



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8
INDUSTRY CANADA RSS-GEN Issue 3**

CERTIFICATION TEST REPORT

FOR

WIRELESS CHARGER

MODEL NUMBER: A010

REPORT NUMBER: 13U15612-1 Revision B

FCC ID: A4R-A010

IC: 10395A-A010

ISSUE DATE: SEPTEMBER 20, 2013

Prepared for

GOOGLE INC.

**1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW CA, 94043, U.S.A**

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/23/13	Initial Issue	F. de Anda
A	09/06/13	Update to include 99% BW	F. de Anda
B	09/20/13	Update on EUT switching frequency range	F. de Anda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GOOGLE INC.
1600 AMPHITHEATRE PARKWAY
MOUNTAIN VIEW CA, 94043, U.S.A

EUT DESCRIPTION: Wireless charger

MODEL: A010

SERIAL NUMBER: 548

DATE TESTED: JULY 23 - JULY 29, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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.

Approved & Released For
UL Verification Services Inc. By:



FRANCISCO DE ANDA
PROJECT LEAD
UL Verification Services Inc.

Tested By:



JOE VANG
EMC ENGINEER
UL Verification Services Inc

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

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:

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

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	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless charger intended for charging mobile devices, by means of induction technology.

GENERAL INFORMATION

Input Power	100-240 VAC, 9 W
Output Power	5 VDC, 5W
Frequencies generated or used by the EUT.	111-134 KHz Charger 16 MHz USB
Power supply - USB charger	Model:WOO9A050 S/N: Proto 1

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal loop antenna (Circular Coil).

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was V3.6.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was tested with the maximum charging power of 5 watts.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Test board (load)	Texas Instruments	BQ52013AEVM-764	3368022WBG	N/A

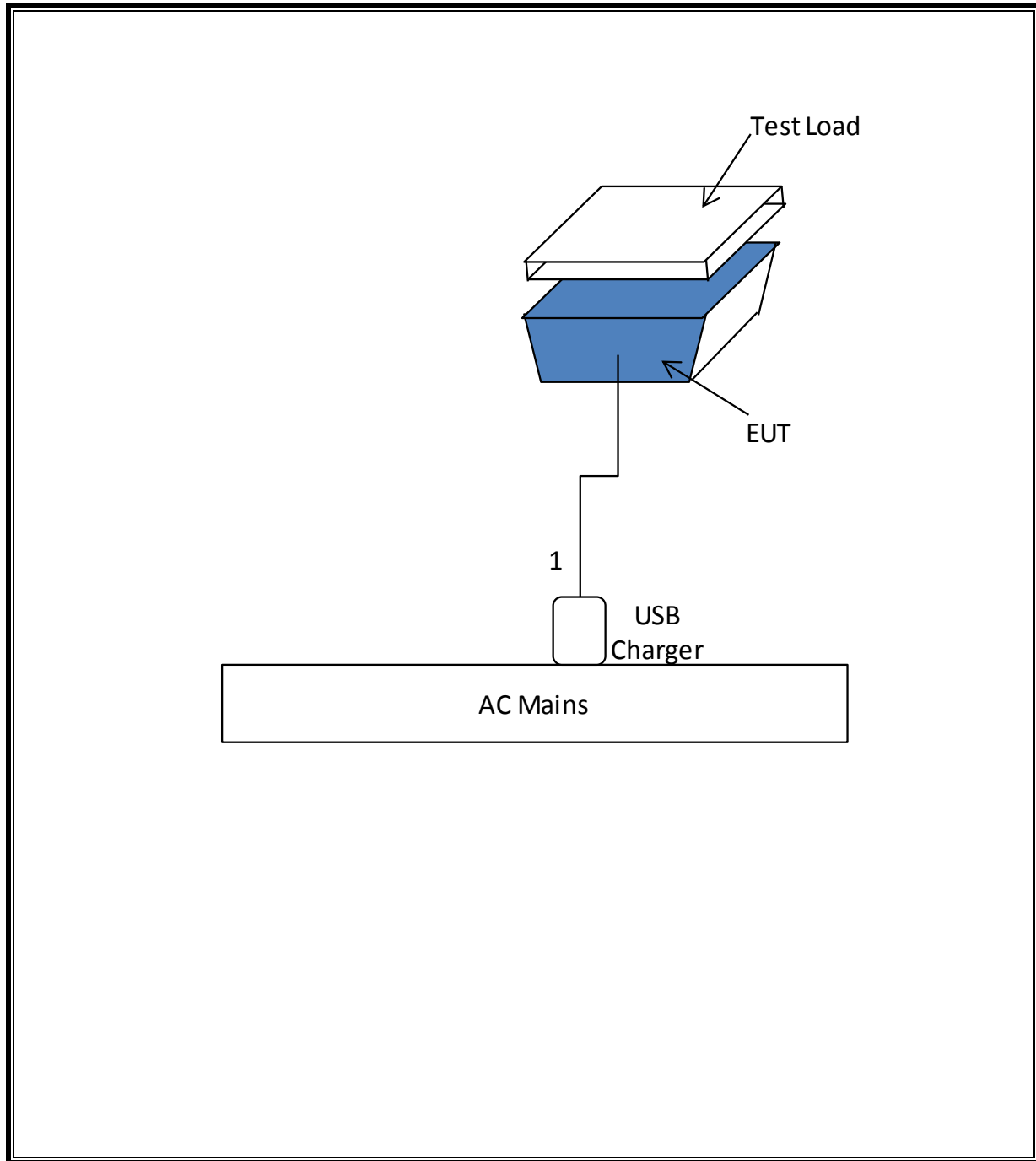
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	1	

TEST SETUP

The EUT is a standalone charger. A test jig was used to represent a load.

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	Serial Number	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	A092308	02/13/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	2944A06550	03/23/14
Spectrum Analyzer, 26.5 GHz	Agilent	E4440A	MY46186329	05/07/14
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14
LISN, 10 kHz - 30 MHz	Solar	8012-50-R-24-BNC	8379443	5/9/2014
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13
Digital Barometer	Cole-Palmer	9976-00	102077332	8/22/2013
Antenna, Loop, 30 MHz	EMCO	6502	9202-2722	2/20/2014
Spectrum Analyzer, 26.5 GHz	Agilent	E4407B	US41444322	04/04/14

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.209 (a)
IC RSS-210, Section 2.6
IC RSS-GEN, Section 6

Frequency (MHz)	Field Strength (microvolts/meter)	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 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3
Note: The lower limit shall apply at the transition frequency.		

TEST PROCEDURE

ANSI C63.4

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 134 KHz, while the highest frequency generated or used in the device is 16 MHz; therefore, the frequency range was investigated from 30 MHz to 1000 MHz.

RESULTS

No non-compliance noted:

7.2. TX SPURIOUS EMISSIONS 0.15 TO 30 MHz

FCC Part 15, Subpart B & C

10 Meter Distance Measurement At Open Field

Company: GOOGLE

Project #: 13U15612

Model #: Wireless Charger with new EMI gasket.

Tester: Thanh Nguyen

Date: 07/29/13

Frequency (MHz)	PK (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	PK Margin (dB)	Notes
Loop Antenna Face On:							
0.12163	43.46	10.48378	-29.54	24.41	50.48	-26.1	Fundamental @ 10m Dist
0.24302	32.01	10.39274	-29.54	12.87	29.54	-16.7	
0.36568	31.5	10.30074	-29.54	12.26	29.54	-17.3	
0.4865	25.73	10.21012	-29.54	6.40	30.54	-24.1	
1.33824	21.44	10.28309	-29.54	2.19	50.48	-48.3	Measeure at @ 10m Dist
2.433	20.32	10.22835	-29.54	1.01	29.54	-28.5	

Loop Antenna Face Off:							
0.1215	33.49	10.48388	-29.54	14.44	40.51	-26.1	Fundamental @ 10m Dist
0.24403	36.84	10.39198	-29.54	17.69	40.51	-22.8	
2.31079	23.26	10.23446	-29.54	3.96	40.51	-36.6	
3.04	20.72	10.2	-29.54	1.38	41.51	-40.1	

*** 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 10000Mhz.

Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak

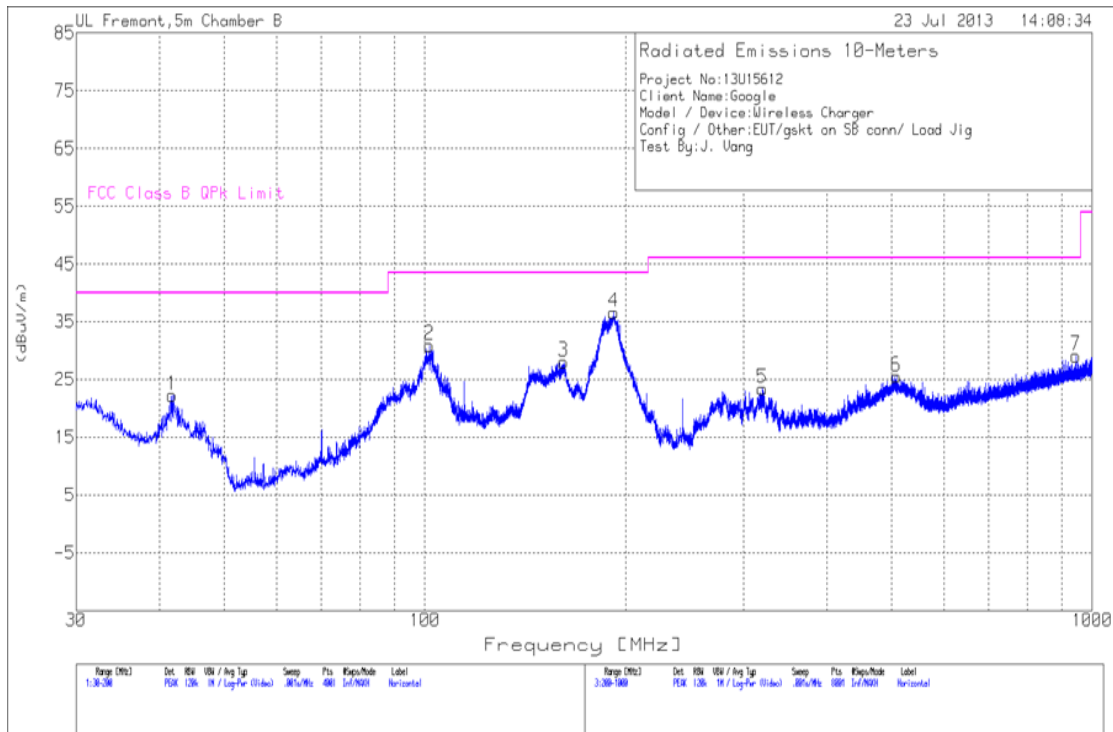
Q.P. = Quasi Peak

A.F. = Antenna factor

Rev. 10.23.09

7.3. TX SPURIOUS EMISSION 30 TO 1000 MHz (HORIZONTAL)

HORIZONTAL PLOT



File: 13U15612 FCC Full Scan 30-1000MHz 7_23_0AT

HORIZONTAL DATA

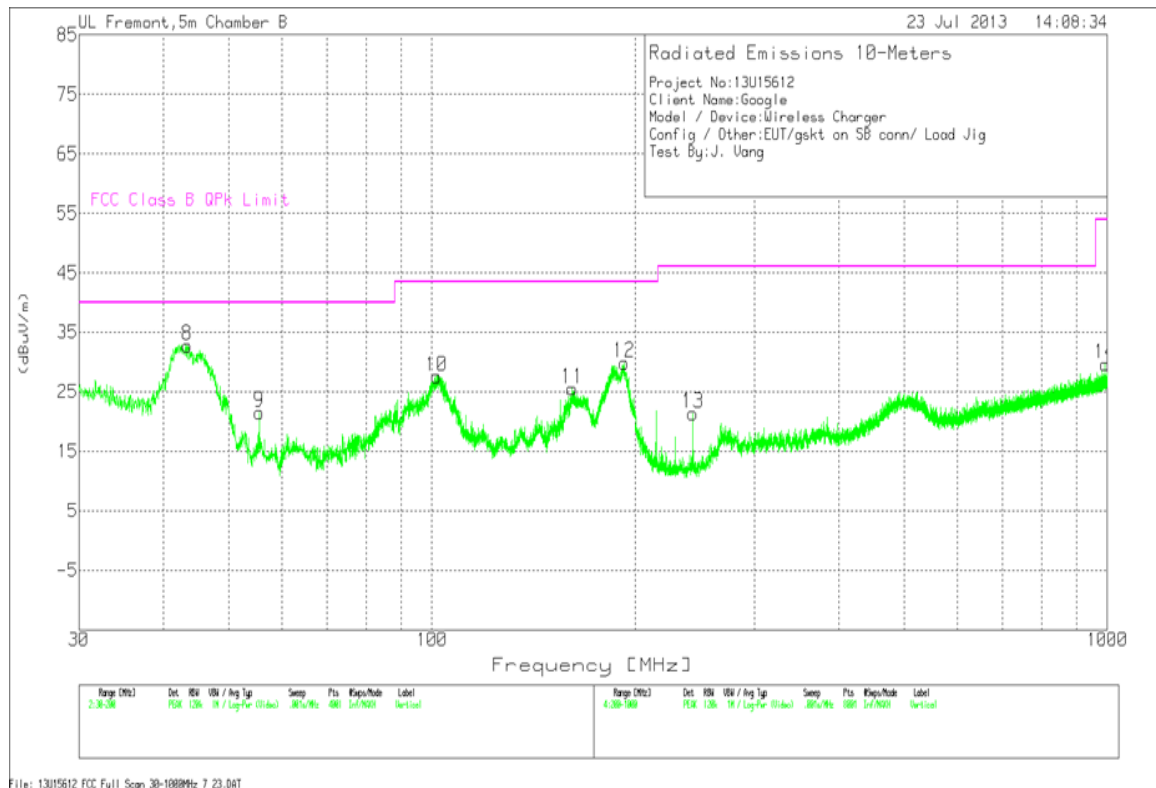
Trace Markers

Horizontal 30 - 200MHz									
Frequency (MHz)	Meter Reading	Det	AF T243 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	(dBuV/m)	FCC Class B QPk Limit	Margin (dB)	Height (cm)	Polarity
41.815	38.84	PK	12.1	-28.7	22.24	40	-17.76	300	Horz
101.57	48.41	PK	10.5	-28	30.91	43.5	-12.61	300	Horz
161.41	43.36	PK	12	-27.3	28.06	43.5	-15.46	200	Horz
191.925	52.42	PK	11.3	-27.1	36.62	43.5	-6.9	200	Horz
320.5	35.52	PK	13.8	-25.9	23.42	46	-22.58	100	Horz
508.7	33.54	PK	17.7	-25.7	25.54	46	-20.46	200	Horz
945.4	29.2	PK	22.7	-22.8	29.1	46	-16.9	300	Horz

PK - Peak detector

7.4. TX SPURIOUS EMISSION 30 TO 1000 MHz (VERTICAL)

VERTICAL PLOT



VERTICAL DATA

Trace Markers

Vertical 30 - 200MHz									
Frequency (MHz)	Meter Reading	Det	AF T243 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	(dBuV/m)	FCC Class B QPk Limit	Margin (dB)	Height (cm)	Polarity
43.43	50.46	PK	11	-28.7	32.76	40	-7.24	100	Vert
55.5	43.28	PK	6.9	-28.6	21.58	40	-18.42	100	Vert
101.613	45.06	PK	10.5	-28	27.56	43.5	-15.96	100	Vert
161.37	40.84	PK	12	-27.3	25.54	43.5	-17.98	100	Vert
192.65	45.62	PK	11.4	-27.1	29.92	43.5	-13.6	100	Vert
243.4	36.28	PK	11.6	-26.5	21.38	46	-24.64	400	Vert
993	28.77	PK	23.3	-22.4	29.67	54	-24.3	400	Vert

PK - Peak detector

7.5. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

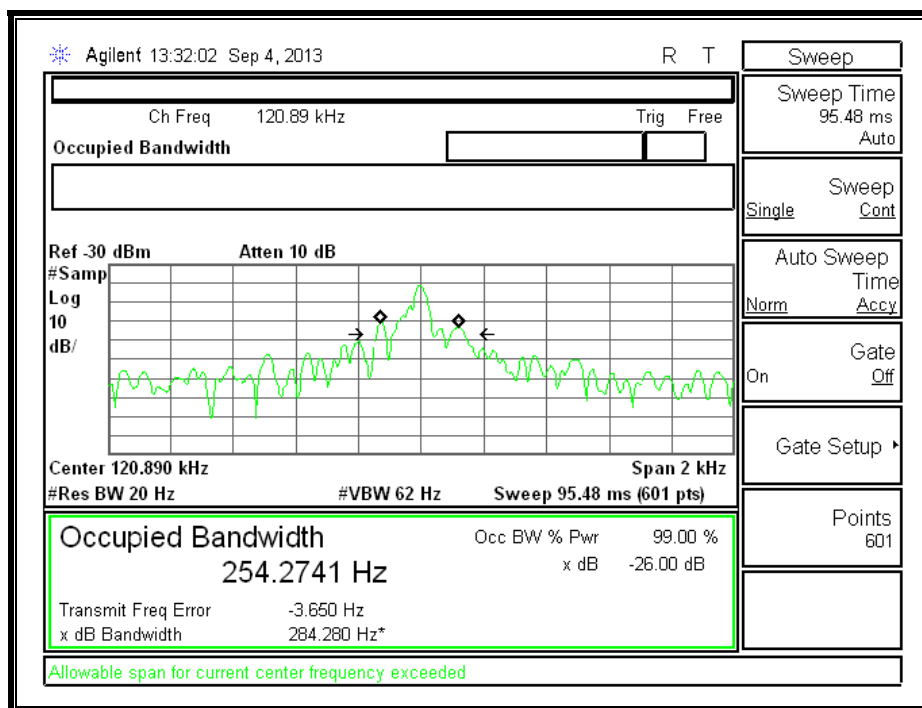
TEST PROCEDURE

The transmitter output is connected to E-Field probe then to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Frequency (MHz)	99% Bandwidth (KHz)
0.12089	0.25427

99% BANDWIDTH



8. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)
IC RSS-GEN, Section 7.2.2

Frequency of emission (MHz)	Conducted Limit (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
* Decreases with the logarithm of the frequency.		

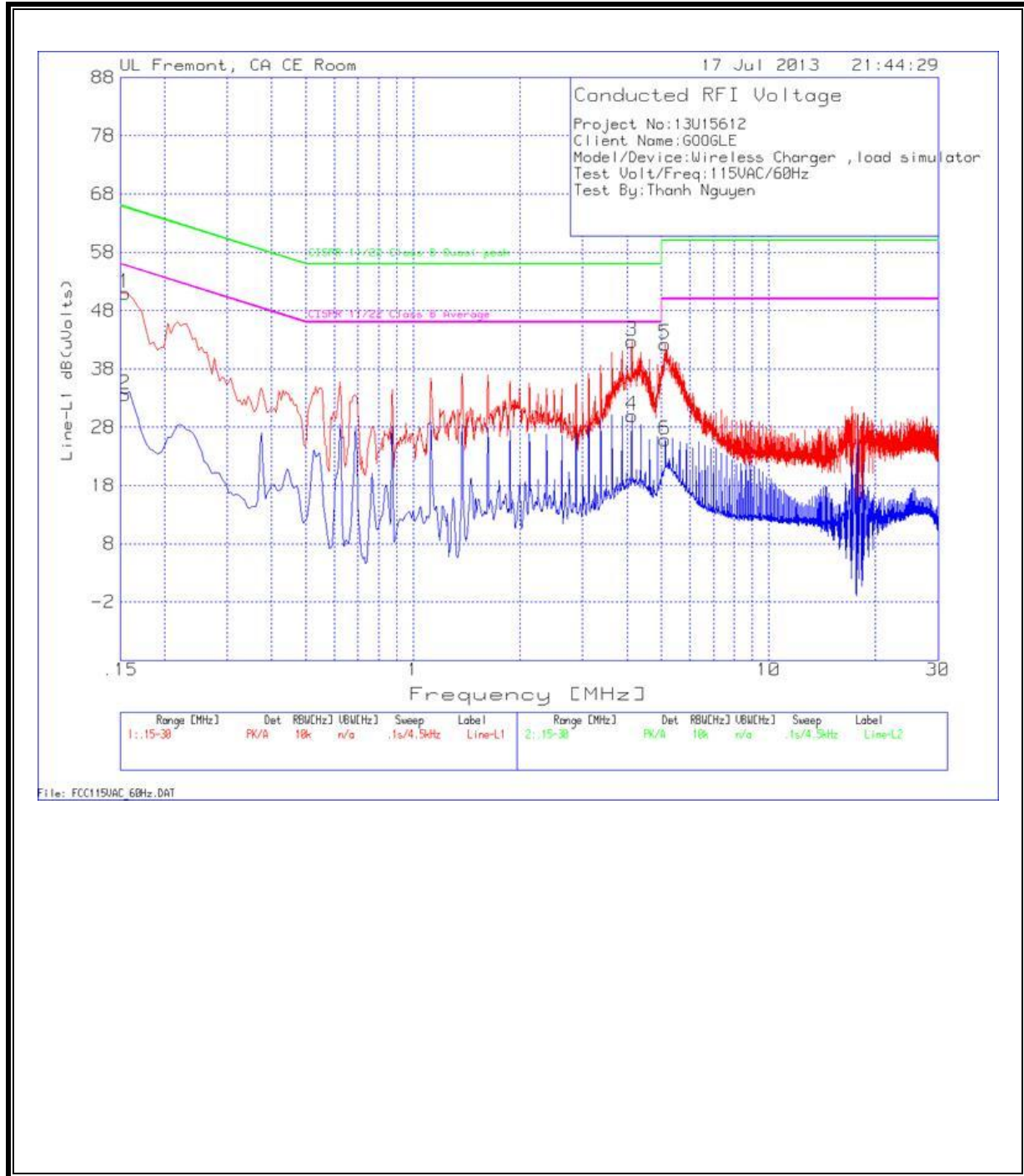
TEST PROCEDURE

ANSI C63.4

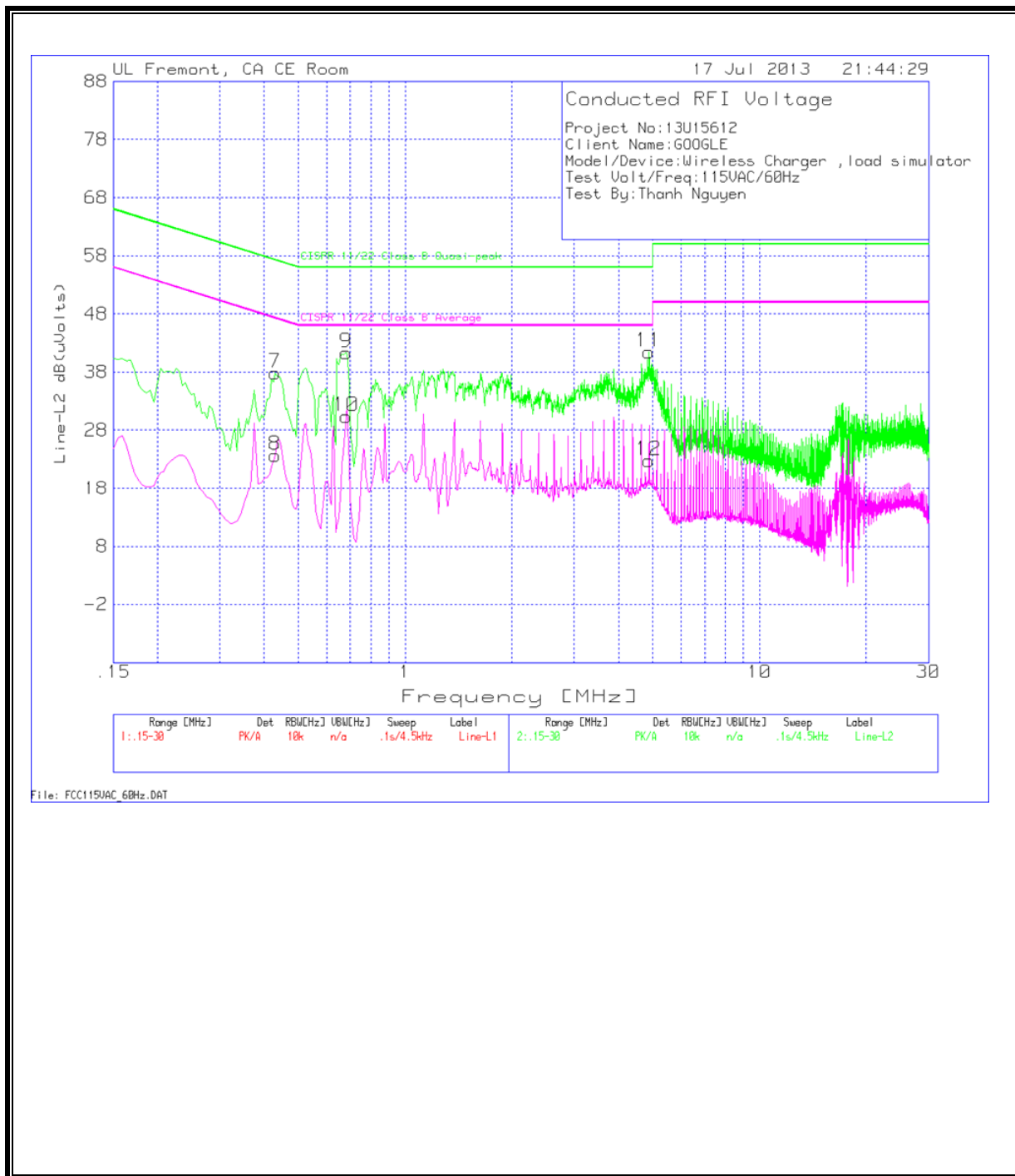
RESULTS

No non-compliance noted:

LINE 1 RESULTS



LINE 2 RESULTS



6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.1545	50.92	PK	.1	0	51.02	65.8	-14.78	-	-
2	.1545	33.53	Av	.1	0	33.63	-	-	55.8	-22.17
3	4.119	42.49	PK	.1	.1	42.69	56	-13.31	-	-
4	4.119	29.76	Av	.1	.1	29.96	-	-	46	-16.04
5	5.1225	42.05	PK	.1	.1	42.25	60	-17.75	-	-
6	5.1225	25.6	Av	.1	.1	25.8	-	-	50	-24.2

Line-L2 .15 - 30MHz

Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
7	.429	37.73	PK	.1	0	37.83	57.3	-19.47	-	-
8	.429	23.58	Av	.1	0	23.68	-	-	47.3	-23.62
9	.681	41.17	PK	.1	0	41.27	56	-14.73	-	-
10	.681	30.24	Av	.1	0	30.34	-	-	46	-15.66
11	4.8795	41.21	PK	.1	.1	41.41	56	-14.59	-	-
12	4.8795	22.56	Av	.1	.1	22.76	-	-	46	-23.24

PK - Peak detector

Av - average detection