



FCC CFR47 PART 15 SUBPART C

NFC

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-J600FN/DS, SM-J600FN

FCC ID: A3LSMJ600FN

REPORT NUMBER: 4788398272-E5V2

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Prepared for
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TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	04/10/18	Initial issue	Junwhan Lee
V2	04/11/18	Updated to address 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 b/g/n and NFC
MODEL NUMBER: SM-J600FN/DS, SM-J600FN
SERIAL NUMBER: R38K20GS05X(RADIATED, CONDUCTED);
DATE TESTED: MAR 30, 2018 - APR 10, 2018

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.

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	
☐	Chamber 1
☒	Chamber 2
☐	Chamber 3

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	3.86 dB

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 b/g/n 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 16.99 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).

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83EWE	RT2K117oS/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

I/O CABLES

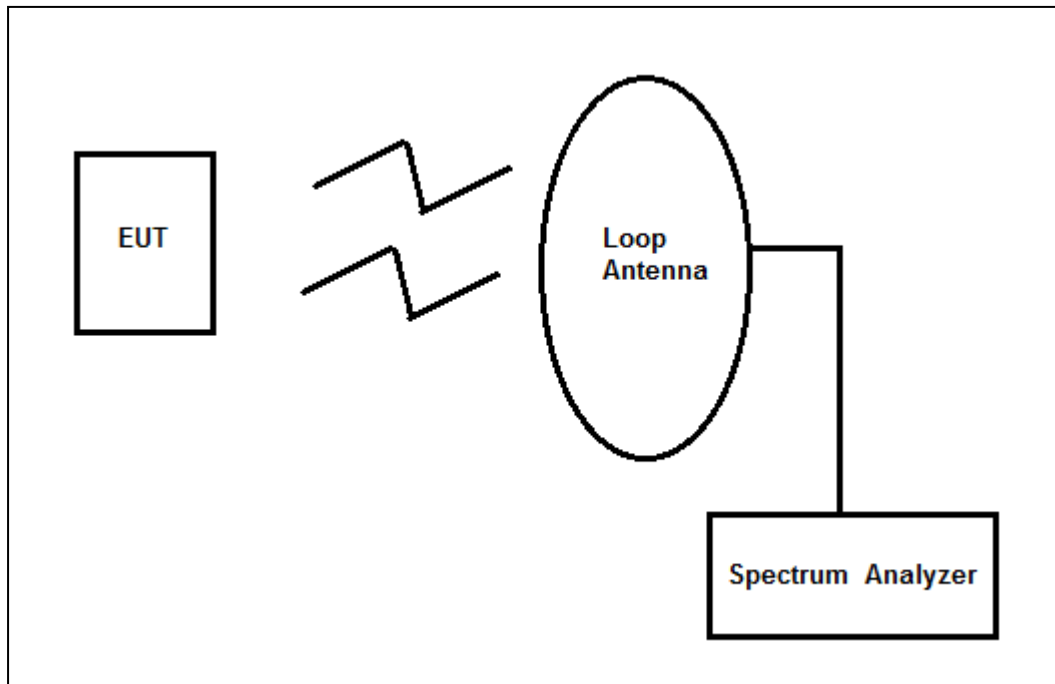
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

TEST SETUP

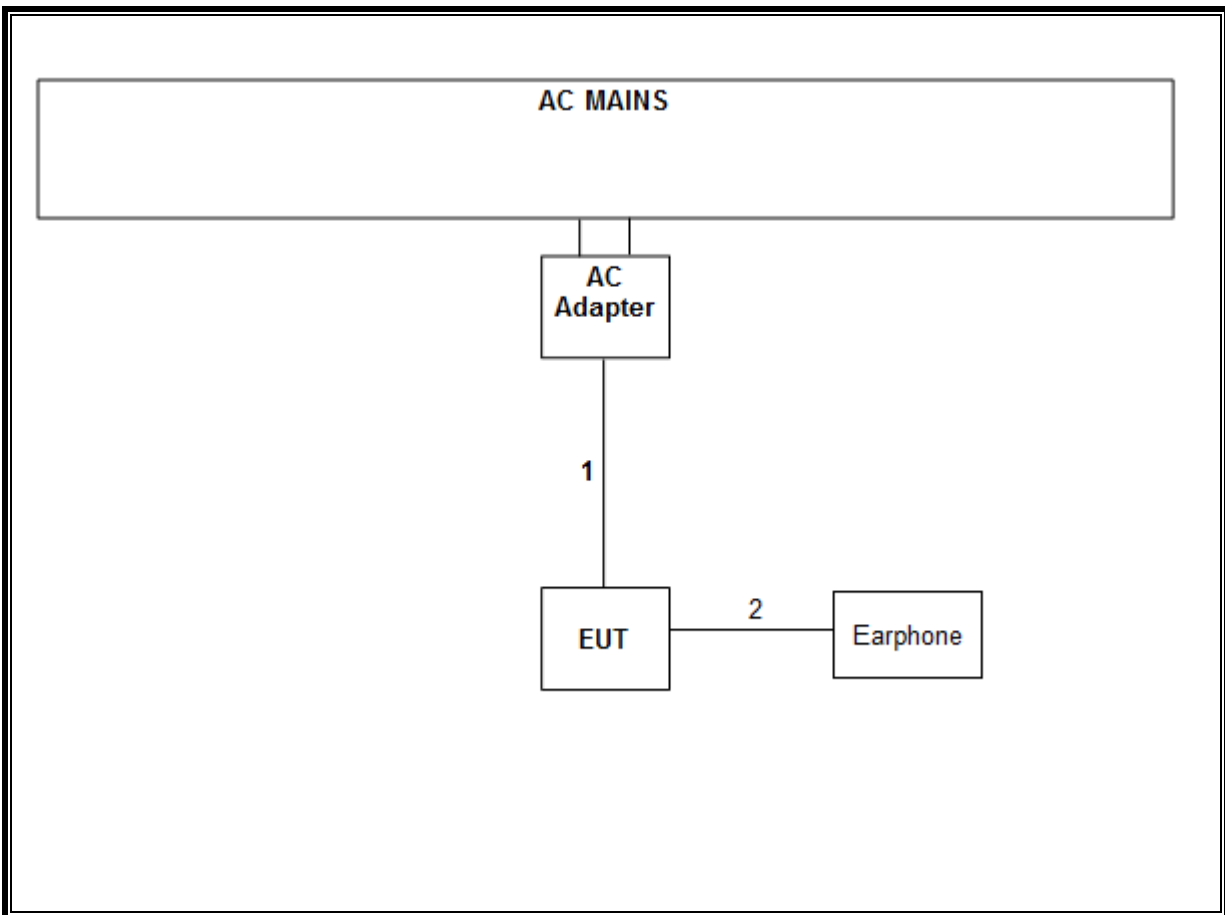
For fundamental level below 30MHz, the EUT standalone condition is worst-case configuration. For above 30MHz to 1GHz and AC power line conducted test, the EUT with earphone and charger condition is worst-case configuration.

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	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-31-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	09-14-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-10-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	08-07-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-09-18
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-07-18
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-07-18
Temperature Chamber	ESPEC	SH-642	93001109	08-08-18
LISN	R&S	ENV216	101837	08-09-18
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	433.90

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 field strength from µV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (µV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

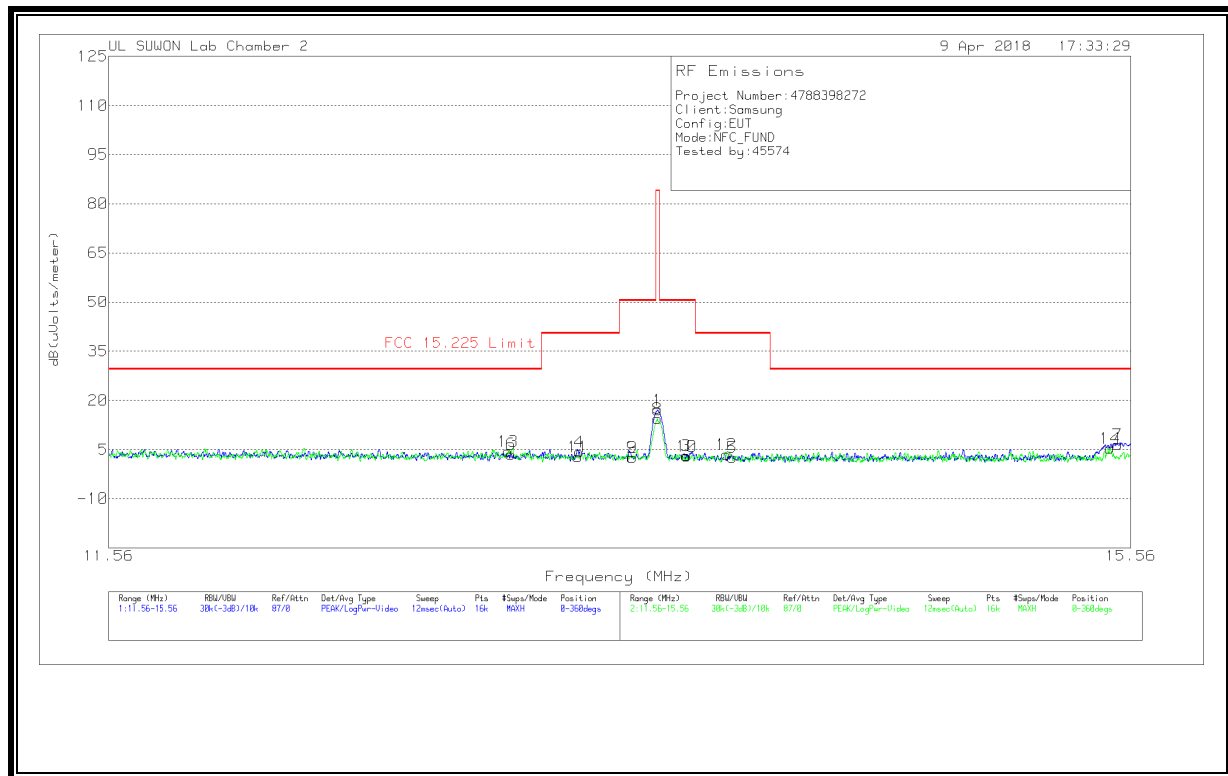
ANSI C63.10-2013

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

RESULTS

No non-compliance noted:

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



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	PK Margin (dB)	Azimuth (Degs)
1	13.56	36.59	PK	19.9	-40	.5	16.99	84	-67.01	0-360
2	13.46275	22.26	PK	19.9	-40	.5	2.66	50.5	-47.84	0-360
3	13.67463	22.73	PK	19.9	-40	.6	3.23	50.5	-47.27	0-360
4	13.2555	23.92	PK	19.9	-40	.5	4.32	40.51	-36.19	0-360
5	13.8575	22.22	PK	19.8	-40	.6	2.62	40.51	-37.89	0-360
6	12.994	23.22	PK	19.9	-40	.5	3.62	29.54	-25.92	0-360
7	15.5005	26.18	PK	19.8	-40	.6	6.58	29.54	-22.96	0-360

PK – Peak Detector

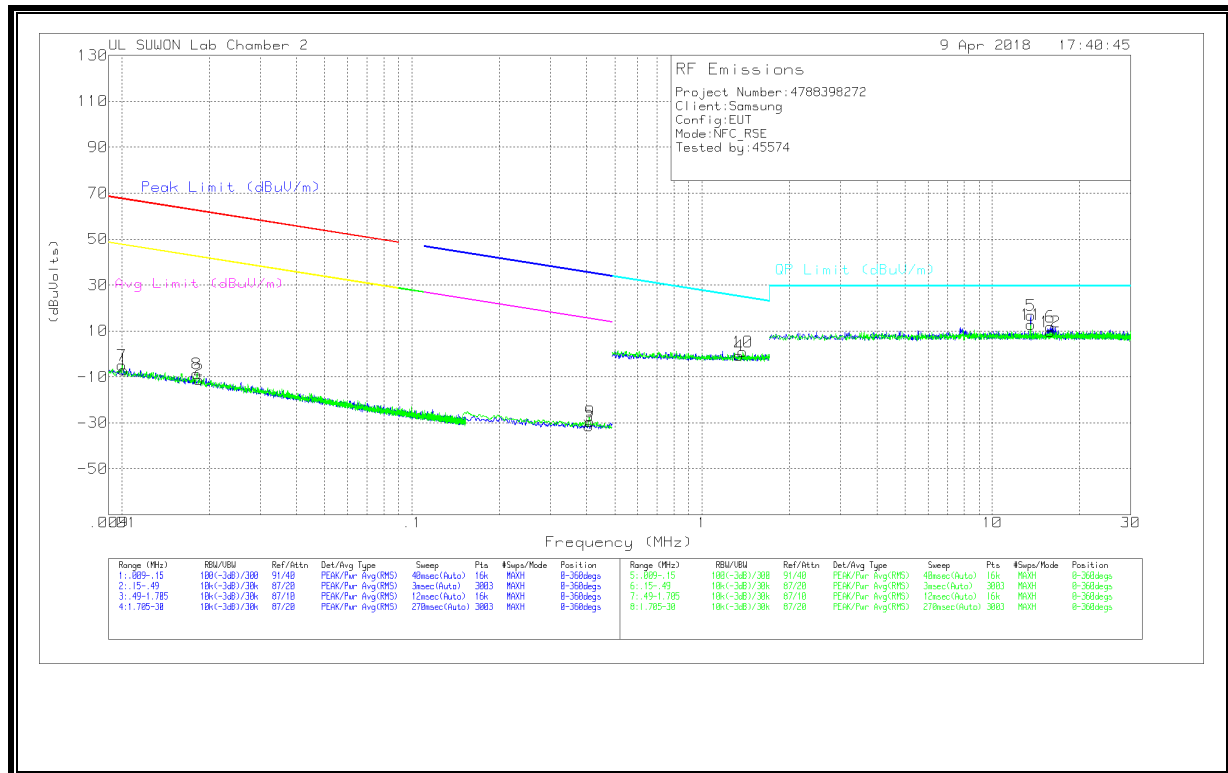
[Face-Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Dist Corr 30m	Cable Loss	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)
8	13.56	33.99	PK	19.9	-40	.5	14.39	84	-69.61	0-360
9	13.46125	22.25	PK	19.9	-40	.5	2.65	50.5	-47.85	0-360
10	13.67588	22.54	PK	19.9	-40	.6	3.04	50.5	-47.46	0-360
11	13.24888	22.47	PK	19.9	-40	.5	2.87	40.51	-37.64	0-360
12	13.83475	23.18	PK	19.8	-40	.6	3.58	40.51	-36.93	0-360
13	12.98388	24.09	PK	19.9	-40	.5	4.49	29.54	-25.05	0-360
14	15.46763	24.97	PK	19.8	-40	.6	5.37	29.54	-24.17	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 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 414788.

8.1.2. SPURIOUS EMISSION 0.09 TO 30 MHz



Trace Markers

[Face On]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01016	52.59	Pk	20.2	.1	-80	-7.11	67.45	-74.56	47.45	-54.56	-	-	-	-	-	-	0-360
2	.01847	48.63	Pk	20	.1	-80	-11.27	62.26	-73.53	42.26	-53.53	-	-	-	-	-	-	0-360
3	.40668	28.86	Pk	19.6	.1	-80	-31.44	-	-	-	-	-	-	35.42	-66.86	15.42	-46.86	0-360
4	1.34109	19.47	Pk	19.7	.2	-40	-63	-	-	-	-	25.08	-25.71	-	-	-	-	0-360
5	13.56165	36.49	Pk	19.9	.5	-40	16.89	-	-	-	-	29.5	-12.61	-	-	-	-	0-360
6	15.87078	31.48	Pk	19.8	.6	-40	11.88	-	-	-	-	29.5	-17.62	-	-	-	-	0-360

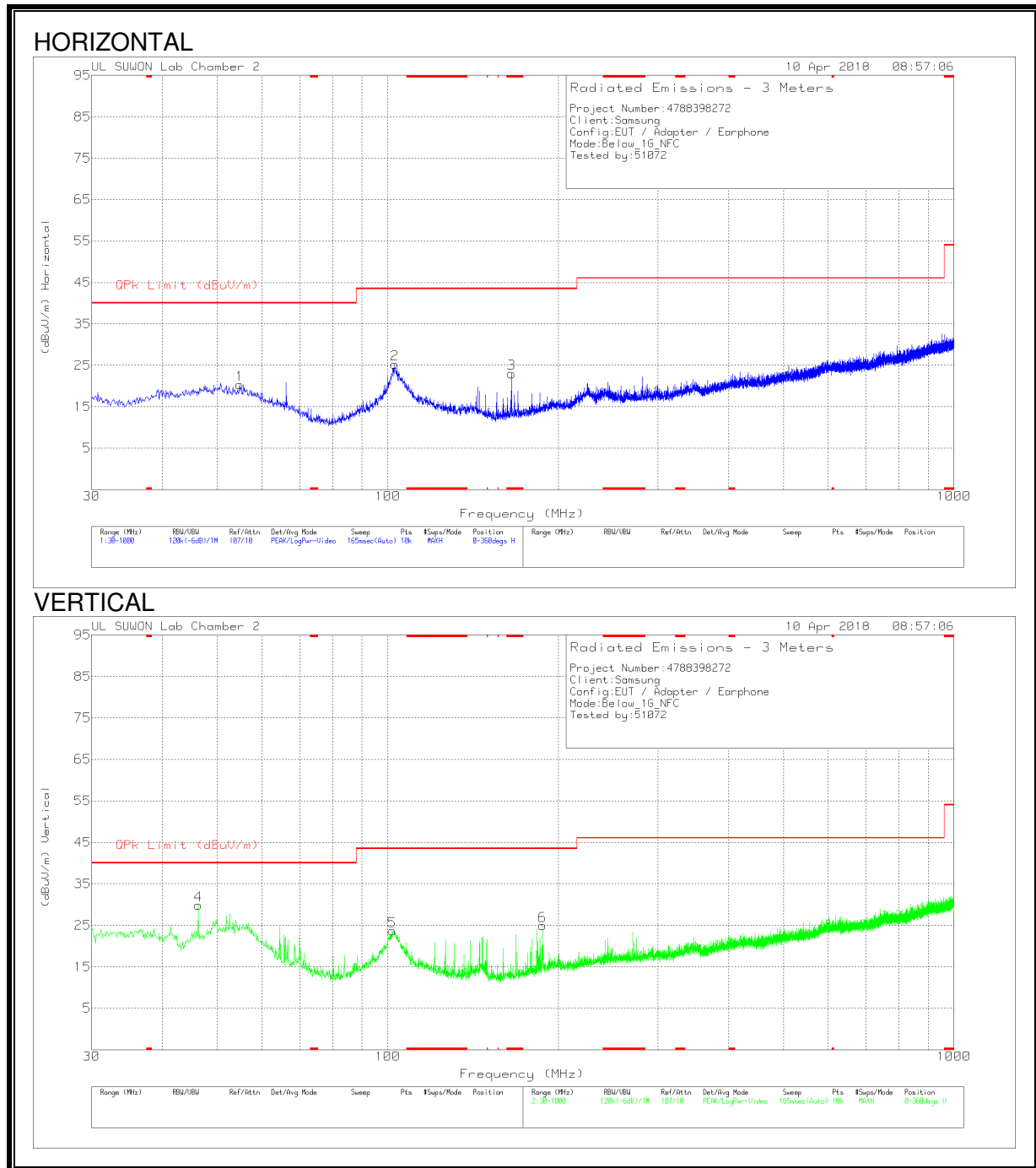
Pk - Peak detector

[Face Off]

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna	Cable Loss	Dist Corr 30m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
7	.01002	54.71	Pk	20.2	.1	-80	-4.99	67.57	-72.56	47.57	-52.56	-	-	-	-	-	-	0-360
8	.01812	51.36	Pk	20	.1	-80	-8.54	62.42	-70.96	42.42	-50.96	-	-	-	-	-	-	0-360
9	.41114	30.8	Pk	19.6	.1	-80	-29.5	-	-	-	-	-	-	35.33	-64.83	15.33	-44.83	0-360
10	1.38087	21.01	Pk	19.7	.2	-40	.91	-	-	-	-	24.83	-23.92	-	-	-	-	0-360
11	13.56165	32.4	Pk	19.9	.5	-40	12.8	-	-	-	-	29.5	-16.7	-	-	-	-	0-360
12	15.8802	29.34	Pk	19.8	.6	-40	9.74	-	-	-	-	29.5	-19.76	-	-	-	-	0-360

Pk - Peak detector

8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	54.832	32.31	Pk	19.4	-31.4	20.31	40	-19.69	0-360	400	H
2	102.944	38.73	Pk	17.5	-31	25.23	43.52	-18.29	0-360	300	H
3	* 165.606	39.19	Pk	14.5	-30.7	22.99	43.52	-20.53	0-360	300	H
4	46.296	41.34	Pk	20	-31.5	29.84	40	-10.16	0-360	100	V
5	101.877	37.26	Pk	17.4	-31	23.66	43.52	-19.86	0-360	100	V
6	187.819	39.47	Pk	16	-30.6	24.87	43.52	-18.65	0-360	100	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 μ 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 μ 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.

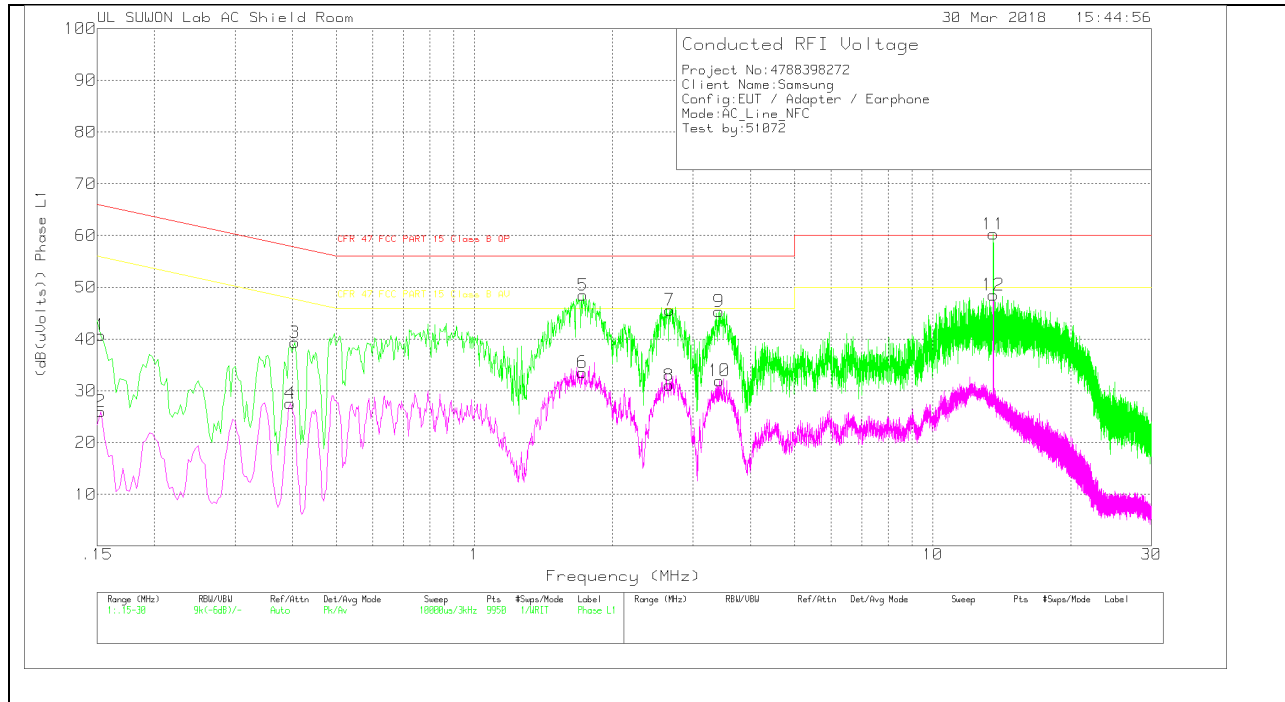
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_L1_with extension	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	30.66	Pk	10	.1	40.76	65.84	-25.08	-	-
2	.153	15.92	Av	10	.1	26.02	-	-	55.84	-29.82
3	.405	29.33	Pk	9.8	.2	39.33	57.75	-18.42	-	-
4	.396	17.54	Av	9.8	.2	27.54	-	-	47.94	-20.4
5	1.725	38.29	Pk	9.9	.3	48.49	56	-7.51	-	-
6	1.722	23.36	Av	9.9	.3	33.56	-	-	46	-12.44
7	2.664	35.51	Pk	9.8	.3	45.61	56	-10.39	-	-
8	2.658	20.95	Av	9.8	.3	31.05	-	-	46	-14.95
9	3.417	35.24	Pk	9.8	.3	45.34	56	-10.66	-	-
10	3.42	21.85	Av	9.8	.3	31.95	-	-	46	-14.05
11	13.56	50.08	Pk	9.8	.4	60.28	60	.28	-	-
12	13.56	38.31	Av	9.8	.4	48.51	-	-	50	-1.49

Pk - Peak detector

Av - Average detection

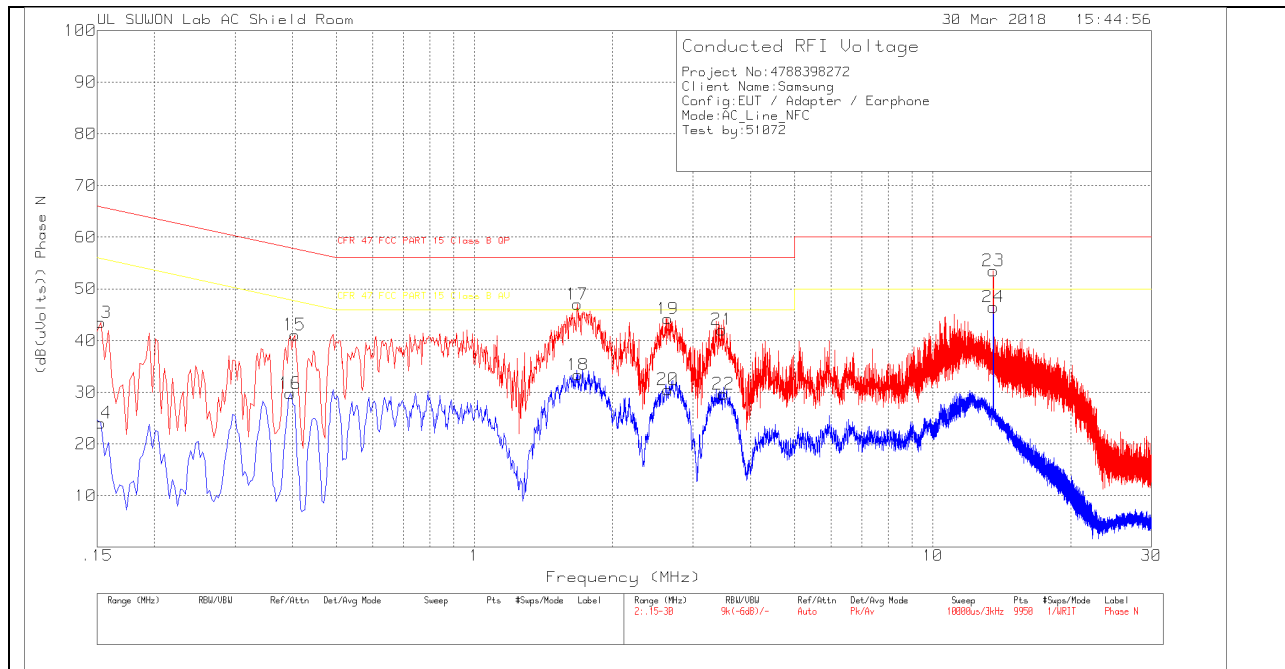
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_L1_with extension	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)
.15225	28.3	Qp	10	.1	38.4	65.88	-27.48	-	-
.40575	26.47	Qp	9.8	.2	36.47	57.73	-21.26	-	-
.39675	26.07	Qp	9.8	.2	36.07	57.92	-21.85	-	-
1.72575	35.67	Qp	9.9	.3	45.87	56	-10.13	-	-
1.72275	34.8	Qp	9.9	.3	45	56	-11	-	-
2.66475	31.85	Qp	9.8	.3	41.95	56	-14.05	-	-
2.65875	31.07	Qp	9.8	.3	41.17	56	-14.83	-	-
3.41625	31.43	Qp	9.8	.3	41.53	56	-14.47	-	-
3.42015	31.07	Qp	9.8	.3	41.17	56	-14.83	-	-
13.5593	48.07	Qp	9.8	.4	58.27	60	-1.73	-	-

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	101837_N_with extension	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	.153	33.39	Pk	10	.1	43.49	65.84	-22.35	-	-
14	.153	13.96	Av	10	.1	24.06	-	-	55.84	-31.78
15	.405	31.09	Pk	9.8	.2	41.09	57.75	-16.66	-	-
16	.396	19.76	Av	9.8	.2	29.76	-	-	47.94	-18.18
17	1.677	36.82	Pk	9.9	.3	47.02	56	-8.98	-	-
18	1.683	23.17	Av	9.9	.3	33.37	-	-	46	-12.63
19	2.64	34	Pk	9.9	.3	44.2	56	-11.8	-	-
20	2.64	20.31	Av	9.9	.3	30.51	-	-	46	-15.49
21	3.468	31.99	Pk	9.8	.3	42.09	56	-13.91	-	-
22	3.492	19.56	Av	9.8	.3	29.66	-	-	46	-16.34
23	13.56	43.32	Pk	9.8	.4	53.52	60	-6.48	-	-
24	13.56	36.3	Av	9.8	.4	46.5	-	-	50	-3.5

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_N_with extension	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)
.15225	29.68	Qp	10	.1	39.78	65.88	-26.1	-	-
.40515	28.21	Qp	9.8	.2	38.21	57.75	-19.54	-	-
.39675	28.01	Qp	9.8	.2	38.01	57.92	-19.91	-	-
1.67625	33.45	Qp	9.9	.3	43.65	56	-12.35	-	-
1.68375	32.83	Qp	9.9	.3	43.03	56	-12.97	-	-
2.64015	30.3	Qp	9.9	.3	40.5	56	-15.5	-	-
3.46725	26.54	Qp	9.8	.3	36.64	56	-19.36	-	-
3.49275	27.92	Qp	9.8	.3	38.02	56	-17.98	-	-
13.5593	40.76	Qp	9.8	.4	50.96	60	-9.04	-	-

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: ± 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)
3.85	50	13.559819991	0.482	13.559819573	0.513	13.559818872	0.565	13.559818236	0.612	100
3.85	40	13.559822824	0.273	13.559822639	0.287	13.559822242	-4.109	13.559821870	0.344	100
3.85	30	13.559824942	0.117	13.559824815	0.127	13.559824616	0.141	13.559824042	0.184	100
3.85	20	13.559826531	0	13.559826575	-0.003	13.559827602	-0.079	13.559828735	-0.163	100
3.85	10	13.559828127	-0.118	13.559828311	-0.131	13.559828683	-0.159	13.559829250	-0.201	100
3.85	0	13.559828988	-0.181	13.559829022	-0.184	13.559829497	-0.219	13.559830465	-0.290	100
3.85	-10	13.559829692	-0.233	13.559829808	-0.242	13.559829847	-0.245	13.559830733	-0.310	100
3.85	-20	13.559831248	-0.348	13.559831476	-0.365	13.559831808	-0.389	13.559832245	-0.421	100
3.85	-30	13.559833773	-0.534	13.559833925	-0.545	13.559836289	-0.720	13.559836777	-0.756	100

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 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)
3.85	20	13.559826531	0	13.559826575	-0.003	13.559827602	-0.079	13.559828735	-0.163	100
4.40	20	13.559826434	0.007	13.559826993	-0.034	13.559827762	-0.012	13.559828125	-0.118	100
3.60	20	13.559825119	0.104	13.559825408	0.083	13.559825763	0.136	13.559826275	0.019	100

No non-compliance noted.