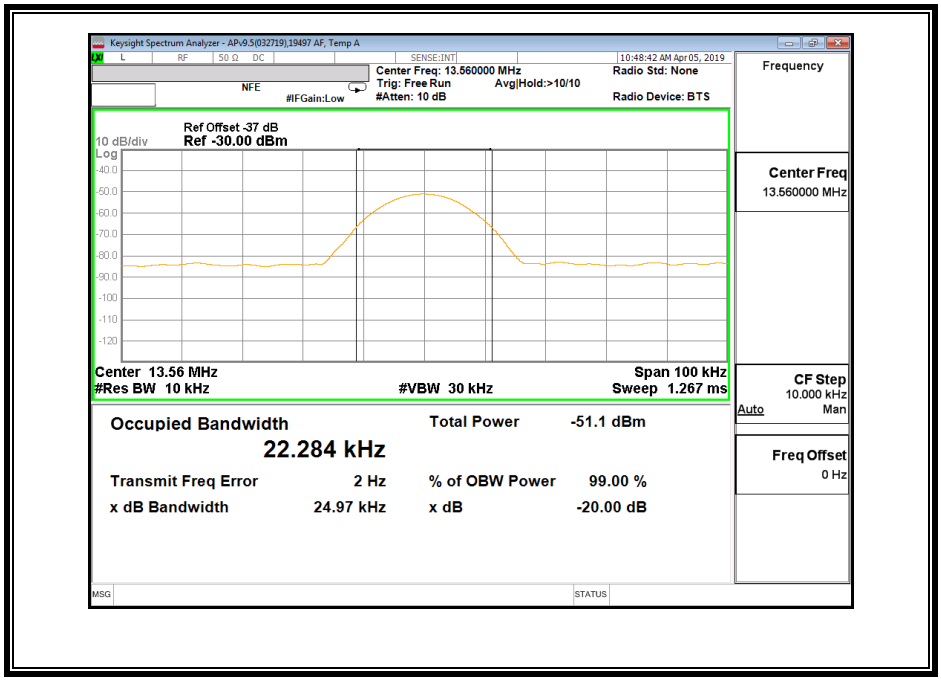


8.2. Type B

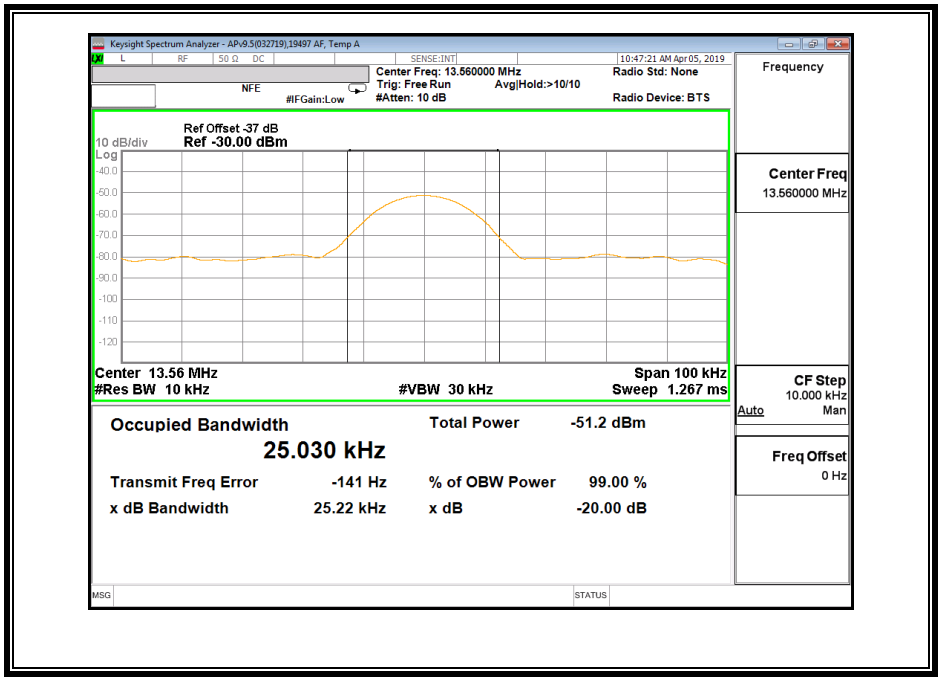
424Kbps



212Kbps

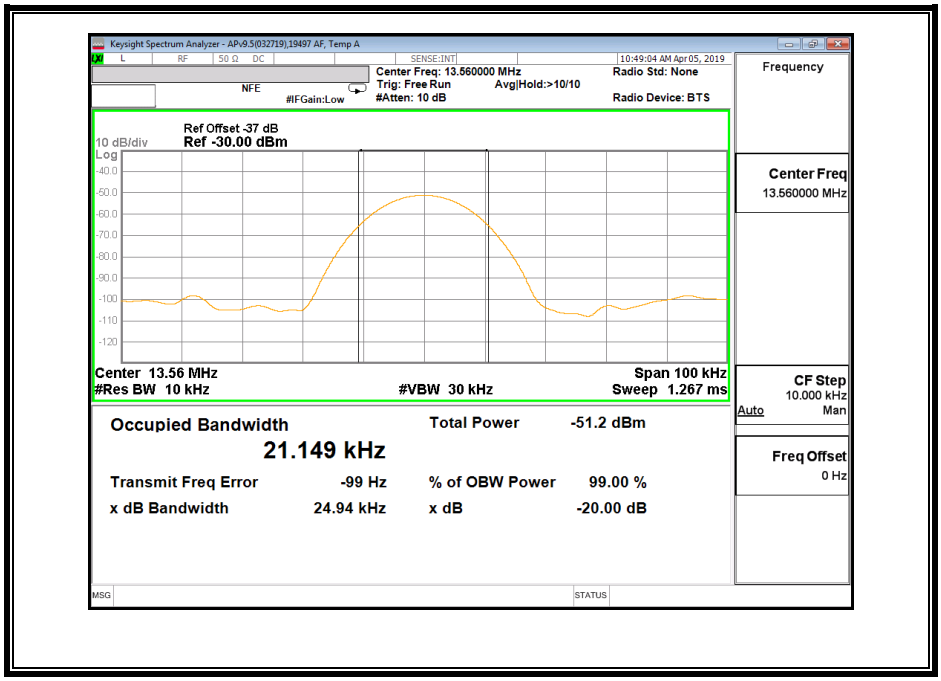


106Kbps

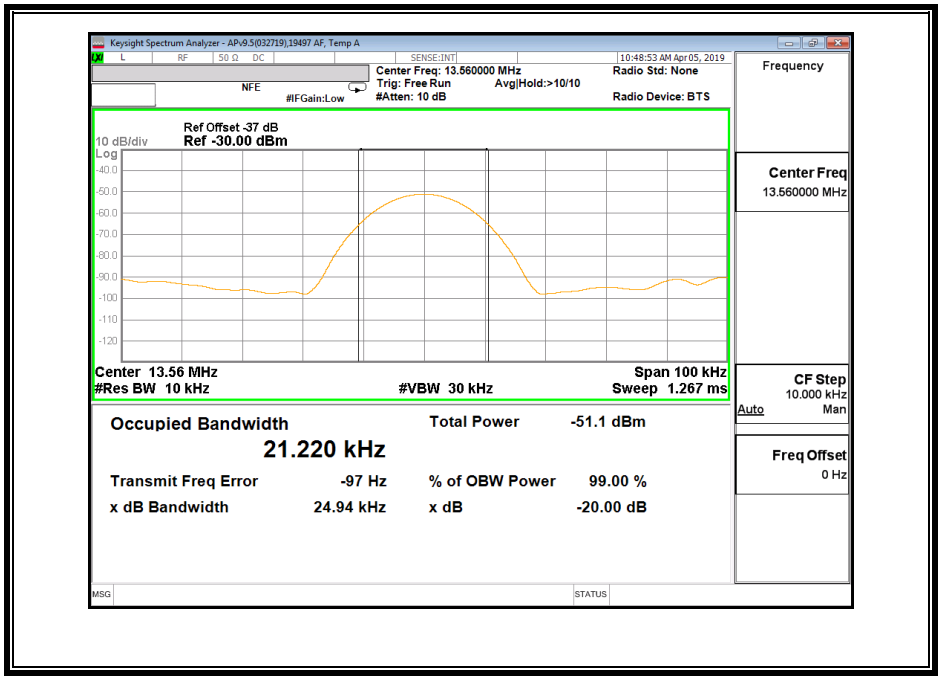


8.3. Type F

424Kbps



212Kbps



9. RADIATED EMISSION TEST RESULTS

9.1. 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; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

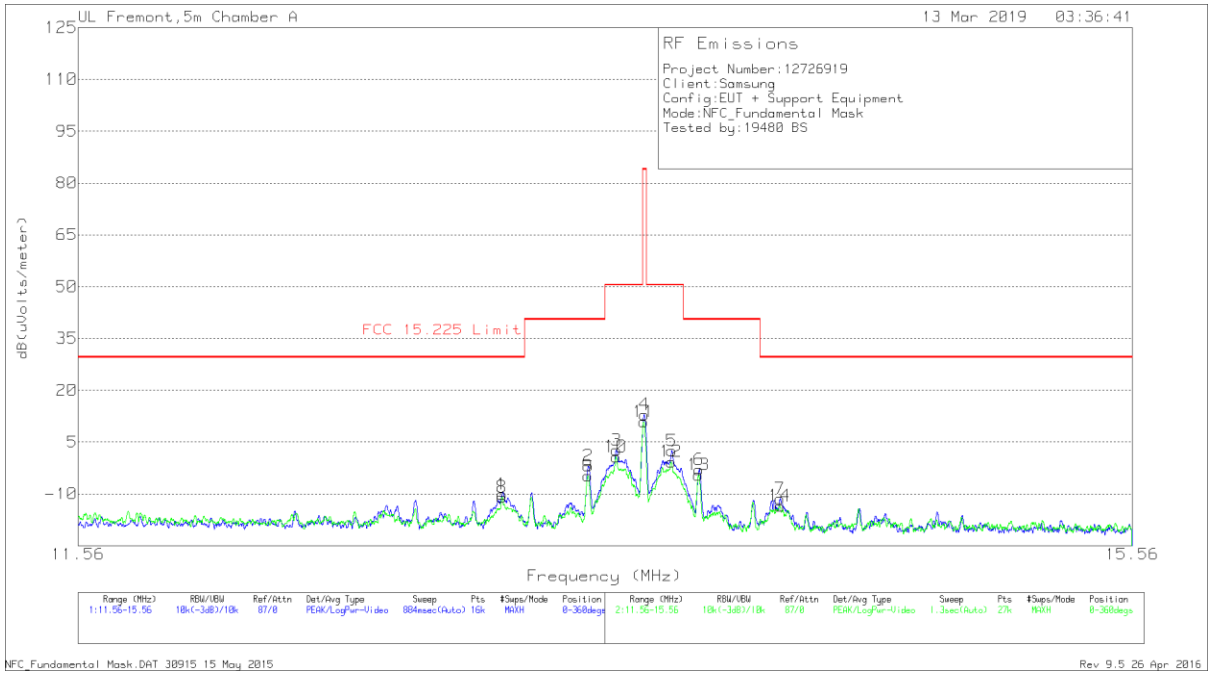
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

RESULTS

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 - 30 MHz)

TYPE A - 106Kbps (CE Mode)

FUNDAMENTAL EMISSION MASK - (11.56 – 15.56 MHz)



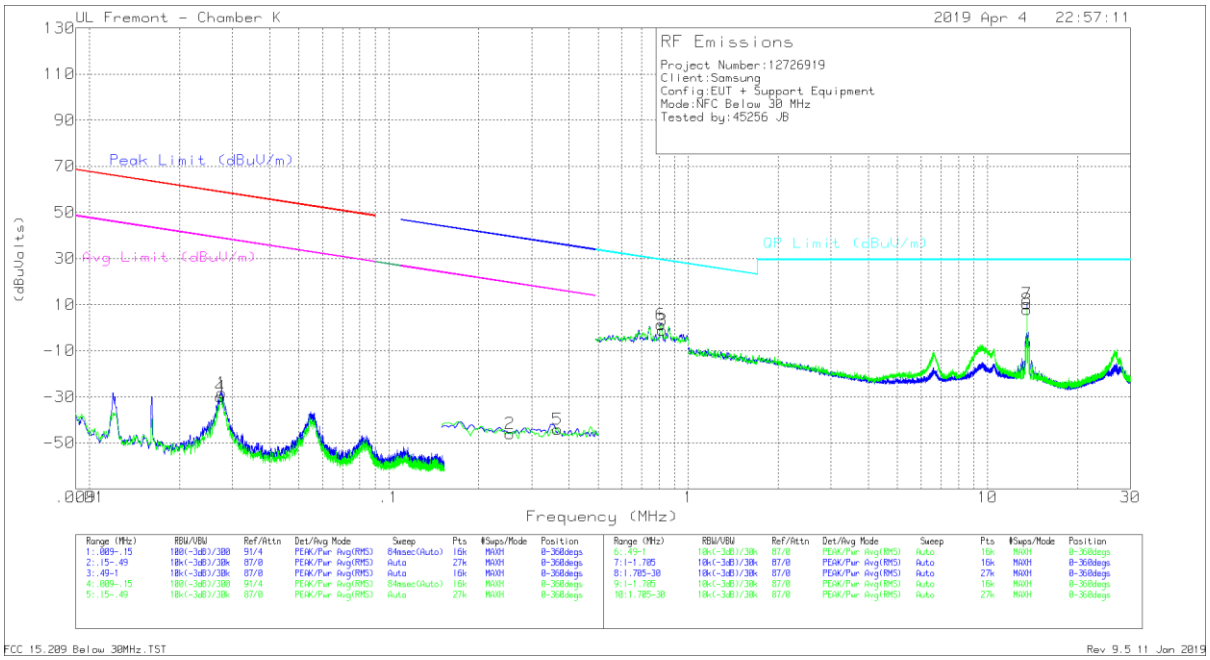
NOTE: All data rate Field Strength was investigated and Type A, 106k found to have the highest Field Strength results and represents as the worst case data rate.

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 30m	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)	Polarity
8	13.02705	17.83	Pk	10.7	.5	-40	-10.97	29.54	-40.51	0-360	Face-Off
1	13.0275	18.67	Pk	10.7	.5	-40	-10.13	29.54	-39.67	0-360	Face-On
9	13.34658	24	Pk	10.7	.5	-40	-4.8	40.51	-45.31	0-360	Face-Off
2	13.34725	26.93	Pk	10.7	.5	-40	-1.87	40.51	-42.38	0-360	Face-On
10	13.45211	29.54	Pk	10.7	.5	-40	.74	50.5	-49.76	0-360	Face-Off
3	13.45388	31.45	Pk	10.7	.5	-40	2.65	50.5	-47.85	0-360	Face-On
11	*13.55778	39.76	Pk	10.6	.5	-40	10.86	84	-73.14	0-360	Face-Off
4	*13.55963	41.88	Pk	10.6	.5	-40	12.98	84	-71.02	0-360	Face-On
12	13.6633	28.2	Pk	10.6	.5	-40	-.7	50.5	-51.2	0-360	Face-Off
5	13.6655	31.41	Pk	10.6	.5	-40	2.51	50.5	-47.99	0-360	Face-On
13	13.76912	24.39	Pk	10.6	.5	-40	-4.51	40.51	-45.02	0-360	Face-Off
6	13.77175	25.9	Pk	10.6	.5	-40	-3	40.51	-43.51	0-360	Face-On
14	14.08806	15.4	Pk	10.6	.5	-40	-13.5	29.54	-43.04	0-360	Face-Off
7	14.08963	17.51	Pk	10.6	.5	-40	-11.39	29.54	-40.93	0-360	Face-On

* - Indicates fundamental frequency
Pk - Peak detector

SPURIOUS EMISSIONS (0.09 – 30MHz)



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.0277	25.64	Pk	58.2	-32.2	-80	-28.36	58.73	-87.09	38.73	-67.09	-	-	-	-	0-360
2	.25399	9.89	Pk	56.3	-32.1	-80	-45.91	-	-	-	-	39.52	-85.43	19.52	-65.43	0-360
4	.02735	24.14	Pk	58.2	-32.2	-80	-29.86	58.85	-88.71	38.85	-68.71	-	-	-	-	0-360
5	.3662	11.89	Pk	56.2	-32.1	-80	-44.01	-	-	-	-	36.33	-80.34	16.33	-60.34	0-360

Pk - Peak detector

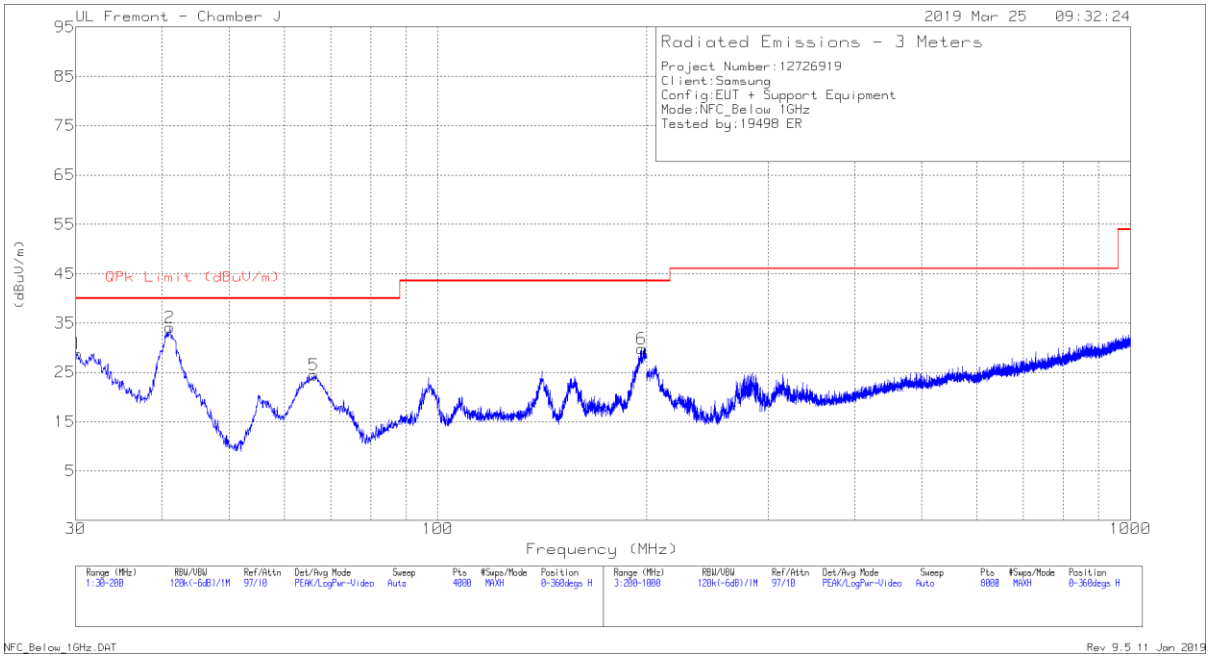
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.81902	14.59	Pk	56.3	-32.1	-40	-1.21	29.35	-30.56	0-360
6	.81146	17.22	Pk	56.3	-32.1	-40	1.42	29.43	-28.01	0-360
7	13.55998	47.73	Pk	34.3	-31.8	-40	10.23	29.5	-19.27	0-360
8	13.55998	45.44	Pk	34.3	-31.8	-40	7.94	29.5	-21.56	0-360

Pk - Peak detector

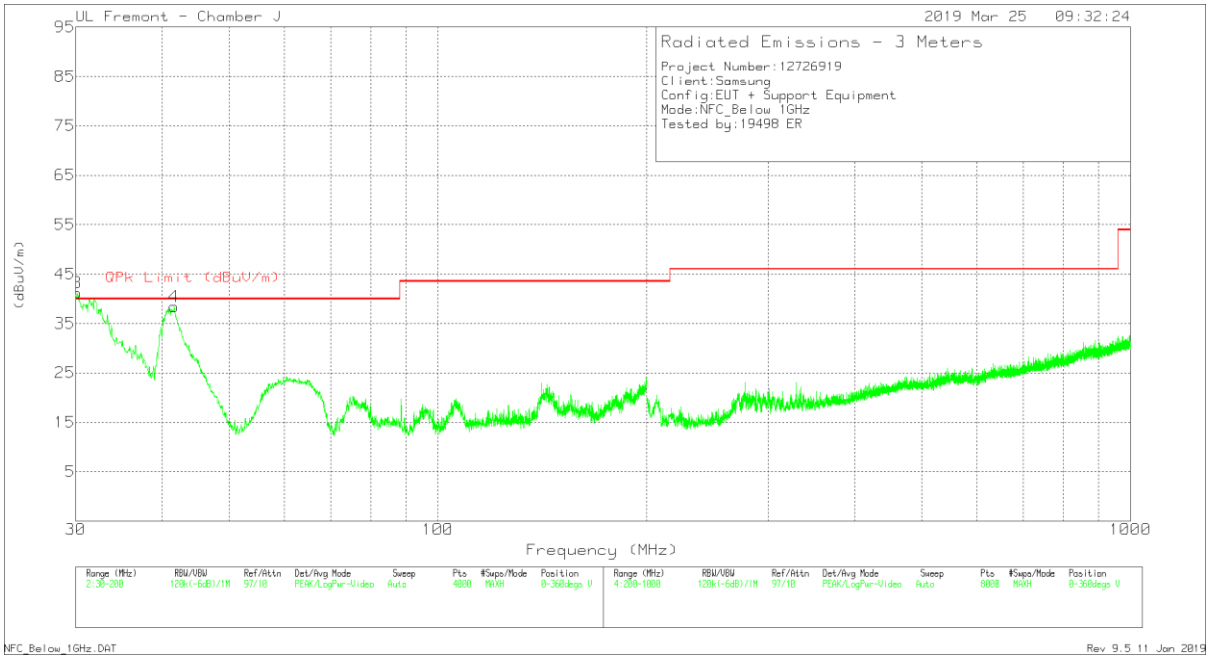
Note: Markers 7 and 8 are the 13.56MHz NFC Fundamental

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

TYPE A - 106Kbps (CE Mode)



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184052 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.17	34.11	Pk	26.3	-31.6	28.81	40	-11.19	0-360	399	H
2	40.9873	40.98	Pk	18.9	-31.5	28.38	40	-11.62	169	341	H
	41.0554	37.54	Qp	18.9	-31.5	24.94	40	-15.06	169	341	H
5	66.2619	41.89	Pk	13.8	-31.2	24.49	40	-15.51	0-360	299	H
6	196.6856	42.07	Pk	17.9	-30.2	29.77	43.52	-13.75	0-360	98	H
3	30.0564	46.69	Pk	26.4	-31.6	41.49	**40**	**1.49**	39	101	V
	30.0442	42.85	Qp	26.4	-31.6	37.65	40	-2.35	39	101	V
4	41.687	45.47	Pk	18.4	-31.4	32.47	40	-7.53	61	105	V
	41.7441	42.12	Qp	18.3	-31.4	29.02	40	-10.98	61	105	V

* - indicates frequency in CFR47 Pt 15 Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

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 C63.10-2013 Clause 6.8

RESULTS

ID:	19497 AF	Date:	4/4/2019

No non-compliance noted.

TYPE A - 106Kbps (CE Mode)

106Kbps

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(Vdc)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5597026	4.084	13.5597061	3.819	13.5597320	1.912	13.5597414	1.216	± 100
3.80	40	13.5596992	4.330	13.5596995	4.311	13.5597009	4.208	13.5597025	4.088	± 100
3.80	30	13.5597558	0.161	13.5597582	-0.019	13.5597145	3.200	13.5597004	4.240	± 100
3.80	***20***	***13.5597579***	***0.000***	***13.5597578***	***0.010***	***13.5597575***	***0.029***	***13.5597566***	***0.095***	***± 100***
3.80	10	13.5597418	1.193	13.5597636	-0.416	13.5597876	-2.192	13.5598056	-3.519	± 100
3.80	0	13.5598064	-3.575	13.5598163	-4.302	13.5598230	-4.798	13.5598239	-4.863	± 100
3.80	-10	13.5598239	-4.862	13.5598222	-4.737	13.5598205	-4.612	13.5598168	-4.341	± 100
3.23	20	13.5597567	0.089	13.5597567	0.092	13.5597565	0.103	13.5597562	0.126	± 100
4.37	20	13.5597563	0.122	13.5597562	0.126	13.5597562	0.131	13.5597558	0.155	± 100

11. 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

ANSI C63.10:2013

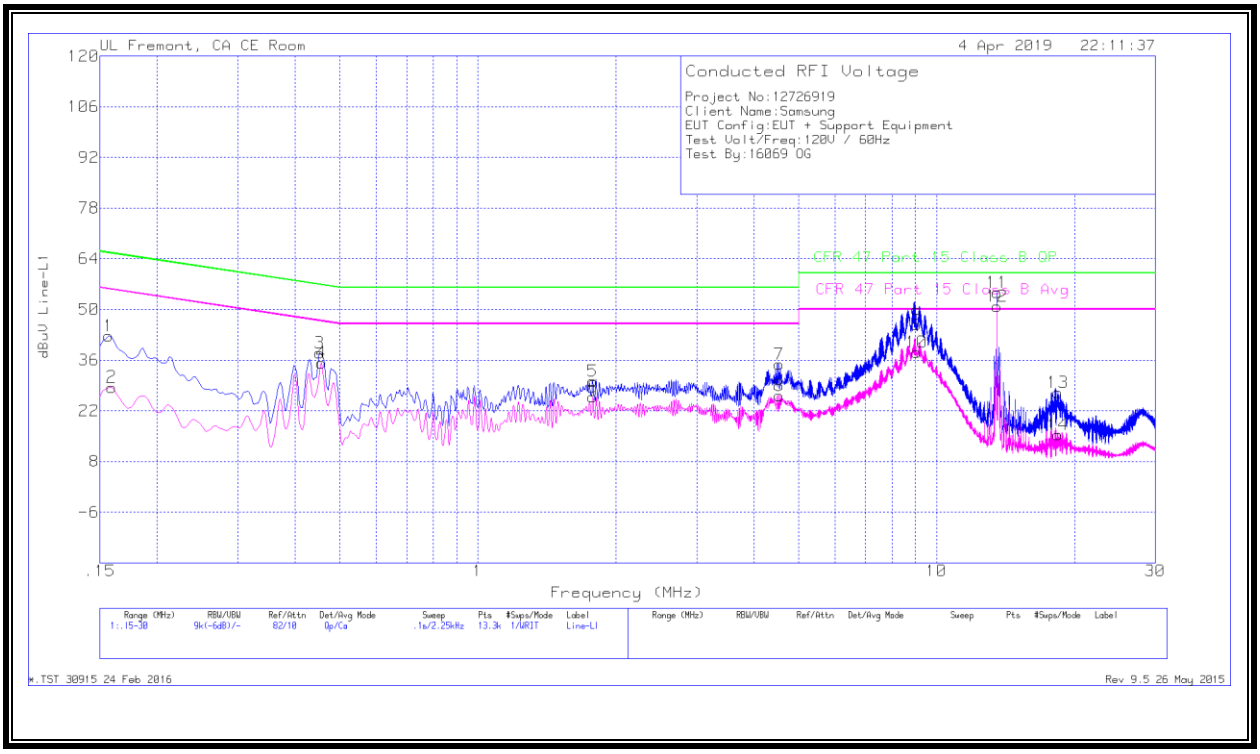
RESULTS

No non-compliance noted:

TYPE A - 106Kbps (CE Mode)

11.1.1. NORMAL OPERATION with ANTENNA

LINE 1 RESULTS

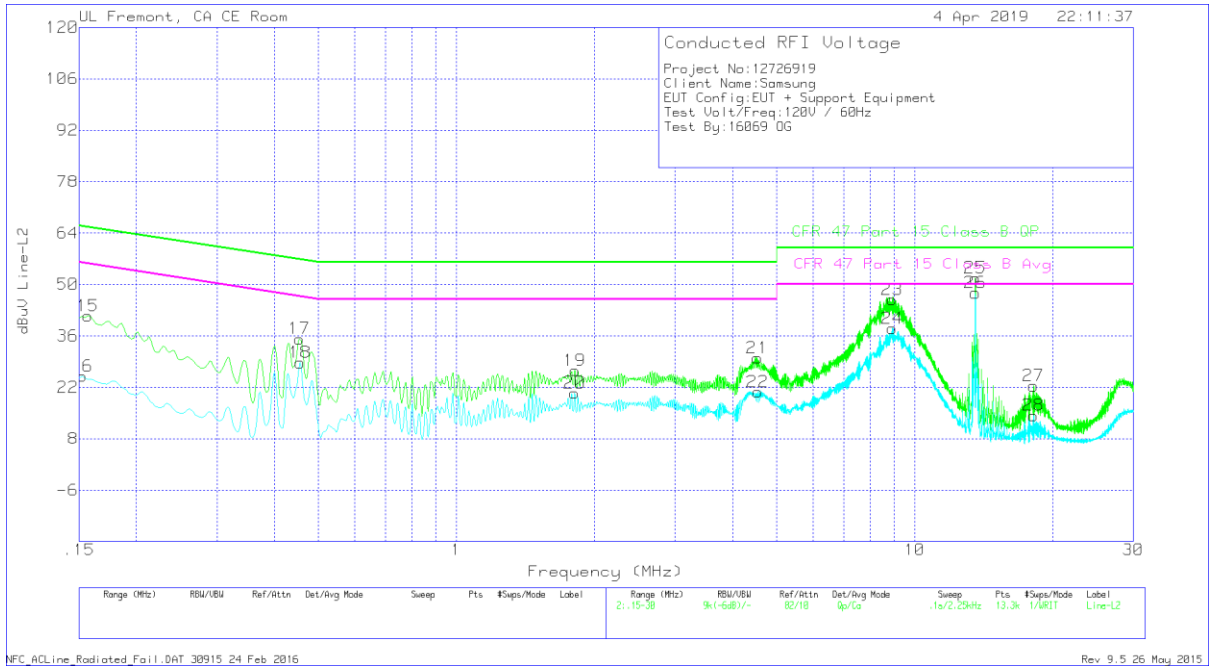


Worst Emission

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15675	32.53	Qp	.1	0	10.1	42.73	65.63	-22.9	-	-
2	.159	18.33	Ca	.1	0	10.1	28.53	-	-	55.52	-26.99
3	.4515	27.87	Qp	0	0	10.1	37.97	56.85	-18.88	-	-
4	.456	25.15	Ca	0	0	10.1	35.25	-	-	46.77	-11.52
5	1.78125	19.98	Qp	0	.1	10.1	30.18	56	-25.82	-	-
6	1.78125	15.56	Ca	0	.1	10.1	25.76	-	-	46	-20.24
7	4.5375	24.69	Qp	0	.1	10.1	34.89	56	-21.11	-	-
8	4.5375	15.95	Ca	0	.1	10.1	26.15	-	-	46	-19.85
9	9.05775	35.36	Qp	0	.2	10.2	45.76	60	-14.24	-	-
10	9.0465	27.8	Ca	0	.2	10.2	38.2	-	-	50	-11.8
11	13.56	44.15	Qp	.1	.2	10.2	54.65	60	-5.35	-	-
12	13.56	40.37	Ca	.1	.2	10.2	50.87	-	-	**50**	**.87**
13	18.40875	16.37	Qp	.1	.3	10.3	27.07	60	-32.93	-	-
14	18.40875	4.72	Ca	.1	.3	10.3	15.42	-	-	50	-34.58

Qp - Quasi-Peak detector
Ca - CISPR average detection
Note: Markers 11 and 12 are the 13.56MHz NFC Fundamental

LINE 2 RESULTS



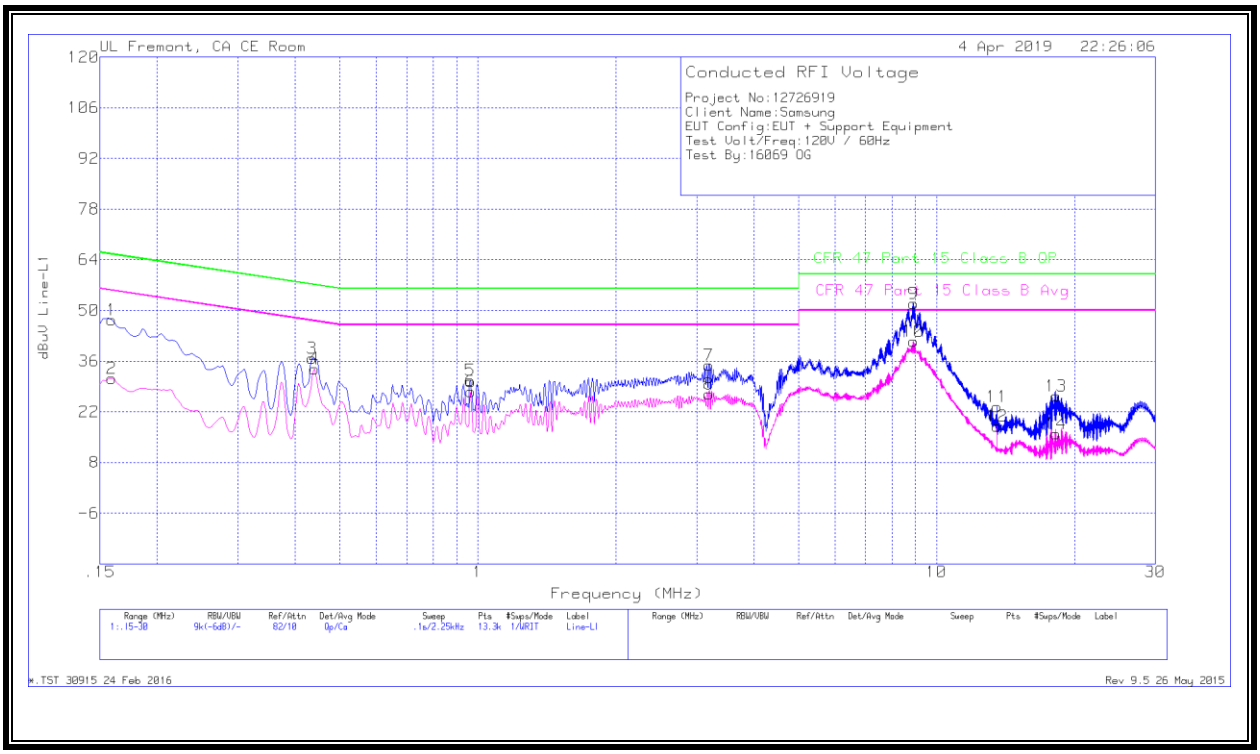
Worst Emission

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
15	.15675	31.27	Qp	.1	0	10.1	41.47	65.63	-24.16	-	-
16	.15225	14.82	Ca	.1	0	10.1	25.02	-	-	55.88	-30.86
17	.45375	25.11	Qp	0	0	10.1	35.21	56.81	-21.6	-	-
18	.456	18.63	Ca	0	0	10.1	28.73	-	-	46.77	-18.04
19	1.81275	16.36	Qp	0	.1	10.1	26.56	56	-29.44	-	-
20	1.8105	10.26	Ca	0	.1	10.1	20.46	-	-	46	-25.54
21	4.5375	19.76	Qp	0	.1	10.1	29.96	56	-26.04	-	-
22	4.542	10.52	Ca	0	.1	10.1	20.72	-	-	46	-25.28
23	8.93288	35.47	Qp	0	.2	10.2	45.87	60	-14.13	-	-
24	8.934	27.6	Ca	0	.2	10.2	38	-	-	50	-12
25	13.56	41.28	Qp	.1	.2	10.2	51.78	60	-8.22	-	-
26	13.56	37.21	Ca	.1	.2	10.2	47.71	-	-	50	-2.29
27	18.168	11.7	Qp	.1	.3	10.3	22.4	60	-37.6	-	-
28	18.17025	3.65	Ca	.1	.3	10.3	14.35	-	-	50	-35.65

Qp - Quasi-Peak detector
Ca - CISPR average detection
Note: Markers 25 and 26 are the 13.56MHz NFC Fundamental

11.1.2. NORMAL OPERATION with ANTENNA TERMINATED

LINE 1 RESULTS

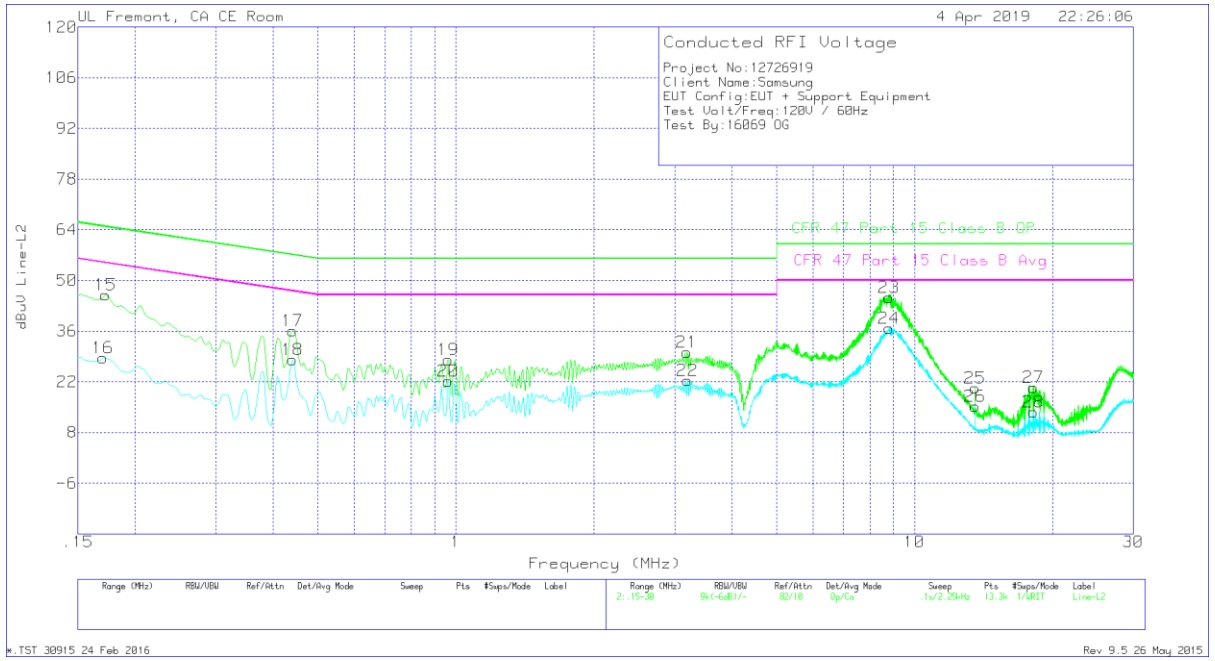


Worst Emission

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.159	37.12	Qp	.1	0	10.1	47.32	65.52	-18.2	-	-
2	.159	21.08	Ca	.1	0	10.1	31.28	-	-	55.52	-24.24
3	.43575	26.72	Qp	0	0	10.1	36.82	57.14	-20.32	-	-
4	.44025	23.82	Ca	0	0	10.1	33.92	-	-	47.06	-13.14
5	.96225	20.44	Qp	0	.1	10.1	30.64	56	-25.36	-	-
6	.9645	17.36	Ca	0	.1	10.1	27.56	-	-	46	-18.44
7	3.18975	24.64	Qp	0	.1	10.1	34.84	56	-21.16	-	-
8	3.18975	16.69	Ca	0	.1	10.1	26.89	-	-	46	-19.11
9	8.9205	41.45	Qp	0	.2	10.2	51.85	60	-8.15	-	-
10	8.9205	31.01	Ca	0	.2	10.2	41.41	-	-	50	-8.59
11	13.56	12.97	Qp	.1	.2	10.2	23.47	60	-36.53	-	-
12	13.56	7.5	Ca	.1	.2	10.2	18	-	-	50	-32
13	18.21638	15.61	Qp	.1	.3	10.3	26.31	60	-33.69	-	-
14	18.2175	5.16	Ca	.1	.3	10.3	15.86	-	-	50	-34.14

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Worst Emission

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
15	.1725	35.94	Qp	0	0	10.1	46.04	64.84	-18.8	-	-
16	.17025	18.45	Ca	0	0	10.1	28.55	-	-	54.95	-26.4
17	.44025	25.92	Qp	0	0	10.1	36.02	57.06	-21.04	-	-
18	.44025	17.97	Ca	0	0	10.1	28.07	-	-	47.06	-18.99
19	.96225	17.92	Qp	0	.1	10.1	28.12	56	-27.88	-	-
20	.96225	12.03	Ca	0	.1	10.1	22.23	-	-	46	-23.77
21	3.192	19.98	Qp	0	.1	10.1	30.18	56	-25.82	-	-
22	3.1965	12.14	Ca	0	.1	10.1	22.34	-	-	46	-23.66
23	8.81025	34.97	Qp	0	.2	10.2	45.37	60	-14.63	-	-
24	8.81025	26.37	Ca	0	.2	10.2	36.77	-	-	50	-13.23
25	13.56	9.84	Qp	.1	.2	10.2	20.34	60	-39.66	-	-
26	13.56	4.7	Ca	.1	.2	10.2	15.2	-	-	50	-34.8
27	18.1545	9.72	Qp	.1	.3	10.3	20.42	60	-39.58	-	-
28	18.1545	2.97	Ca	.1	.3	10.3	13.67	-	-	50	-36.33

Qp - Quasi-Peak detector
Ca - CISPR average detection