



**FCC CFR47 PART 15 SUBPART C**

**NFC**

**CERTIFICATION TEST REPORT**

**FOR**

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

**MODEL NUMBER : SM-G390Y**

**FCC ID: A3LSMG390Y**

**REPORT NUMBER: 4787873630-E5V2**

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V1	03/20/17	Initial issue	Junwhan Lee
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# 1. ATTESTATION OF TEST RESULTS

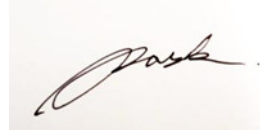
**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n and NFC  
**MODEL NUMBER:** SM-G390F  
**SERIAL NUMBER:** R38HC0238JF (RADIATED, CONDUCTED, Original model);  
R38J10TN4JF(RADIATED, A3LSMG390Y)  
**DATE TESTED:** JAN 23, 2017 - FEB 27, 2017 (Original Test)  
FEB 28, 2017 – MAR 07, 2017 (A3LSMG390Y)

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  
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Tested By:



Junwhan Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

### 1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMG390F, DXX 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: A3LSMG390Y shares the same enclosure and circuit board as FCC ID: A3LSMTG390F. The NFC circuitry and layout are identical between these two units. The NFC antennas and surrounding circuitry are the same between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMG390F remains representative of FCC ID: A3LSMG390Y. The test data of FCC ID: A3LSMG390F being submitted for this application to cover NFC features.

Due to difference of charger, radiated emission from 30MHz to 1GHz and AC line conducted test were performed newly.

### 1.3. SPOT CHECK VERIFICATION DATA

Mode	Test Item	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
				SM-G390F Results	SM-G390Y Results		
				FCC ID : A3LSMG390F	FCC ID : A3LSMG390Y		
NFC	Fundamental	13.56 MHz	84 dBuV/m	12.15 dBuV/m	9.81 dBuV/m	-2.34 dBc	Loop antenna Face on
	Emission	13.57 MHz	50.48 dBuV/m	1.14 dBuV/m	-1.59 dBuV/m	-2.73 dBc	Loop antenna Face on

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

### 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 Title / Section
DTS	A3LSMG390F	Grant	4787833362-E2V1	Test	FCC Report BLE All sections (Except Section 10.3, 11)
DSS	A3LSMG390F	Grant	4787833362-E3V1	Test	FCC Report BT / All sections (Except Section 10.3, 11)
			4787833362-S1V2	RF Exposure	FCC Report SAR / Section 9.6, 10.8
DXX	A3LSMG390F	Grant	4787833362-E5V2	Test	FCC Report NFC / All sections (Except Section 8.1.2, 9)
PCE	A3LSMG390F	Grant	4787833362-E6V1	Test	FCC Report WWAN / All sections
			4787833362-S1V2	RF Exposure	FCC Report SAR / Section for GSM 850 (9.1, 10.1), GSM 1900 (9.1, 10.2), WCDMA B2 (9.2, 10.3), WCDMA B5 (9.2, 10.4), LTE B2 (9.3, 10.5),

## 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.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input type="checkbox"/>	Chamber 2

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

### 4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB

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

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

### 5.2. MAXIMUM OUTPUT POWER

The testing was performed at 1 meter. The transmitter maximum E-field at 30m distance is 12.15 dBuV/m which convert from 1 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).

### 5.4. MODIFICATIONS

No modifications were made during testing.

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA50HWE	DK4H630HS/A -E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	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	0.8m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.0m	N/A

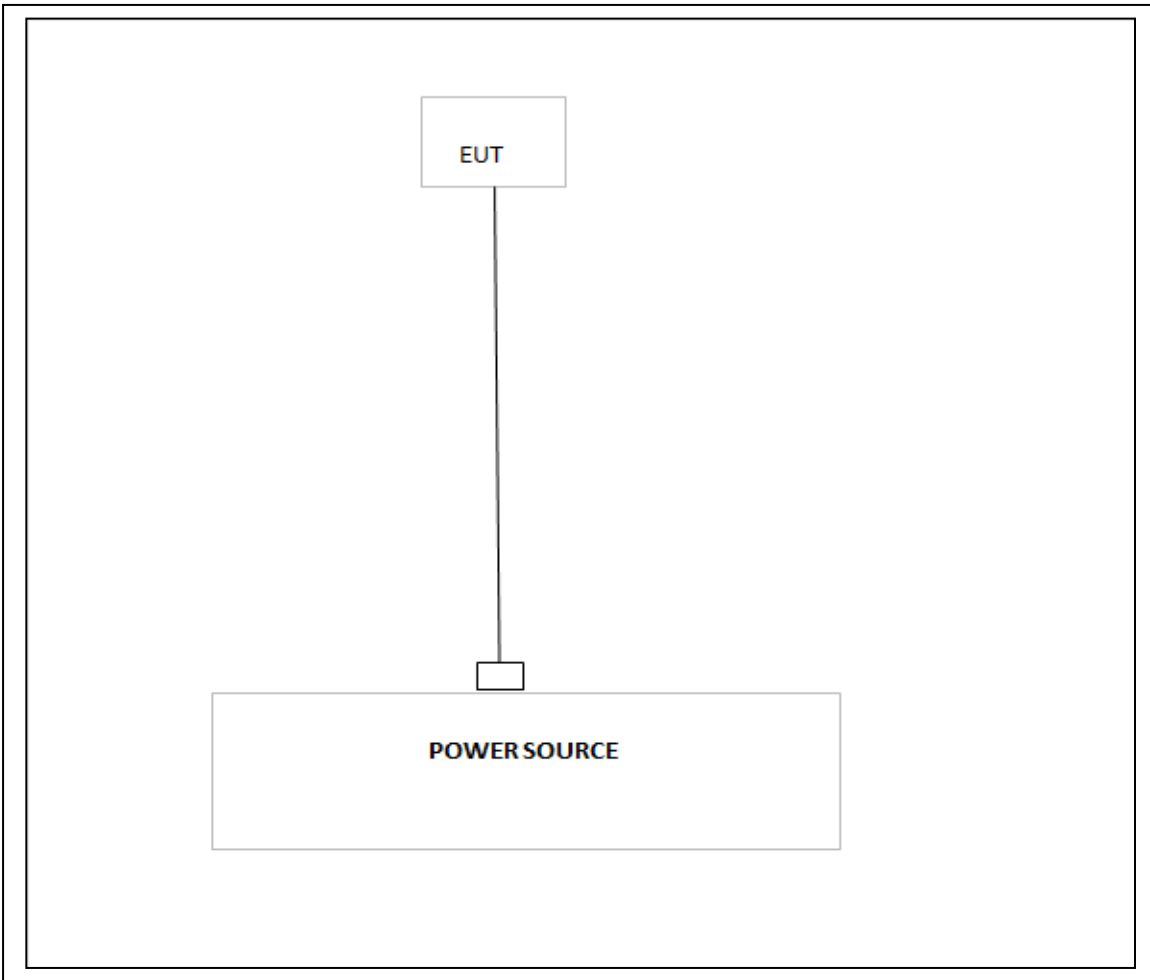
### TEST SETUP

The EUT is a stand-alone device configured and tested in a worst-case setup.

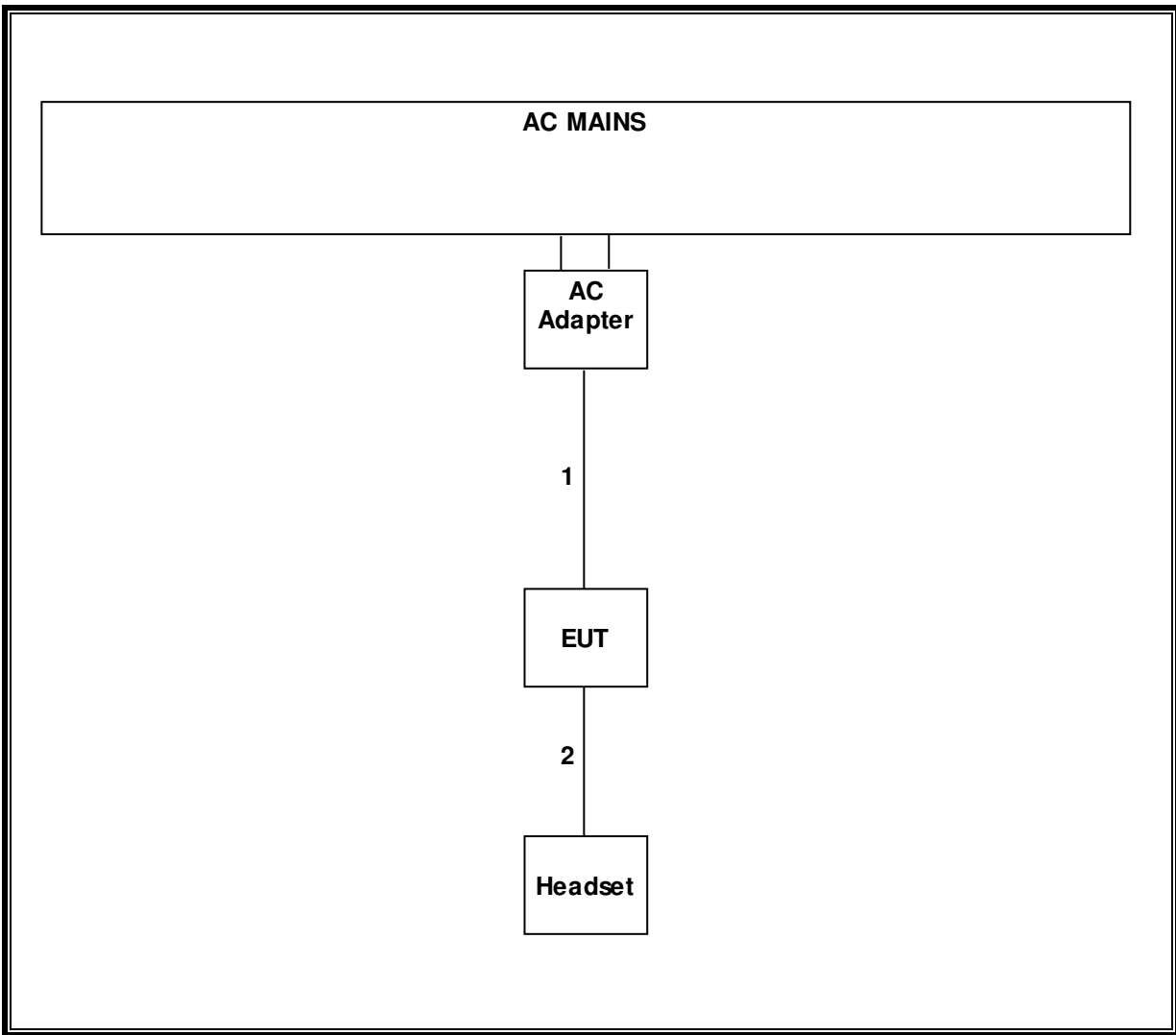
Note: Worst case is using worst case orientation with AC charger and headset attached to the EUT with NFC signal continuously transmitting.

**SETUP DIAGRAM FOR TESTS**

**Radiated Emissions Below 30 MHz:**



**Radiated Emissions Above 30 MHz, AC Line Conducted Emissions:**



## 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	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	251741	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-16-17
Temperature Chamber	ESPEC	SH-642	93001109	08-17-17
LISN	R&S	ENV216	101836	08-16-17
LISN	R&S	ENV216	101837	08-16-17
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

## 7. 20dB BANDWIDTH

### LIMITS

§15.215

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated

§15.225

Operation within the band 13.110 – 14.010MHz

### TEST PROCEDURE

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

### RESULTS

Frequency [MHz]	20dB Bandwidth [KHz]
13.56	430.6

Note : The measured point from marker 2 to marker 3 is within the frequency operation band 13.110MHz ~ 14.011MHz

### 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)

FCC Part 15, Subpart B & C													1 Meter Distance Measurement At Chamber 1	
Company: Samsung														
Project #: 4787833362														
Model #: SM-G390F														
Tester: Chan Park														
Date: 2017/01/23														
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF (dB/m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes		
<b>Loop Antenna Face on: Z position worst</b>														
13.56	52.2		N/A	19.03	-59.08	12.15	N/A	84.00	N/A	-71.9	N/A	Fundamental @ 1m Dist		
13.55	39.57		N/A	19.032	-59.08	-0.48	N/A	50.48	N/A	-51.0	N/A	13.41MHz-13.553MHz		
13.57	41.2		N/A	19.029	-59.08	1.14	N/A	50.48	N/A	-49.3	N/A	13.567MHz-13.71MHz		
13.38	34.83		N/A	19.059	-59.08	-5.20	N/A	40.51	N/A	-45.7	N/A	13.110-13.410MHz		
13.77	32.50		N/A	18.996	-59.08	-7.59	N/A	40.51	N/A	-48.1	N/A	13.71-14.01MHz		
12.72	29.56		N/A	19.165	-59.08	-10.36	N/A	29.54	N/A	-39.9	N/A	9k-13.11MHz		
14.30	24.36		N/A	18.912	-59.08	-15.81	N/A	29.54	N/A	-45.4	N/A	14.01MHz-30MHz		
<b>Loop Antenna Face off: Z position worst</b>														
13.56	41.03		N/A	19.03	-59.08	0.98	N/A	84.00	N/A	-83.0	N/A	Fundamental @ 1m Dist		
13.55	28.52		N/A	19.032	-59.08	-11.53	N/A	50.48	N/A	-62.0	N/A	13.41MHz-13.553MHz		
13.57	29.85		N/A	19.029	-59.08	-10.21	N/A	50.48	N/A	-60.7	N/A	13.567MHz-13.71MHz		
13.35	23.22		N/A	19.064	-59.08	-16.80	N/A	40.51	N/A	-57.3	N/A	13.110-13.410MHz		
13.77	20.99		N/A	18.997	-59.08	-19.10	N/A	40.51	N/A	-59.6	N/A	13.71-14.01MHz		
5.59	23.38		N/A	19.777	-59.08	-15.93	N/A	29.54	N/A	-45.5	N/A	9k-13.11MHz		
15.70	14.43		N/A	18.814	-59.08	-25.84	N/A	29.54	N/A	-55.4	N/A	14.01MHz-30MHz		

\* No more emissions were found up to 30MHz

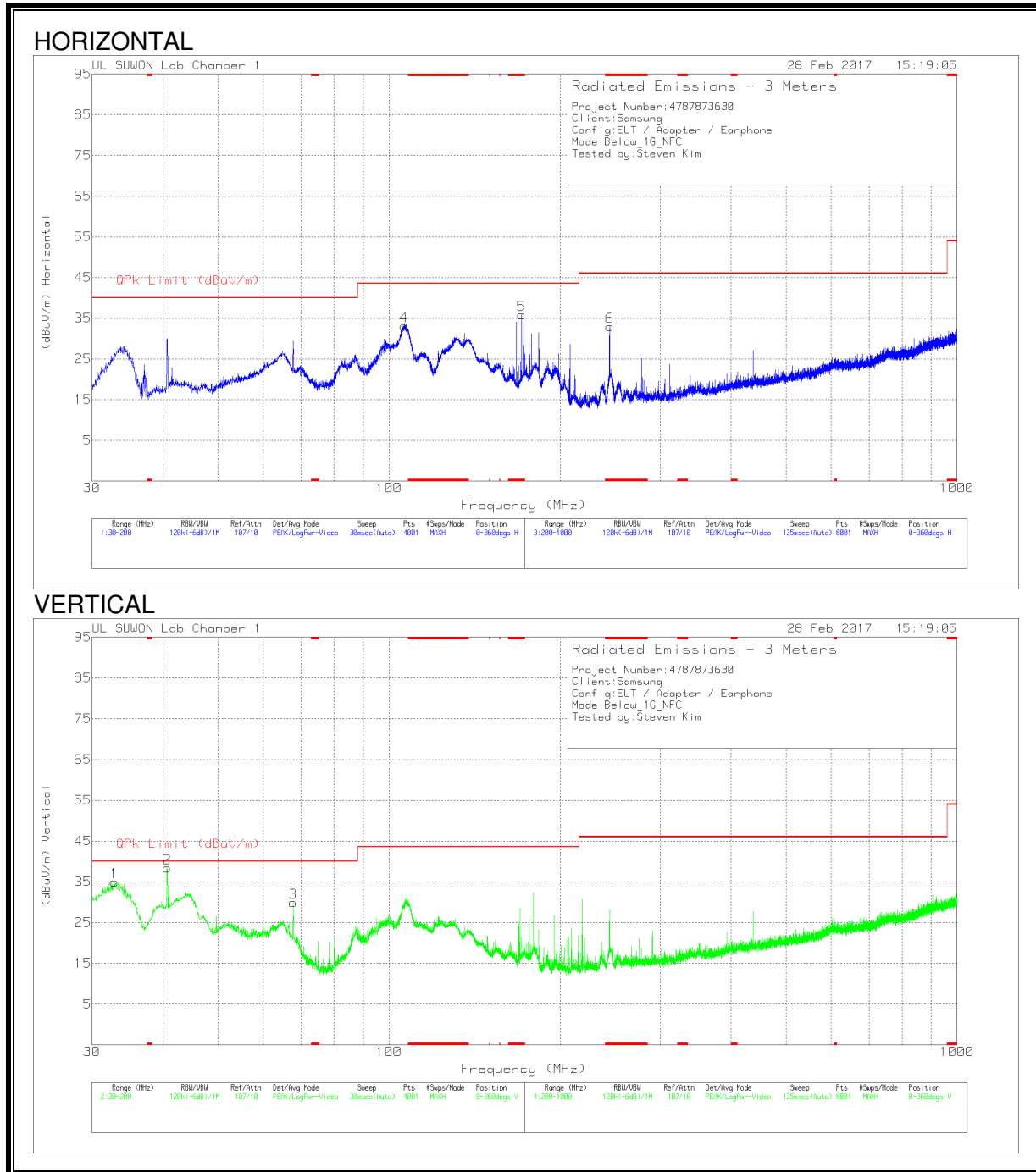
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak  
 Q.P. = Quasi Peak Readings  
 A.F. = Antenna factor

Rev. 10.23.09

Note : Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area 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 937606.

### 8.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750(dB)	30-1000MHz(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	106.245	48.62	Pk	11.6	-27.1	33.12	43.52	-10.4	0-360	300	H
5	* 171.1	53.74	Pk	8.9	-26.8	35.84	43.52	-7.68	0-360	100	H
1	32.8475	52.82	Pk	10.5	-28.3	35.02	40	-4.98	0-360	100	V
2	40.6675	53.74	Pk	12.6	-28	38.34	40	-1.66	0-360	100	V
3	67.7825	47.22	Pk	10.3	-27.6	29.92	40	-10.08	0-360	100	V
6	* 244.5	47.31	Pk	12.2	-26.6	32.91	46.02	-13.11	0-360	100	H

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750(dB)	30-1000MHz(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
32.6185	48.15	Qp	10.5	-28.3	30.35	40	-9.65	294	100	V
40.6805	52.14	Qp	12.6	-28	36.74	40	-3.26	227	100	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Qp - Quasi-Peak detector

## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Notes:  
 1. The lower limit shall apply at the transition frequencies  
 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

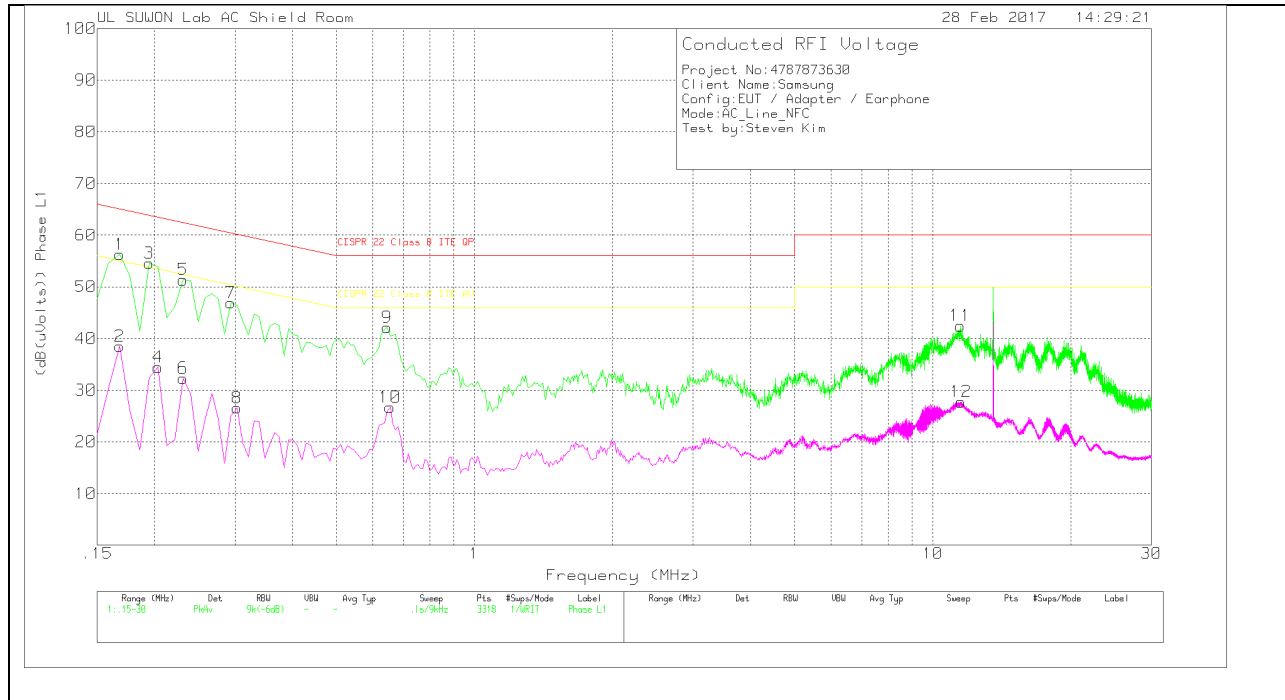
Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

No non-compliance noted:

**WORST EMISSIONS**

**LINE 1 PLOT**



**LINE 1 RESULTS**

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_wit h ex-cord_L1	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.168	46.15	Pk	10	.1	56.25	65.06	-8.81	-	-
2	.168	28.39	Av	10	.1	38.49	-	-	55.06	-16.57
3	.195	44.47	Pk	9.9	.2	54.57	63.82	-9.25	-	-
4	.204	24.34	Av	9.9	.2	34.44	-	-	53.45	-19.01
5	.231	41.47	Pk	9.7	.2	51.37	62.41	-11.04	-	-
6	.231	22.43	Av	9.7	.2	32.33	-	-	52.41	-20.08
7	.294	37.01	Pk	9.7	.2	46.91	60.41	-13.5	-	-
8	.303	16.69	Av	9.7	.2	26.59	-	-	50.16	-23.57
9	.645	32.06	Pk	9.9	.2	42.16	56	-13.84	-	-
10	.654	16.61	Av	9.9	.2	26.71	-	-	46	-19.29
11	11.481	32.17	Pk	10	.3	42.47	60	-17.53	-	-
12	11.526	17.44	Av	10	.3	27.74	-	-	50	-22.26

Pk - Peak detector

Av - Average detection

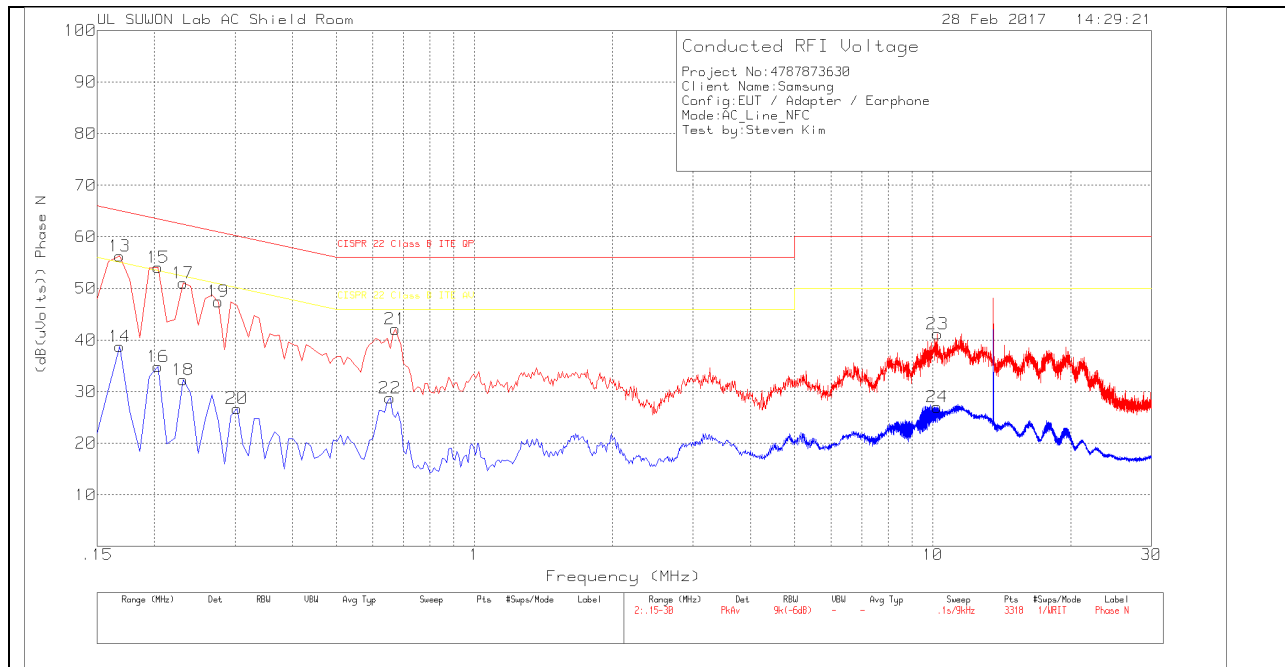
Quasi-Peak Emissions

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_wit h ex-cord_L1	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1698	44.36	Qp	10	.1	54.46	64.97	-10.51	-	-
.1995	42.06	Qp	9.9	.2	52.16	63.63	-11.47	-	-

Qp - Quasi-Peak detector

**LINE 2 PLOT**



**LINE 2 RESULTS**

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_N	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.168	46.19	Pk	10	.1	56.29	65.06	-8.77	-	-
14	.168	28.62	Av	10	.1	38.72	-	-	55.06	-16.34
15	.204	43.98	Pk	9.9	.2	54.08	63.45	-9.37	-	-
16	.204	24.75	Av	9.9	.2	34.85	-	-	53.45	-18.6
17	.231	41.15	Pk	9.7	.2	51.05	62.41	-11.36	-	-
18	.231	22.39	Av	9.7	.2	32.29	-	-	52.41	-20.12
19	.276	37.56	Pk	9.7	.2	47.46	60.94	-13.48	-	-
20	.303	16.83	Av	9.7	.2	26.73	-	-	50.16	-23.43
21	.672	32.02	Pk	9.9	.2	42.12	56	-13.88	-	-
22	.654	18.65	Av	9.9	.2	28.75	-	-	46	-17.25
23	10.239	30.68	Pk	10.1	.4	41.18	60	-18.82	-	-
24	10.23	16.53	Av	10.1	.4	27.03	-	-	50	-22.97

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_wit h ex-cord_N	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.1698	44.31	Qp	10	.1	54.41	64.97	-10.56	-	-
.1995	42.03	Qp	9.9	.2	52.13	63.63	-11.5	-	-

Qp - Quasi-Peak detector

## 10. FREQUENCY STABILITY

### LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### TEST PROCEDURE

ANSI C63.10 §6.8

### RESULTS

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: $\pm 100$ 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	50	13.560348631	-0.167	13.560348679	-0.170	13.560348585	-0.163	13.560348627	-0.166	100
3.80	40	13.560347734	-0.100	13.560347792	-0.105	13.560347742	-0.101	13.560347816	-0.106	100
3.80	30	13.560346606	-0.017	13.560346667	-0.022	13.560346585	-0.016	13.560346663	-0.021	100
<b>3.80</b>	<b>20</b>	<b>13.560346373</b>	<b>0</b>	<b>13.560346443</b>	-0.005	<b>13.560346406</b>	-0.002	<b>13.560346335</b>	0.003	<b>100</b>
3.80	10	13.560346776	-0.030	13.560346747	-0.028	13.560346796	-0.031	13.560346728	-0.026	100
3.80	0	13.560348600	-0.164	13.560348537	-0.160	13.560348652	-0.168	13.560348704	-0.172	100
3.80	-10	13.560350818	-0.328	13.560350783	-0.325	13.560350853	-0.330	13.560350843	-0.330	100
3.80	-20	13.560351333	-0.366	13.560351342	-0.366	13.560351427	-0.373	13.560351282	-0.362	100
3.80	-30	13.560353902	-0.555	13.560353942	-0.558	13.560353924	-0.557	13.560353982	-0.561	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)
<b>3.85</b>	<b>20</b>	<b>13.560346373</b>	<b>0</b>	<b>13.560346443</b>	-0.005	<b>13.560346406</b>	-0.002	<b>13.560346335</b>	0.003	<b>100</b>
4.43	20	13.560346645	-0.020	<b>13.560346466</b>	-0.007	<b>13.560346373</b>	0.002	<b>13.560346424</b>	-0.004	100
3.40	20	13.560346361	0.001	<b>13.560346424</b>	-0.004	<b>13.560346685</b>	-0.021	<b>13.560346726</b>	-0.026	100

No non-compliance noted.