



# **CERTIFICATION TEST REPORT**

**REPORT NUMBER :** 12073310-E7V3

**APPLICANT :** SONY MOBILE COMMUNICATIONS INC.  
4-12-3 HIGASHI-SHINAGAWA,  
SHINAGAWA -KU,TOKYO, 140-0002, JAPAN

**FCC ID :** PY7-21831A

**EUT DESCRIPTION :** GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

**TEST STANDARD(S) :** FCC 47 CFR PART 15 SUBPART C

**Date Of Issue:**

January 19, 2018

**Prepared by:**

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**Revision History**

<u>Ver.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	01/08/18	Initial Issue	Dan Corona
V2	01/16/18	Section 1 removed "Reviewed By", updated Section 5.5 and header date	Dan Corona
V3	01/19/18	Updated Section 5.5 (Note)	Dan Corona

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SONY MOBILE COMMUNICATIONS, INC.  
4-12-3 HIGASHI-SHINAGAWA,  
SHINAGAWA –KU, TOKYO, 140-0002, JAPAN

**EUT DESCRIPTION:** GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

**SERIAL NUMBER:** QV7000GC12, QV70003Q12

**DATE TESTED:** DECEMBER 11 - 14, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies

UL Verification Services Inc. 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 Verification Services Inc. 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 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 any government.

Approved & Released For  
UL Verification Services Inc By:



Dan Corona  
Operations Leader  
UL Verification Services Inc.

Prepared By:



Kiya Kedida  
Project Engineer  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, and FCC CFR 47 Part 15.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, 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	
<input type="checkbox"/>	Chamber A (IC:2324B-1)	<input type="checkbox"/>	Chamber D (IC:22541-1)
<input checked="" type="checkbox"/>	Chamber B (IC:2324B-2)	<input type="checkbox"/>	Chamber E (IC: 22541-2)
<input checked="" type="checkbox"/>	Chamber C (IC:2324B-3)	<input type="checkbox"/>	Chamber F (IC: 22541-3)
		<input type="checkbox"/>	Chamber G (IC: 22541-4)
		<input type="checkbox"/>	Chamber H (IC: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

## 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	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Radiated Disturbance, 26000 to 40000 MHz	5.24 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 with BT, DTS/UNII a/b/g/n/ac & NFC

### **5.2. MAXIMUM FIELD STRENGTH**

The testing was performed at 3 meters. The transmitter maximum E-field at 30 meter distance was 19.49dBuV/m, which was converted from the 3 meter data.

### **5.3. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes the loop antenna.

### **5.4. SOFTWARE AND FIRMWARE**

The software version installed in the EUT during testing was 0.202.

### **5.5. WORST-CASE CONFIGURATION AND MODE**

Radiated emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that Y-Axis with AC/DC adapter and headphone was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y-Axis with AC/DC adapter and headphone orientation.

**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.

### **5.6. MODIFICATIONS**

No modifications were made during testing.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SONY	UCH12	VB17W46601037	NA
Headphone	SONY	MH410c	N/A	N/A

### I/O CABLES

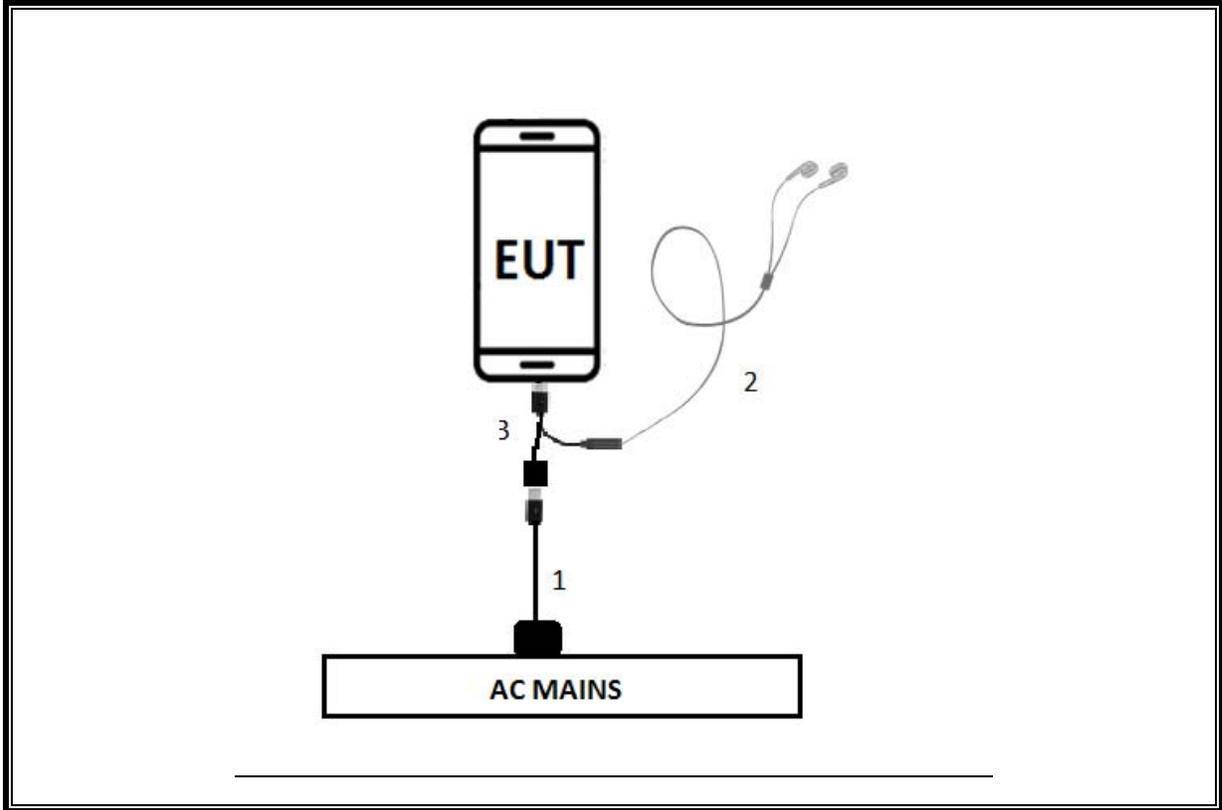
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	AC Adapter	Un-Shielded	1.2m	No
2	Jack	1	Headset	Shielded	1m	No
3	USB/HP Jack	1	USB Type-C/Audio	Un-Shielded	.2m	Audio & Charging Cabel

### TEST SETUP

The EUT is setup as a standalone device. Test software exercised the radio card.

**SETUP DIAGRAM FOR TESTS**

**RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM**



## 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	ID Num	Cal Due
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB3	T899	06/15/2018
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/11/2018
Amplifier, 10kHz-1GHz	Agilent (Keysight) Technologies	8447D	T15	08/14/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T907	01/23/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T905	01/11/2018
Temperature Chamber	Thermotron Industries	SE-600-10-10	T80	02/18/2018
EMI Test Receiver	Rohde & Schwarz	ESR	T1436	01/18/2018
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/08/2018
Transient Limiter	COM-POWER	LIT-930	T1457	02/24/2018

Test Software List			
Description	Manufacturer	Model	Version
Antenna Port Software	UL	UL EMC	Ver 7.6, Nov 11, 2017
Radiated Emissions Software	UL	UL EMC	Ver 9.5, Dec 01, 2016

NOTE: \*testing is completed before equipment calibration expiration date.

## 7. OCCUPIED BANDWIDTH

### LIMITS

For reporting purposes only. Tested per ANSI C63.10 (6.9.3)

### RESULTS

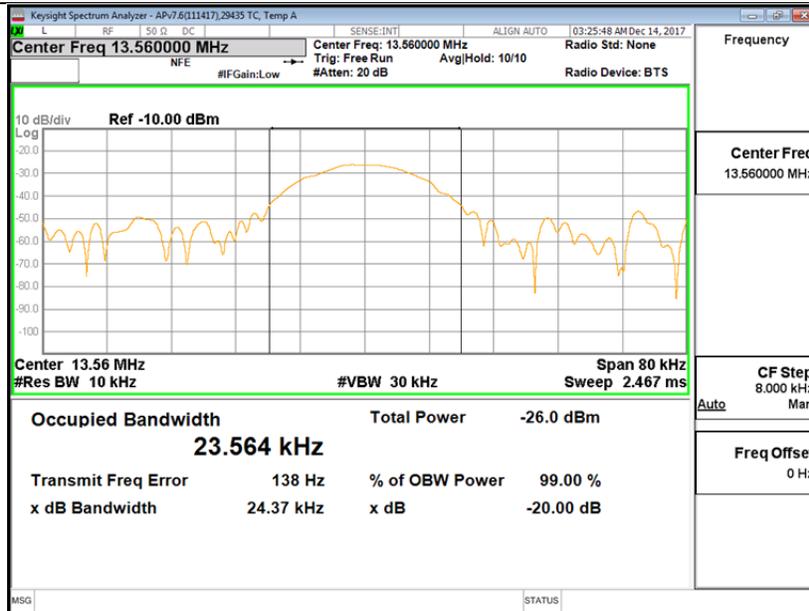
<b>ID:</b>	29435 TC	<b>Date:</b>	12/13/17
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Frequency (MHz)	Modulation	Data Rate (kbps)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)
13.56	Type A	106	23.564	24.370
		212	22.833	24.750
		424	21.718	24.560
		848	21.240	24.820
	Type B	106	22.790	25.030
		212	21.971	25.140
		424	21.607	25.090
		848	21.372	24.560
	Type F	212	21.175	25.150
		424	21.133	24.910

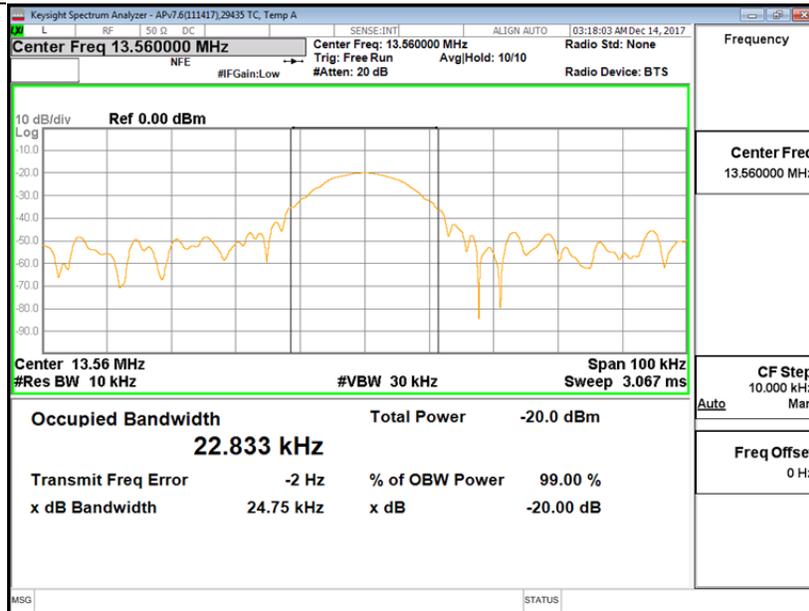
Note: Measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

**99% & 20dB Bandwidth**

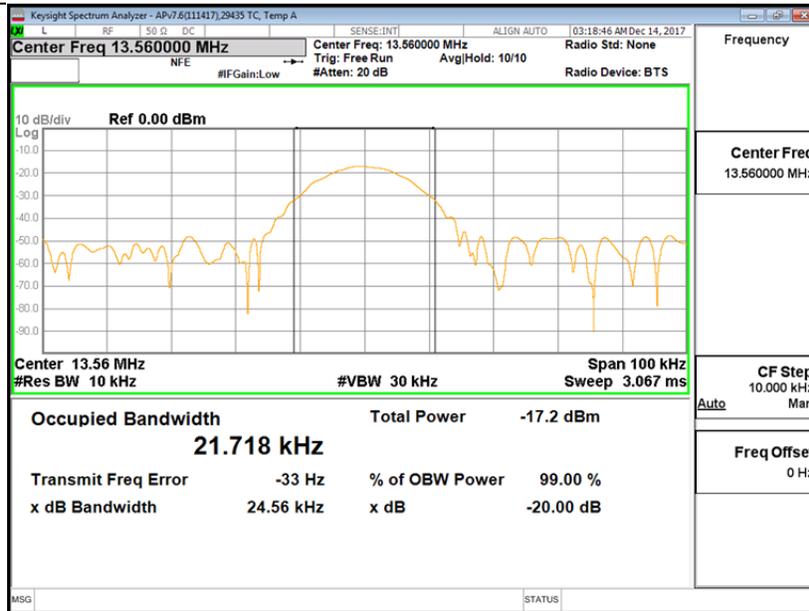
**99% & 20dB BANDWIDTH TYPE A 106k**



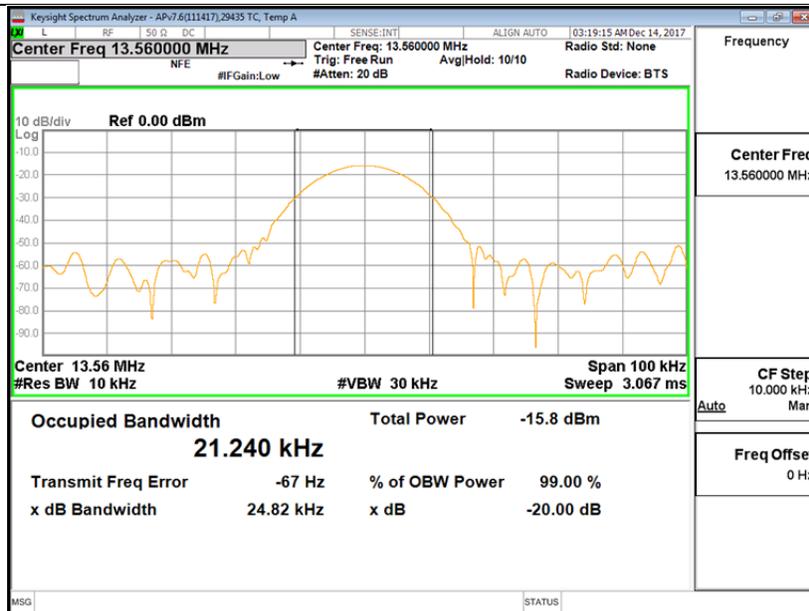
**99% & 20dB BANDWIDTH TYPE A 212k**



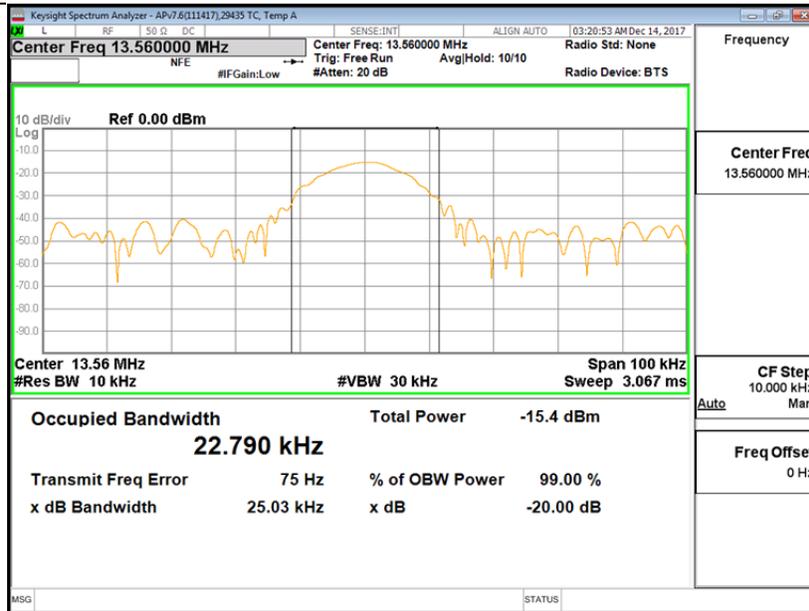
99% & 20dB BANDWIDTH TYPE A 424k



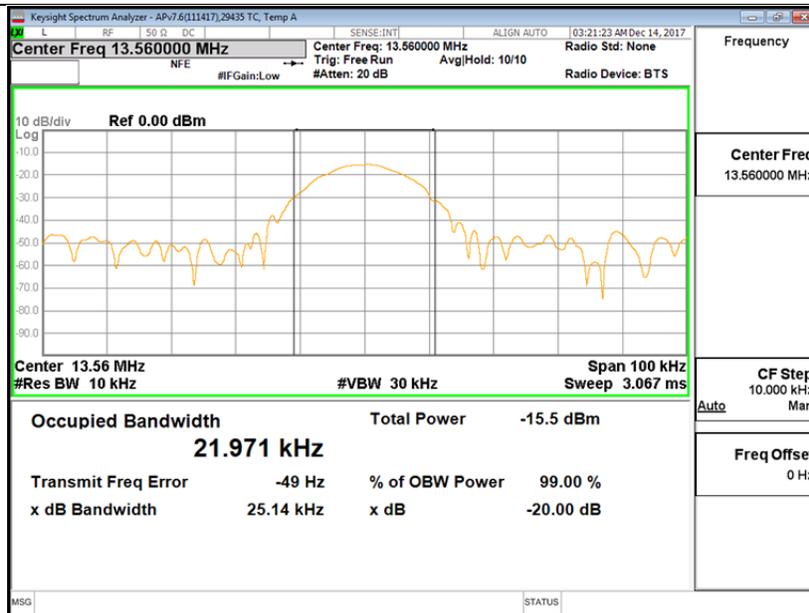
99% & 20dB BANDWIDTH TYPE A 848k



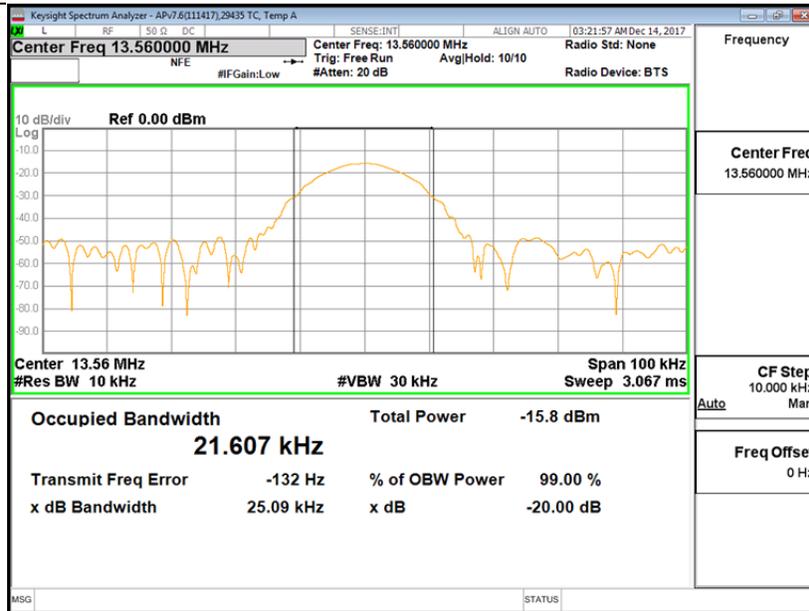
99% & 20dB BANDWIDTH TYPE B 106k



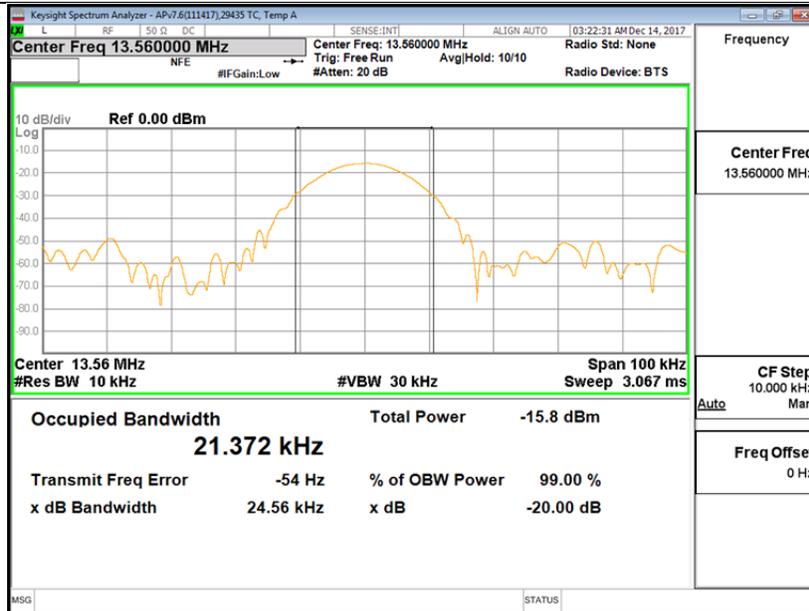
99% & 20dB BANDWIDTH TYPE B 212k



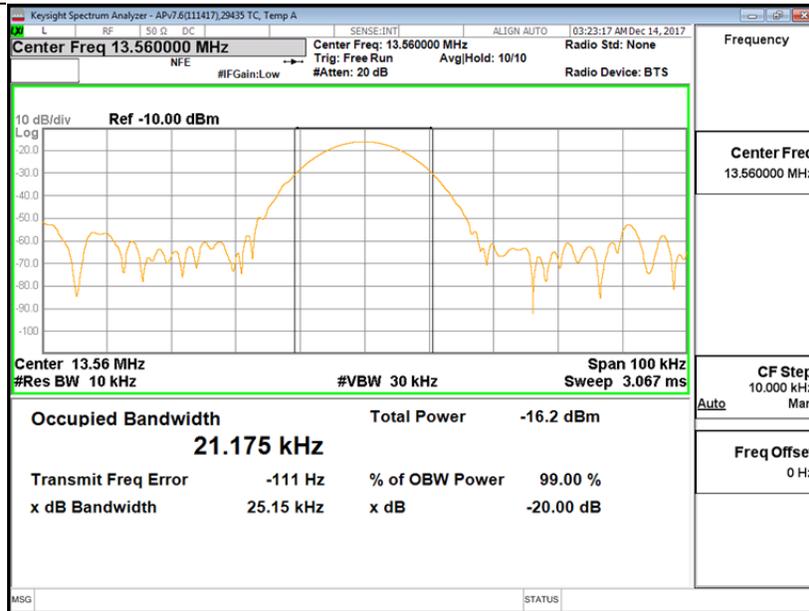
99% & 20dB BANDWIDTH TYPE B 424k



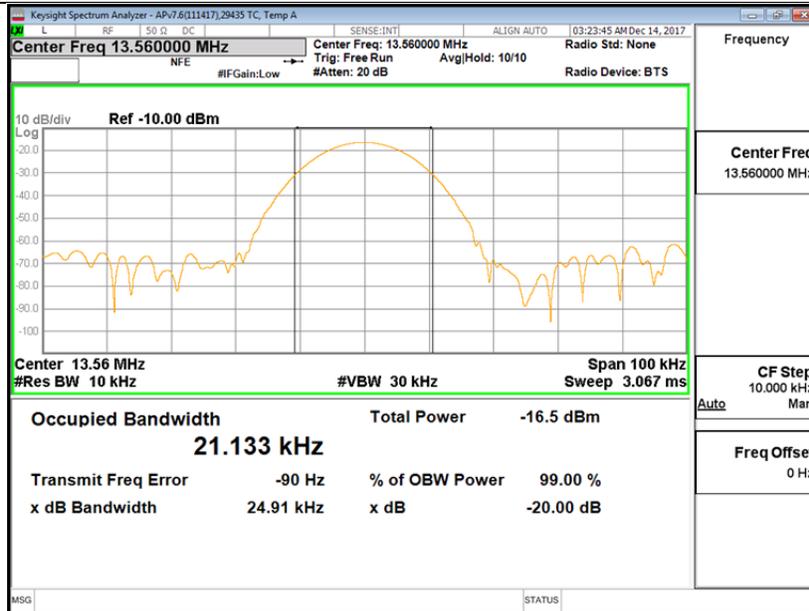
99% & 20dB BANDWIDTH TYPE B 848k



99% & 20dB BANDWIDTH TYPE F 212k



99% & 20dB BANDWIDTH TYPE F 424k



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMIT

§15.225, 15.209

(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:

$$\text{Limit (dBuV/m)} = 20 \log \text{limit (uV/m)}$$

In addition:

§15.209 (d) The emission limits shown at 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:

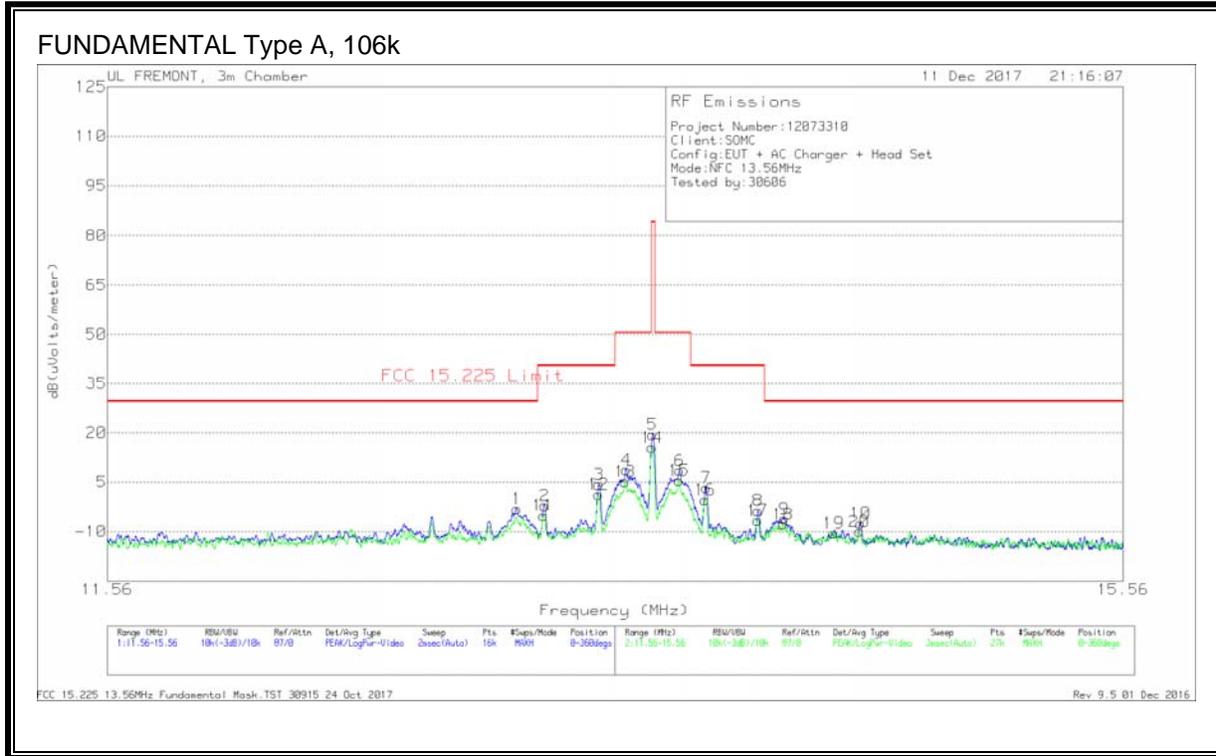
### **KDB 414788 OATS and Chamber Correlation Justification**

Device is a Smart Phone.

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.

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

**8.1.1. FUNDAMENTAL EMISSION MASK (11.56 – 15.56MHz)**



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 (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)	Azimuth (Degs)
1	13.0315	20.71	Pk	14.6	1.6	-40	-3.09	29.54	-32.63	0-360	Face-On
11	13.13265	18.74	Pk	14.6	1.6	-40	-5.06	40.51	-45.57	0-360	Face-Off
2	13.138	21.71	Pk	14.6	1.6	-40	-2.09	40.51	-42.6	0-360	Face-On
12	13.34614	25.12	Pk	14.6	1.6	-40	1.32	40.51	-39.19	0-360	Face-Off
3	13.34788	28.12	Pk	14.6	1.6	-40	4.32	40.51	-36.19	0-360	Face-On
13	13.45129	29.04	Pk	14.6	1.6	-40	5.24	50.5	-45.26	0-360	Face-Off
4	13.4555	32.61	Pk	14.6	1.6	-40	8.81	50.5	-41.69	0-360	Face-On
14	*13.55756	39.44	Pk	14.5	1.6	-40	15.54	84	-68.46	0-360	Face-Off
5	*13.5585	43.39	Pk	14.5	1.6	-40	19.49	84	-64.51	0-360	Face-On
15	13.66471	29.45	Pk	14.5	1.6	-40	5.55	50.5	-44.95	0-360	Face-Off
6	13.666	32.46	Pk	14.5	1.6	-40	8.56	50.5	-41.94	0-360	Face-On
16	13.7689	23.57	Pk	14.5	1.6	-40	-3.3	40.51	-40.84	0-360	Face-Off
7	13.7735	27.25	Pk	14.5	1.6	-40	3.35	40.51	-37.16	0-360	Face-On
17	13.98298	17.31	Pk	14.5	1.6	-40	-6.59	40.51	-47.1	0-360	Face-Off
8	13.98363	20.3	Pk	14.5	1.6	-40	-3.6	40.51	-44.11	0-360	Face-On
18	14.08636	16.18	Pk	14.5	1.6	-40	-7.72	29.54	-37.26	0-360	Face-Off
9	14.09175	17.84	Pk	14.5	1.6	-40	-6.06	29.54	-35.6	0-360	Face-On
19	14.29659	13.46	Pk	14.5	1.6	-40	-10.44	29.54	-39.98	0-360	Face-Off
20	14.40434	13.96	Pk	14.5	1.6	-40	-9.94	29.54	-39.48	0-360	Face-Off
10	14.4095	16.45	Pk	14.5	1.6	-40	-7.45	29.54	-36.99	0-360	Face-On

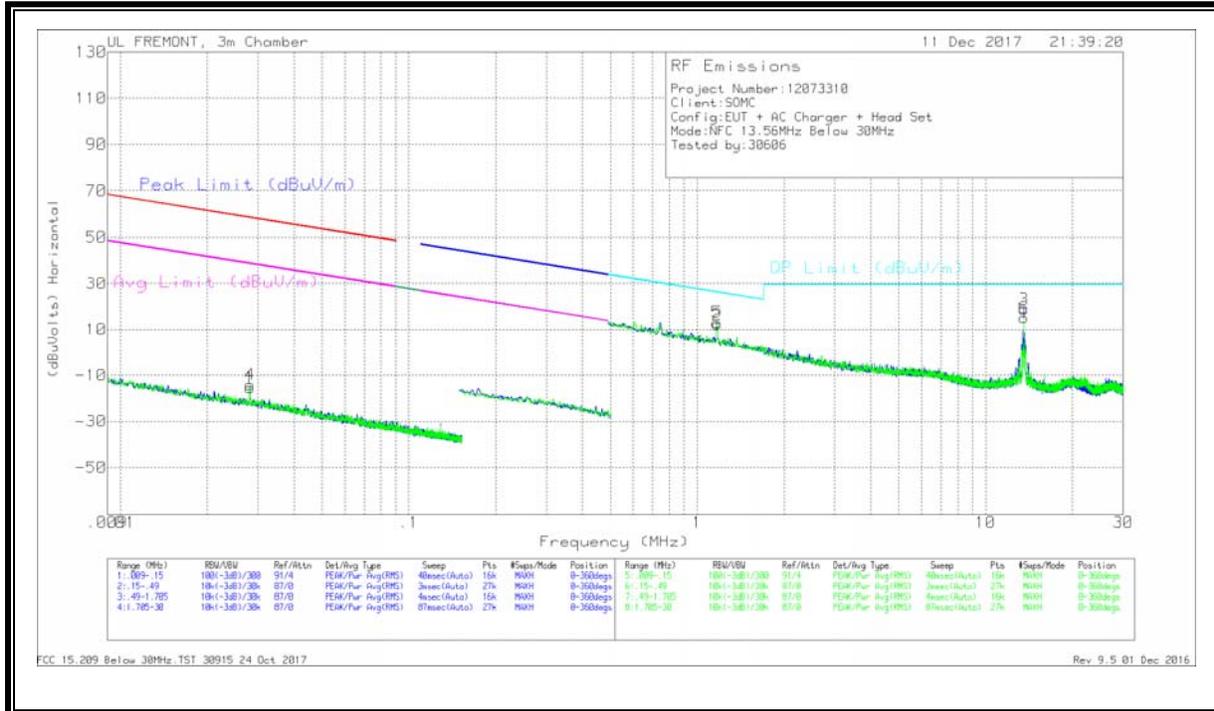
\* - Indicates fundamental frequency  
 Pk - Peak detector

Fundamental Frequency

Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit	PK Margin (dB)	Azimuth (Degs)	Antenna Position
*13.55756	39.44	Pk	14.5	1.6	-40	15.54	84	-68.46	0-360	Face-Off
*13.5585	43.39	Pk	14.5	1.6	-40	19.49	84	-64.51	0-360	Face-On

Pk - Peak detector

### 8.1.2. SPURIOUS EMISSIONS (0.09 – 30MHz)



#### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.02813	49.17	Pk	15.4	1.4	-80	-14.03	58.6	-72.63	38.6	-52.63	0-360
1	.02814	47.85	Pk	15.4	1.4	-80	-15.35	58.6	-73.95	38.6	-53.95	0-360

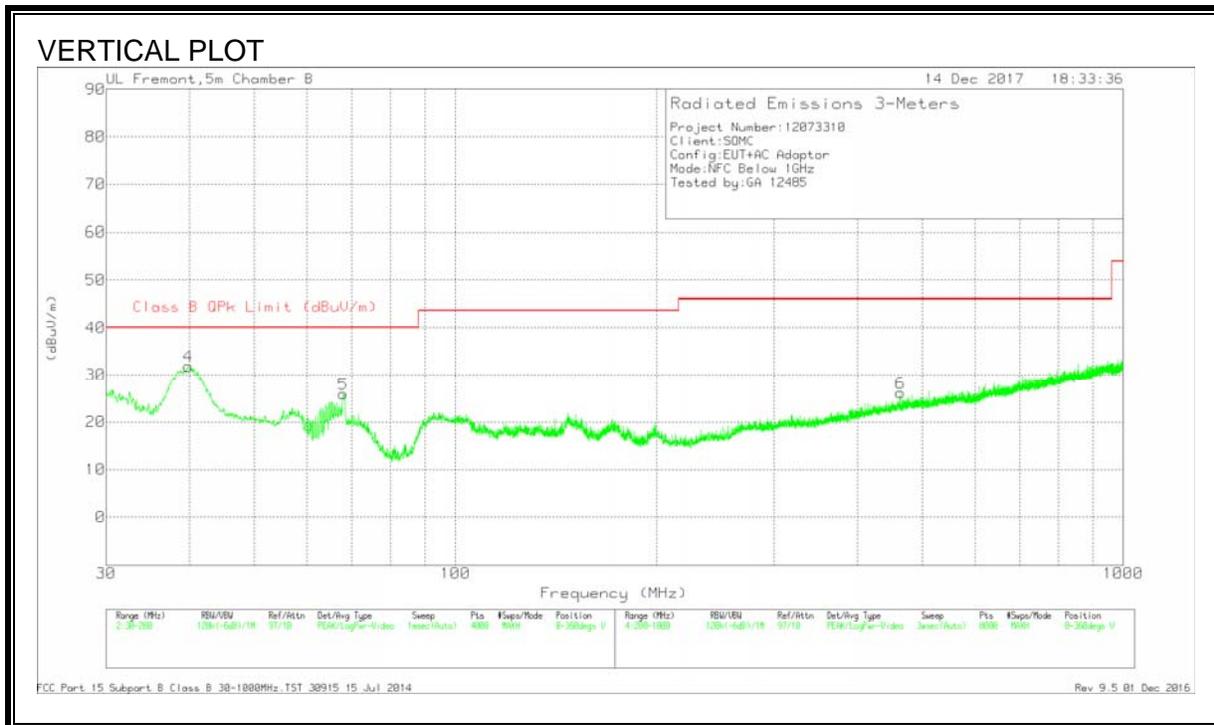
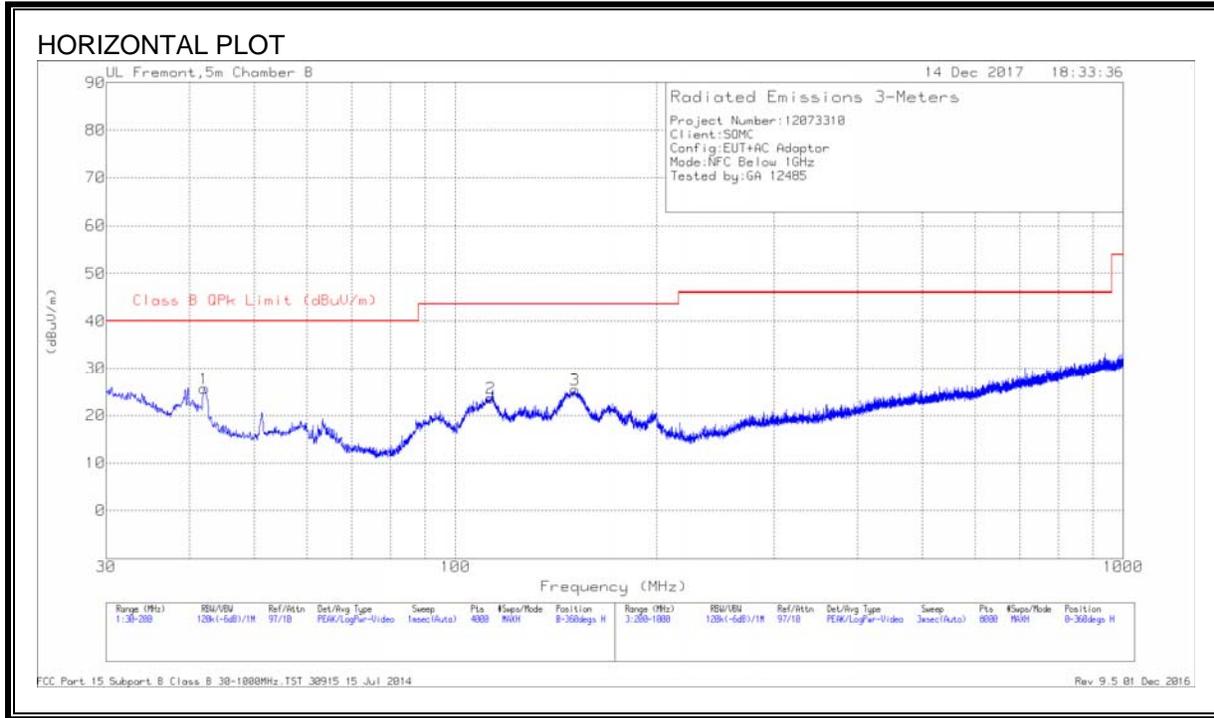
#### Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	1.17012	37.37	Pk	14.3	1.5	-40	13.17	26.26	-13.09	0-360
2	1.17271	36.48	Pk	14.3	1.5	-40	12.28	26.24	-13.96	0-360
6	*13.55945	39.13	Pk	14.5	1.6	-40	15.23	29.5	-	0-360
3	*13.56207	42.79	Pk	14.5	1.6	-40	18.89	29.5	-	0-360

\* - Indicates fundamental frequency

Pk - Peak detector

### 8.1.3. TX SPURIOUS EMISSIONS (30 – 1000MHz)



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T899 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	39.82	42.24	Pk	18.3	-28.7	31.84	40	-8.16	0-360	100	V
1	42.0944	37.65	Pk	16.6	-28.6	25.65	40	-14.35	0-360	400	H
5	68.0048	42.11	Pk	12.1	-28.3	25.91	40	-14.09	0-360	100	V
2	113.024	34.34	Pk	17.1	-27.8	23.64	43.52	-19.88	0-360	400	H
3	150.9438	36.35	Pk	16.4	-27.3	25.45	43.52	-18.07	0-360	200	H
6	463.9343	31.05	Pk	21.1	-26	26.15	46.02	-19.87	0-360	300	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
Pk - Peak detector

## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207

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

Frequency range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

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

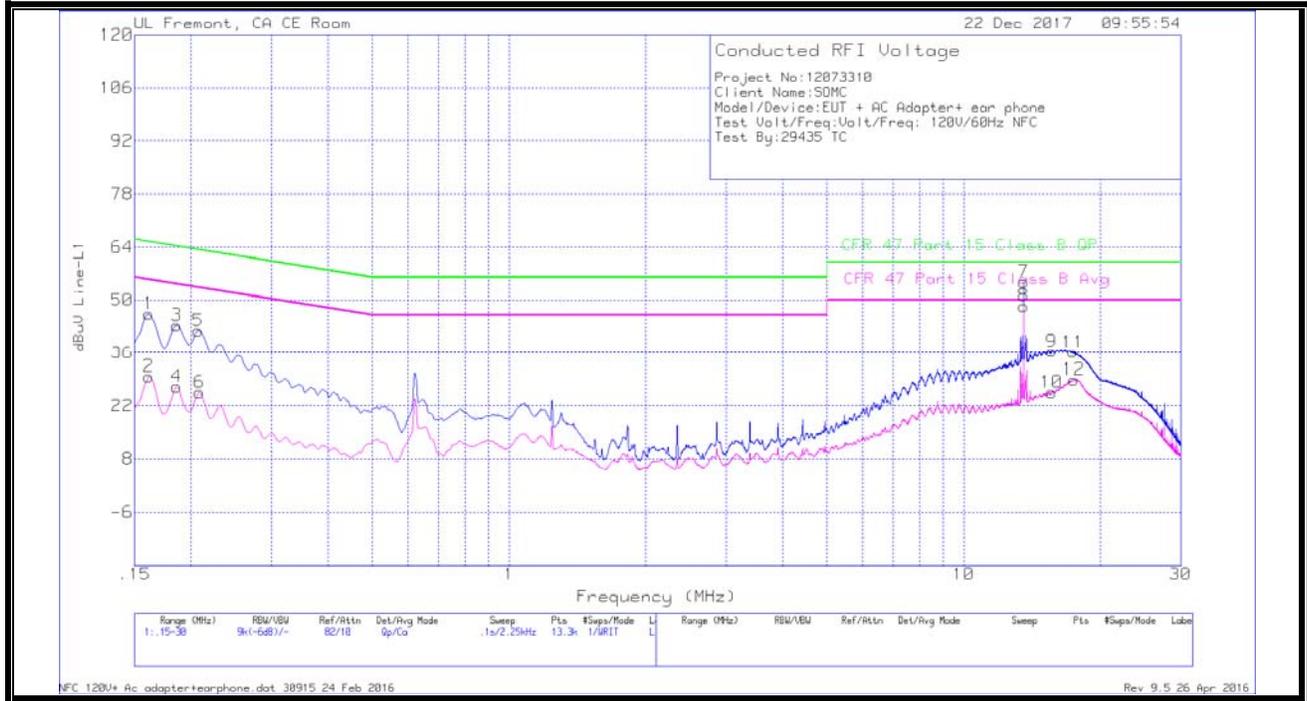
### TEST PROCEDURE

ANSI C63.10

### RESULTS

No non-compliance noted.

**EUT WITH ANTENNA - LINE 1 RESULTS**



**WORST EMISSIONS**

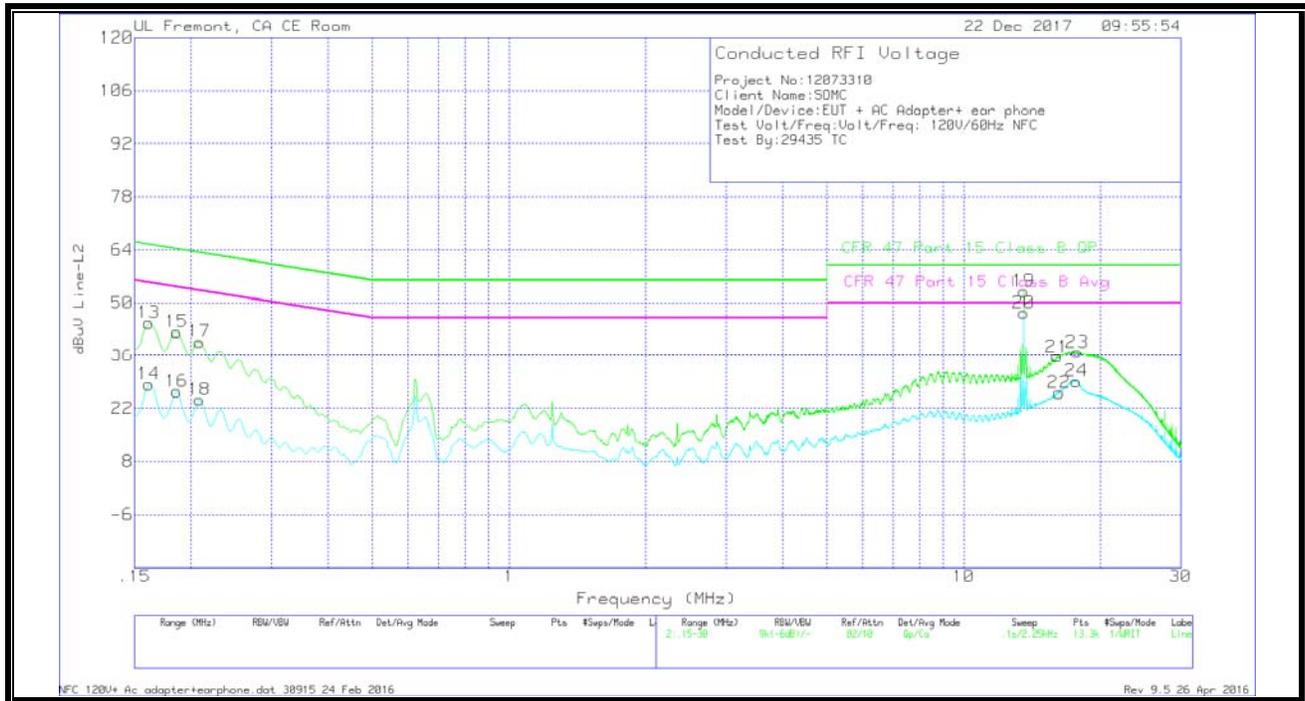
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.16125	36.2	Qp	.1	0	10.1	46.4	65.4	-19	-	-
2	.16125	19.41	Ca	.1	0	10.1	29.61	-	-	55.4	-25.79
3	.186	33.2	Qp	0	0	10.1	43.3	64.21	-20.91	-	-
4	.186	16.83	Ca	0	0	10.1	26.93	-	-	54.21	-27.28
5	.20738	31.74	Qp	0	0	10.1	41.84	63.31	-21.47	-	-
6	.2085	15.36	Ca	0	0	10.1	25.46	-	-	53.26	-27.8
7	13.56	44.33	Qp	.1	.2	10.2	54.83	60	-5.17	-	-
8	13.56	37.96	Ca	.1	.2	10.2	48.46	-	-	50	-1.54
9	15.62775	25.76	Qp	0	.3	10.3	36.36	60	-23.64	-	-
10	15.621	14.86	Ca	0	.3	10.3	25.46	-	-	50	-24.54
11	17.38838	25.63	Qp	0	.3	10.3	36.23	60	-23.77	-	-
12	17.44575	18.15	Ca	0	.3	10.3	28.75	-	-	50	-21.25

Pk - Peak detector

Av - Average detection

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

**EUT WITH ANTENNA-LINE 2 RESULTS**



**WORST EMISSIONS**

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)
13	.16125	34.62	Qp	0	0	10.1	44.72	65.4	-20.68	-	-
14	.16125	18.2	Ca	0	0	10.1	28.3	-	-	55.4	-27.1
15	.186	32.22	Qp	0	0	10.1	42.32	64.21	-21.89	-	-
16	.186	16.3	Ca	0	0	10.1	26.4	-	-	54.21	-27.81
17	.2085	29.65	Qp	0	0	10.1	39.75	63.26	-23.51	-	-
18	.2085	14.11	Ca	0	0	10.1	24.21	-	-	53.26	-29.05
19	13.56	42.58	Qp	.1	.2	10.2	53.08	60	-6.92	-	-
20	13.56	36.86	Ca	.1	.2	10.2	47.36	-	-	50	-2.64
21	16.0485	25.11	Qp	0	.3	10.3	35.71	60	-24.29	-	-
22	16.2105	15.48	Ca	0	.3	10.3	26.08	-	-	50	-23.92
23	17.77425	26.31	Qp	0	.3	10.3	36.91	60	-23.09	-	-
24	17.709	18.52	Ca	0	.3	10.3	29.12	-	-	50	-20.88

Pk - Peak detector

Av - Average detection

Note: Markers 19 and 20 are the 13.56MHz NFC Fundamental

## 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 -10 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

### RESULTS

<b>ID:</b>	29435 TC	<b>Date:</b>	12/13/17
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No non-compliance noted.

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: $\pm 100$ ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(Vdc)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	13.5596938	3.445	13.5596828	4.253	13.5596640	5.638	13.5596647	5.591	$\pm 100$
3.80	40	13.5596990	3.061	13.5596990	3.060	13.5596995	3.023	13.5596999	2.994	$\pm 100$
3.80	30	13.5597566	-1.187	13.5597528	-0.910	13.5597496	-0.672	13.5597487	-0.604	$\pm 100$
<b>3.80</b>	<b>20</b>	<b>13.5597405</b>	<b>0.000</b>	<b>13.5597475</b>	<b>-0.514</b>	<b>13.5597534</b>	<b>-0.953</b>	<b>13.5597574</b>	<b>-1.243</b>	<b><math>\pm 100</math></b>
3.80	10	13.5598558	-8.503	13.5598554	-8.475	13.5598659	-9.247	13.5598532	-8.308	$\pm 100$
3.80	0	13.5598651	-9.191	13.5598851	-10.662	13.5597707	-2.230	13.5597765	-2.655	$\pm 100$
3.80	-10	13.5597953	-4.038	13.5598364	-7.069	13.5598736	-9.817	13.5598221	-6.021	$\pm 100$
3.23	20	13.5597561	-1.154	13.5597580	-1.294	13.5597585	-1.325	13.5597591	-1.371	$\pm 100$
4.37	20	13.5597622	-1.603	13.5597581	-1.298	13.5597625	-1.626	13.5597644	-1.760	$\pm 100$