

FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

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

FCC ID: PY7-PM0941

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NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
V1	3/18/2016	Initial issue	C. OOI
V2	3/30/2016	Updated Information on Page 14	C. 00I

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:SONY MOBILE COMMUNICATIONS, INC.EUT DESCRIPTION:GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFCSERIAL NUMBER:CB5129YWE4DATE TESTED:March 7 - 18, 2016

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

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.

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2. TEST METHODOLOGY

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

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
Chamber A	Chamber D
Chamber B	Chamber E
🛛 Chamber C	Chamber F
	Chamber G
	Chamber H

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 H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, 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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 9KHz to 30 MHz	2.14 dB
Radiated Disturbance, 30 to 1000 MHz	4.98 dB
Radiated Disturbance,1000 to 6000 MHz	3.86 dB
Radiated Disturbance,6000 to 18000 MHz	4.23 dB
Radiated Disturbance, 18000 to 26000 MHz	5.30 dB
Radiated Disturbance,26000 to 40000 MHz	5.23 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 with BT, DTS/UNII a/b/g/n/ac & NFC.

5.2. MAXIMUM OUTPUT POWER

The testing was performed at 1 meter. The transmitter maximum E-field at 30m distance is 23.61 dBuV/m which is converted from the 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.

5.4. MODIFICATIONS

No modifications were made during testing.

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Radiated Emissions Above 30 MHz, AC Line Conducted Emissions and Frequency Stability:

Support Equipment List								
Description	Manufacturer	Model	Serial Number	FCC ID				
AC Adapter	Sony	UCH 20 1295-70821	N/A	N/A				
Earphone	Sony	N/A	N/A	N/A				

I/O CABLES

Radiated Emissions above 30 MHz, AC Line Conducted Emissions:

	I/O Cable List									
Cable	Port	# of identical	f of identical Connector Cable Type		Cable	Remarks				
No		ports	Туре		Length (m)					
1	DC Power	1	Micro-USB	Shielded	1 m	None				
2	Audio	1	Mini-Jack	Un-	1 m	None				
				Shielded						

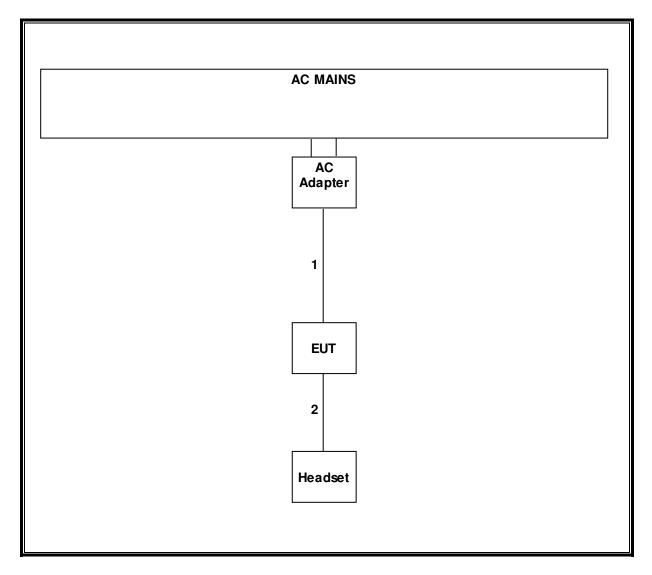
TEST SETUP

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

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SETUP DIAGRAM FOR TESTS

Radiated Emissions Below 30 MHz:



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

	Test Equipn	nent List		
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	T123	10/22/16
Antenna, Loop, 30 MHz	EMCO	6502	T35	05/15/16
Antenna, Biconolog,	Sunol Sciences	JB1	T243	09/25/16
30MHz-1 GHz				
Preamplifier, 1300 MHz	Keysight	8447D	T64	08/14/16
EMI Test Receiver, 9 KHz to	Rohde & Schwa	ECSI7	T284	09/10/16
Peak Power Meter	Agilent / HP	N1914A	T254	06/08/16
Peak / Average Power Sense	Keysight	E9327A	T388	04/16/16
LISN, 30 MHz	Solar	8012-50-R-24-	T28	07/28/16
Temperature Chamber	CSZ	2PHS-8-3	T754	03/21/16

Test Software List						
Description	Manufacturer	Model	Version			
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015			
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015			

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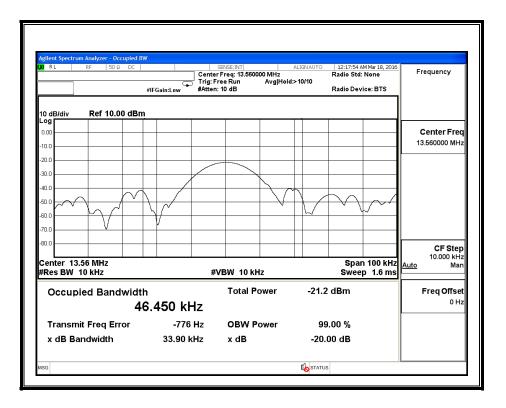
7. OCCUPIED BANDWIDTH

<u>LIMITS</u>

For reporting purposes only

RESULTS

Channel	Frequency	99% Bandwidth	20dB Bandwidth
	(KHz)	(KHz)	(KHz)
Low	13.56	46.45	33.90



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8. RADIATED EMISSION TEST RESULTS

<u>LIMIT</u>

§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	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 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

KDB 937606 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.

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

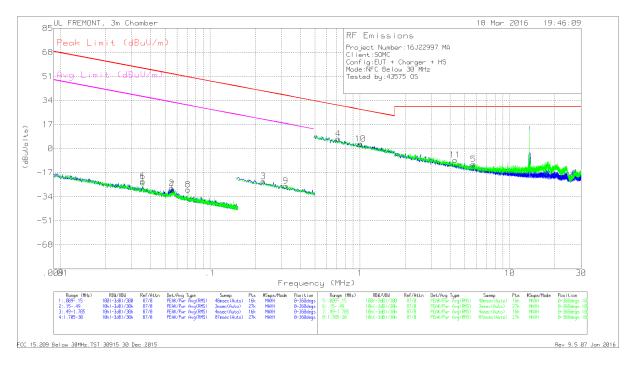
Fundamental

Company: Project #: FCC ID #: Fester: Date:		SOMC											
FCC ID #: Fester: Date:		16J22997											
'ester:)ate:		PY7-PM09	41										
ate:													
		Jude semana	1										
		3/11/2016											
requency	PK	QP	AV	AF	Distance	Distance	PK Corrected	AV Corrected	QP Limit	AV Limit	PK Margin		Notes
(MHz)	(dBu/V)	(dBu/V)	(dBuV)	dB/m	(m)	Correction (dB)	Reading (dBuV/m)	Reading (dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	
oop Antenr	na Face O	n: Z-Position											
	al Field Str	ength & With	nin Bands										
13.56	73.467			10.56	1	-59.08	24.94		84.00		-59.1		Fundamental @ 30m Dist
13.41	51.52			10.54	1	-59.08	2.98		50.48		-47.5		13.41-13.553MHz Sprious @ 30m
13.553	67.83			10.56	1	-59.08	19.30		50.48		-31.2		13.41-13.553MHz Sprious @ 30m
13.567	68.214			10.56	1	-59.08	19.69		50.48		-30.8		13.567-13.710MHz Spurious @ 30n
13.664	52.651			10.57	1	-59.08	4.13		40.51		-36.4		13.567-13.710MHz Spurious @ 30n
13.349	52.761			10.53	1	-59.08	4.21		40.51		-36.3		13.110-13.410MHz Spurious @ 30n
13.772	50.967			10.58	1	-59.08	2.46		29.54		-27.1		13.710-14.010MHz Spurious @ 30n
		ff: Z-Position ength & With		s: 10.56	1	-59.08	20.84		84.00		-63.2		Fundamental @ 30m Dist
				10.55	1	-59.08	2.49		50.48		-48.0		13.41-13.553MHz Sprious @ 30m
13/15/	51 03				1	-59.08	14.35		50.48		-36.1		13.41-13.553MHz Sprious @ 30m
	51.03 62.88			10.56					50.48		-38.8		13.567-13.710MHz Spurious @ 30n
13.454 13.553 13.567	62.88			10.56		-59.08	11.68						
13.553 13.567	62.88 60.21			10.56	1	-59.08	11.68 1.91						
13.553	62.88				1	-59.08 -59.08 -59.08	11.68 1.91 1.11		40.51 40.51		-38.6 -39.4		13.567-13.710MHz Spurious @ 300 13.567-13.710MHz Spurious @ 300 13.110-13.410MHz Spurious @ 300

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Spurious Emissions (0.15 – 30 MHz)





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Trace Markers

Marker	Frequenc y (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)
6	.03552	43	Pk	12.5	1.4	-80	-23.1	56.59	-79.69	36.59	-59.69	0-360
1	.03553	42.18	Pk	12.5	1.4	-80	-23.92	56.59	-80.51	36.59	-60.51	0-360
2	.0554	39.35	Pk	11.2	1.4	-80	-28.05	52.73	-80.78	32.73	-60.78	0-360
7	.05603	38.04	Pk	11.2	1.4	-80	-29.36	52.64	-82	32.64	-62	0-360
8	.07125	38.6	Pk	11	1.4	-80	-29	50.55	-79.55	30.55	-59.55	0-360
3	.22723	44.43	Pk	10.8	1.5	-80	-23.27	40.48	-63.75	20.48	-43.75	0-360
9	.31949	41.36	Pk	10.7	1.5	-80	-26.44	37.52	-63.96	17.52	-43.96	0-360

Pk - Peak detector

Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.71728	34.8	Pk	10.6	1.5	-40	6.9	30.49	-23.59	-	-	0-360
10	1.01056	31.15	Pk	10.7	1.5	-40	3.35	27.51	-24.16	=	-	0-360
11	4.31976	19.53	Pk	10.9	1.5	-40	-8.07	29.54	-37.61	-	-	0-360
5	5.73089	16.45	Pk	10.9	1.5	-40	-11.15	29.54	-40.69	-	-	0-360

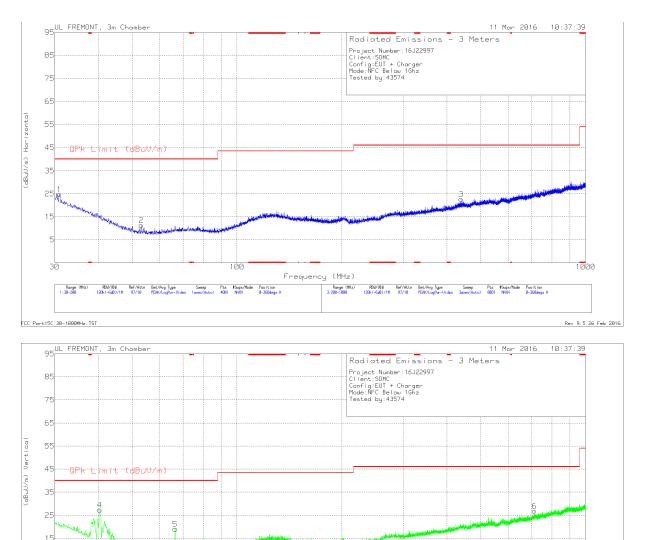
Pk - Peak detector

FCC 15.209 Below 30MHz.TST 30915 30 Dec 2015 Rev 9.5 07 Jan 2016

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1000

Rev 9.5 26 Feb 2016



Frequency (MHz)

 Range (MHz)
 RBM/UBU
 Ref/Attn
 Det/Avg Type
 Sweep
 Pts
 #Sweps/Node
 Position

 4:268-1088
 126k(-6d8)/1M
 97/18
 PER/LogNur-Uideo
 3wee(Auto)
 8881
 NAN
 8-368degs U

8.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz

100

RBM/UBM Ref/Attn Det/Avg Type Sweep Pts #Swes/Mode Position 120k(-6d8)/18 97/18 PER/Cuoghum-Uideo Imsec(Auto) 4081 N4XH 8-368degsU

Range (MHz) 2:39-299

FCC Part15C 38-1000MHz.TST

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Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.9775	31.04	Pk	20.9	-27.2	24.74	40	-15.26	0-360	200	Н
4	40.455	40.5	Pk	13.9	-27	27.4	40	-12.6	0-360	100	V
2	53.1625	30.84	Pk	7.4	-26.9	11.34	40	-28.66	0-360	300	Н
5	66.5075	37.64	Pk	8.1	-26.7	19.04	40	-20.96	0-360	100	V
3	439.6	30.66	Pk	16.9	-24.9	22.66	46.02	-23.36	0-360	100	Н
6	712.7	30.68	Pk	20.3	-24.1	26.88	46.02	-19.14	0-360	400	V

* - indicates frequency in 47 CFR §15.205/IC RSS-Gen §8.10Restricted Band

Pk - Peak detector

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9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μ 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	Limits (dBµV)									
(MHz)	Quasi-peak	Average								
0.15 to 0.50	66 to 56	56 to 46								
0.50 to 5	56	46								
5 to 30	60	50								
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.										

TEST PROCEDURE

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

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

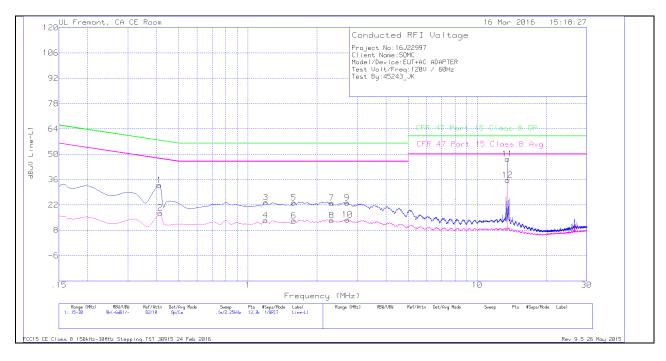
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

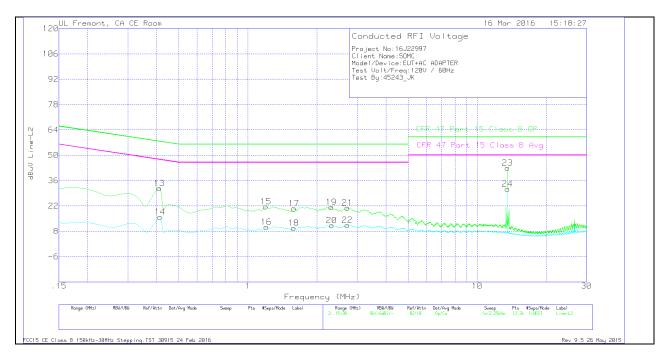
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LINE 1 PLOT



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LINE 2 PLOT



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LINE 1 & LINE 2 RESULTS

Trace Markers

Range	Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	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	.411	22.54	Qp	.4	0	10.1	33.04	57.63	-24.59	-	-	
2	.4155	7.13	Ca	.4	0	10.1	17.63	-	-	47.54	-29.91	
3	1.19625	12.96	Qp	.3	.1	10.1	23.46	56	-32.54	-	-	
4	1.194	3.04	Ca	.3	.1	10.1	13.54	-	-	46	-32.46	
5	1.5855	12.9	Qp	.2	.1	10.1	23.3	56	-32.7	-	-	
6	1.5855	2.84	Ca	.2	.1	10.1	13.24	-	-	46	-32.76	
7	2.31675	12.63	Qp	.2	.1	10.1	23.03	56	-32.97	-	-	
8	2.31675	3.07	Ca	.2	.1	10.1	13.47	-	-	46	-32.53	
9	2.70488	12.89	Qp	.2	.1	10.1	23.29	56	-32.71	-	-	
10	2.71163	3.47	Ca	.2	.1	10.1	13.87	-	-	46	-32.13	
11	13.56	36.84	Qp	.2	.2	10.2	47.44	60	-12.56	-	-	
12	13.56	25.21	Ca	.2	.2	10.2	35.81	-	-	50	-14.19	

Qp - Quasi-Peak detector

Ca - CISPR average detection

Range	Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency	Meter	Det	T24 IL L2	LC Cables	Limiter	Corrected	CFR 47	QP Margin	CFR 47	Av(CISPR)	
	(MHz)	Reading			2&3	(dB)	Reading	Part 15	(dB)	Part 15	Margin	
		(dBuV)					dBuV	Class B QP		Class B Avg	(dB)	
13	.411	21.28	Qp	.4	0	10.1	31.78	57.63	-25.85	-	-	
14	.41325	5.43	Ca	.4	0	10.1	15.93	-	-	47.58	-31.65	
15	1.1985	11.2	Qp	.2	.1	10.1	21.6	56	-34.4	-	-	
16	1.203	05	Ca	.2	.1	10.1	10.35	-	-	46	-35.65	
17	1.59	10.14	Qp	.2	.1	10.1	20.54	56	-35.46	-	-	
18	1.5855	6	Ca	.2	.1	10.1	9.8	-	-	46	-36.2	
19	2.31	10.89	Qp	.2	.1	10.1	21.29	56	-34.71	-	-	
20	2.319	.84	Ca	.2	.1	10.1	11.24	-	-	46	-34.76	
21	2.7195	10.5	Qp	.2	.1	10.1	20.9	56	-35.1	-	-	
22	2.715	1.01	Ca	.2	.1	10.1	11.41	-	-	46	-34.59	
23	13.56	32.51	Qp	.2	.2	10.2	43.11	60	-16.89	-	-	
24	13.56	20.83	Ca	.2	.2	10.2	31.43	-	-	50	-18.57	

Qp - Quasi-Peak detector

Ca - CISPR average detection

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10. FREQUENCY STABILITY

<u>LIMIT</u>

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.

While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized.

TEST PROCEDURE

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RESULTS

No non-compliance noted.

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Reference Frequency: EUT Channel 13.560000 MHz @ 20°C													
	Limit: ± 100 ppm = 1.356 kHz												
Power Supply	Environment Frequency Deviation Measureed with Time												
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)									
5.00	50	13.5598988	-4.143	± 100									
5.00	40	13.5598654	-1.680	± 100									
5.00	30	13.5598627	-1.477	± 100									
5.00	20	13.5598427	0.000	± 100									
5.00	10	13.5598425	0.009	± 100									
5.00	0	13.5598976	-4.055	± 100									
5.00	-10	13.5598877	-3.319	± 100									
5.00	-20	13.5599756	-9.801	± 100									
5.00	-30	13.5599765	-9.870	± 100									
4.25	20	13.5598723	-2.183	± 100									
5.75	20	13.5598652	-1.663	± 100									

Frequency stability versus temperature & apply voltage

Note: Frequency stability versus time interval measurements were taken and worst case results are reported in the above table.

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