



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

CERTIFICATION TEST REPORT

FOR

WIRELESS CHARGER

MODEL NUMBER: CW1

REPORT NUMBER: 15U20782-E1

FCC ID: 2AB8ZND8

IC: 1000X-ND8

ISSUE DATE: AUGUST 26, 2015

Prepared for
**INTEL CORPORATION
2200 MISSION COLLEGE BOULEVARD
SANTA CLARA, CA 95052, U.S.A.**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/26/2015	Initial Issue	E. Rincand

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: INTEL CORPORATION
2200 MISSION COLLEGE BOULEVARD
SANTA CLARA, CA 95052, U.S.A

EUT DESCRIPTION: WIRELESS CHARGER

MODEL: CW1

SERIAL NUMBER: W08222FZ5310007

DATE TESTED: AUGUST 7 – AUGUST 19, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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:



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SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:



THANH NGUYEN
EMC 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, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

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	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input checked="" type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

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 to charge wearable devices.

5.2. MAXIMUM OUTPUT POWER

The transmitter has maximum peak radiated electric field strength at 300m distance as follows:

Fundamental Frequency (KHz)	Mode	E field (300m distance) (dBuV/m)
205.2	Charging	-11.25

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal loop antenna (Circular Coil)

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was DVT Eng. Build.

5.5. WORST-CASE CONFIGURATION AND MODE

For radiated emission, EUT was tested on both metal and leather band; and AC power line conducted emissions was investigated with the following worst case configurations.

Configuration	Mode	Descriptions
1	Charging	EUT with Watch, powered by USB power adapter
2	Charging	EUT with Watch, powered by laptop

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Watch	Intel	FTW1000	CL8354FZ52100B7	2AB8ZND4
Laptop	Lenovo	T420	4236B92	Not Available

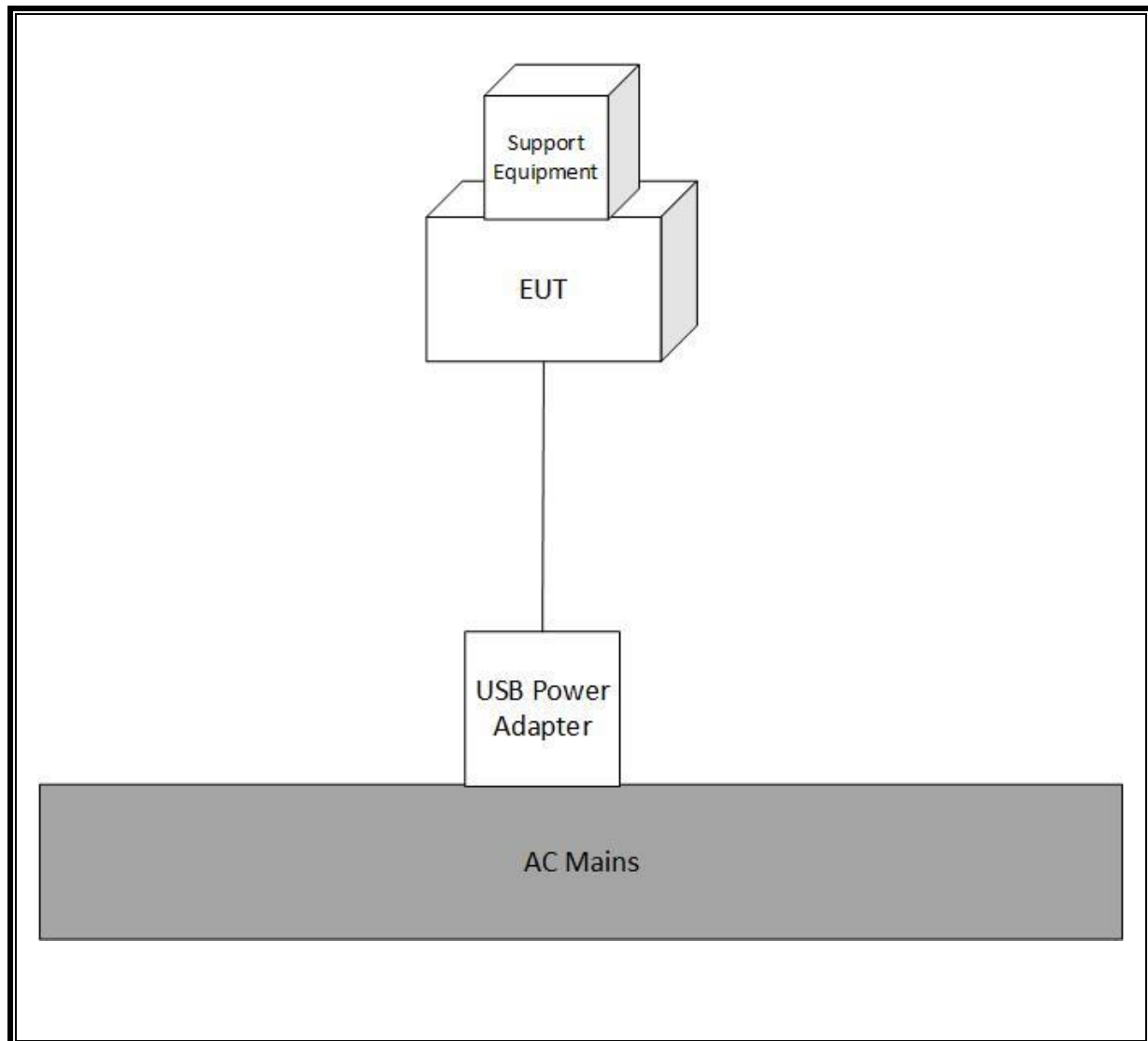
I/O CABLES

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 was powered by USB power Adapter and Watch is in charging mode.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

Radiated Emissions

Test Equipment List					
Description	Manufacturer	Model	Local ID (T No.)	Cal Date	Cal Due
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	341	10/15/2014	10/15/2015
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	122	02/13/2015	02/13/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	173	06/09/2015	06/09/2016
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	35	05/15/2015	05/15/2016
Thermometer	Extech	445703	1007	9/18/2014	9/18/2015
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015		

Line Conducted Emissions

Test Equipment List					
Description	Manufacturer	Model	Local ID (T No.)	Cal Date	Cal Due
EMI Test Receiver, 9KHz to 7GHz	Rohde & Schwarz	ESCI 7	284	09/16/2014	09/16/2015
LISN	FCC	50/250-25-2	24	01/16/2015	01/16/2016
Thermometer	Cole-Palmer	99760-00	437	04/08/2015	04/08/2016
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

7. OCCUPIED BANDWIDTH

7.1. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

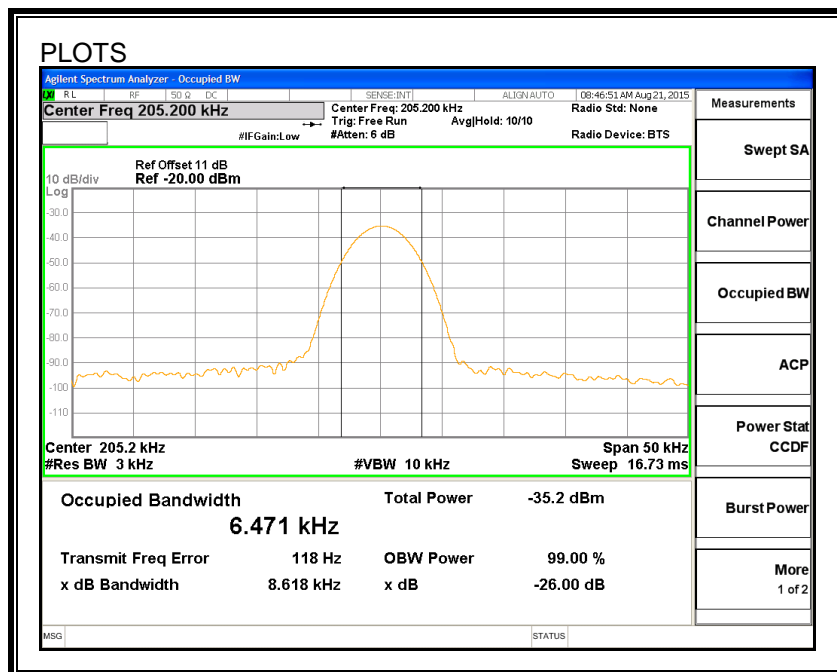
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the emission bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Frequency (KHz)	99% Bandwidth (KHz)
205.2	6.471

99% BANDWIDTH



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.209 (a)
IC RSS-GEN, Section 8.9 & 8.10 (Transmitter)

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.		

RESULTS

8.1.1. FUNDAMENTAL FROM 0.15 TO 30 MHz

EUT WITH METAL BAND

FCC Part 15, Subpart B & C													
Measurement Distance (m): 3													
Company: Intel													
Project #: 145U20782													
EUT configuration #: EUT with Metal/AC Charger													
Mode of operation: Charging													
Tester: Thanh Nguyen													
Date: 8/24/15													
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF dB/m	Distance (m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:													
0.2052	58.327		58.01	10.42	3	-80.00	-11.25	-11.57	41.36	21.36	-52.6	-32.9	
Loop Antenna Face Off:													
0.2052	51.801		51.72	10.42	3	-80.00	-17.78	-17.86	41.36	21.36	-59.1	-39.2	
* 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 Readings A.F. = Antenna factor													
Below 150kHz => RBW=VBW=200 or 300Hz Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)													
Rev. 010715													

EUT WITH LEATHER BAND

FCC Part 15, Subpart B & C

Measurement Distance (m): 3

Company: Intel

Project #: 145U20782

EUT configuration #: EUT with Leather/AC Charger

Mode of operation: Charging

Tester: Thanh Nguyen

Date: 8/24/15

Frequency (MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	AF dB/m	Distance (m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:													
0.2052	53.244		50.14	10.42	3	-80.00	-16.33	-19.44	41.36	21.36	-57.7	-40.8	
Loop Antenna Face Off:													
0.2052	47.024		44.07	10.42	3	-80.00	-22.55	-25.51	41.36	21.36	-63.9	-46.9	

* 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 Readings

A.F. = Antenna factor

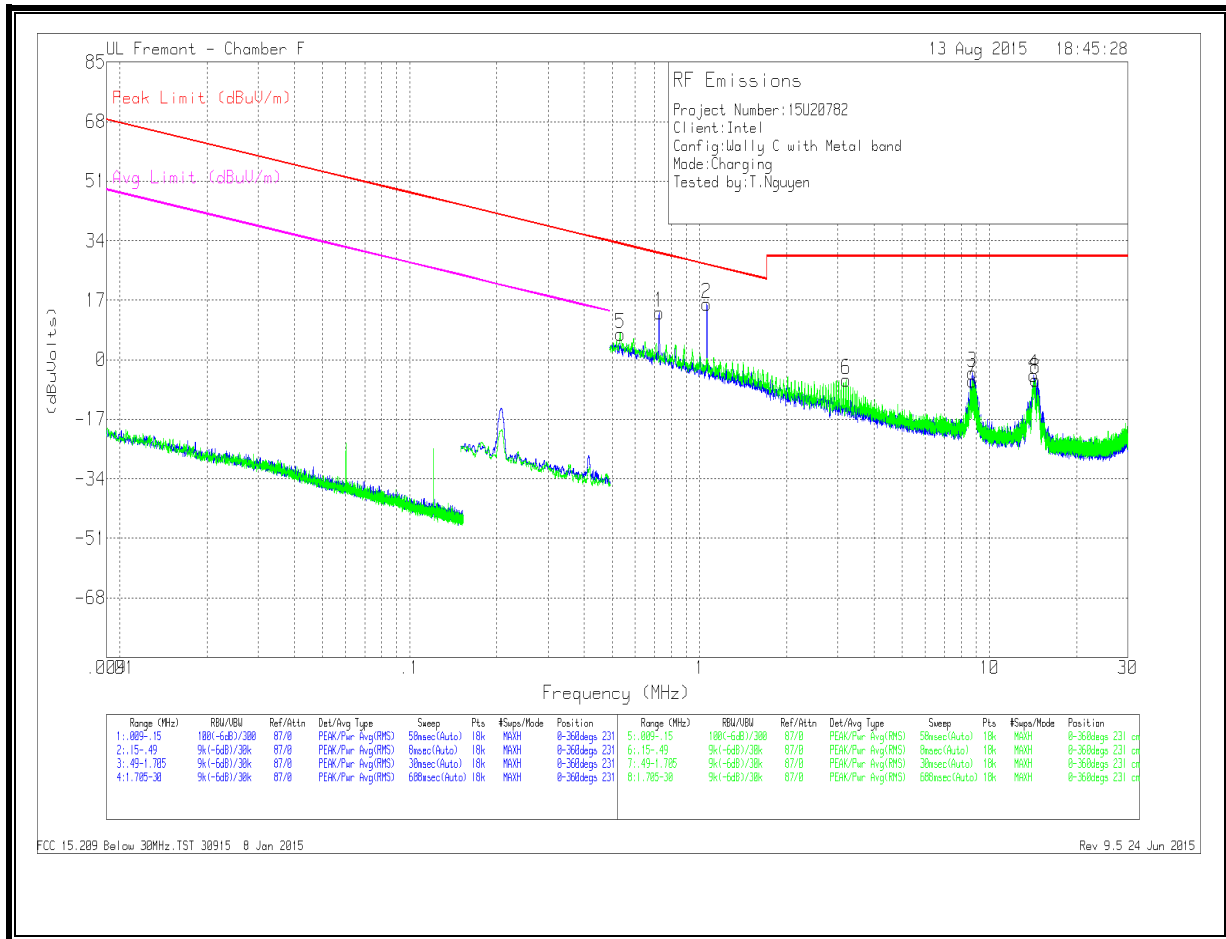
Below 150kHz => RBW=VBW=200 or 300Hz

Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)

Rev. 010715

8.1.2. TX SPURIOUS EMISSIONS 0.15 TO 30 MHz

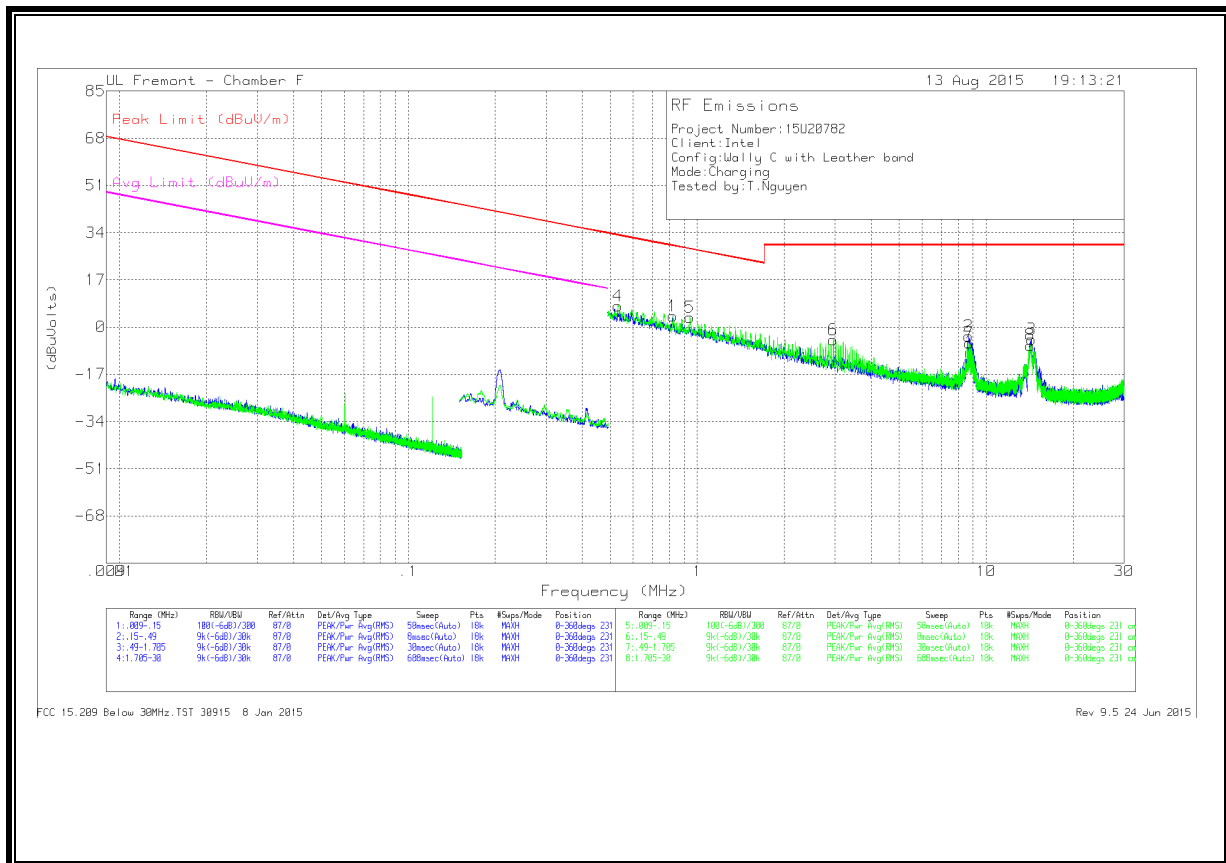
EUT WITH METAL BAND WATCH



DATA SUMMARY

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Amp/Cbl (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.72507	43.25	Pk	10.2	.1	-40	13.55	30.4	-16.85	-	-	0-360
2	1.05947	45.5	Pk	10.4	.1	-40	16	27.1	-11.1	-	-	0-360
3	8.74913	25.55	Pk	10.4	.3	-40	-3.75	29.54	-33.29	-	-	0-360
4	14.21026	24.84	Pk	10.3	.4	-40	-4.46	29.54	-34	-	-	0-360
5	.53308	37.05	Pk	10.3	.1	-40	7.45	33.07	-25.62	-	-	0-360
6	3.1984	23.63	Pk	10.4	.2	-40	-5.77	29.54	-35.31	-	-	0-360
7	8.74992	23.4	Pk	10.4	.3	-40	-5.9	29.54	-35.44	-	-	0-360
8	14.3879	23.66	Pk	10.3	.4	-40	-5.64	29.54	-35.18	-	-	0-360

EUT WITH LEATHER BAND WATCH

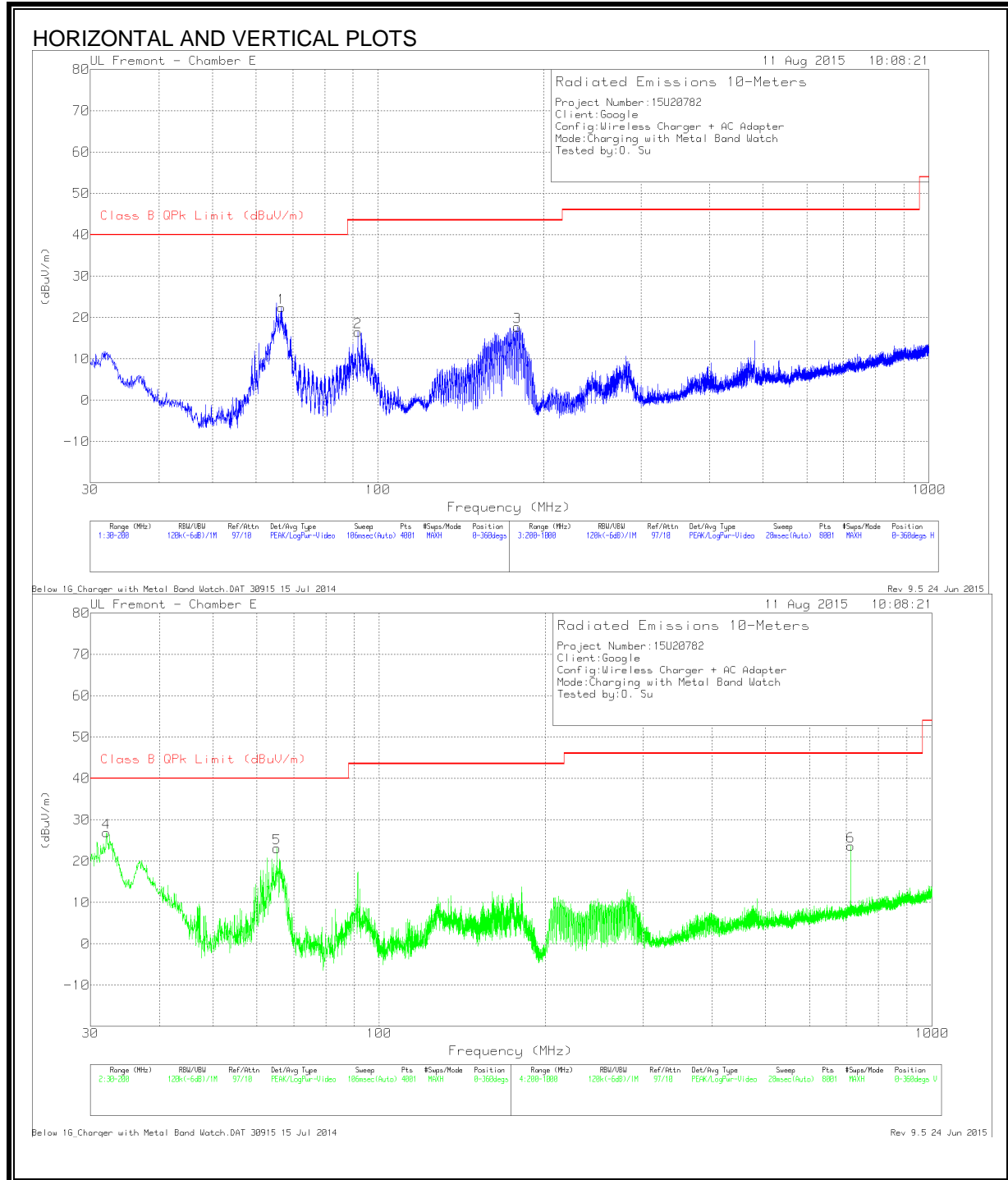


DATA SUMMARY

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Amp/Cbl (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.82209	33.65	Pk	10.2	.1	-40	3.95	29.31	-25.36	-	-	0-360
2	8.68782	26.01	Pk	10.4	.3	-40	-3.29	29.54	-32.83	-	-	0-360
3	14.31873	24.86	Pk	10.3	.4	-40	-4.44	29.54	-33.98	-	-	0-360
4	.53121	37.11	Pk	10.3	.1	-40	7.51	33.1	-25.59	-	-	0-360
5	.94289	33.13	Pk	10.3	.1	-40	3.53	28.11	-24.58	-	-	0-360
6	2.95867	24.79	Pk	10.4	.2	-40	-4.61	29.54	-34.15	-	-	0-360
7	8.7507	23.56	Pk	10.4	.3	-40	-5.74	29.54	-35.28	-	-	0-360
8	14.20083	22.76	Pk	10.3	.4	-40	-6.54	29.54	-36.08	-	-	0-360

8.1.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

EUT WITH METAL BAND WATCH

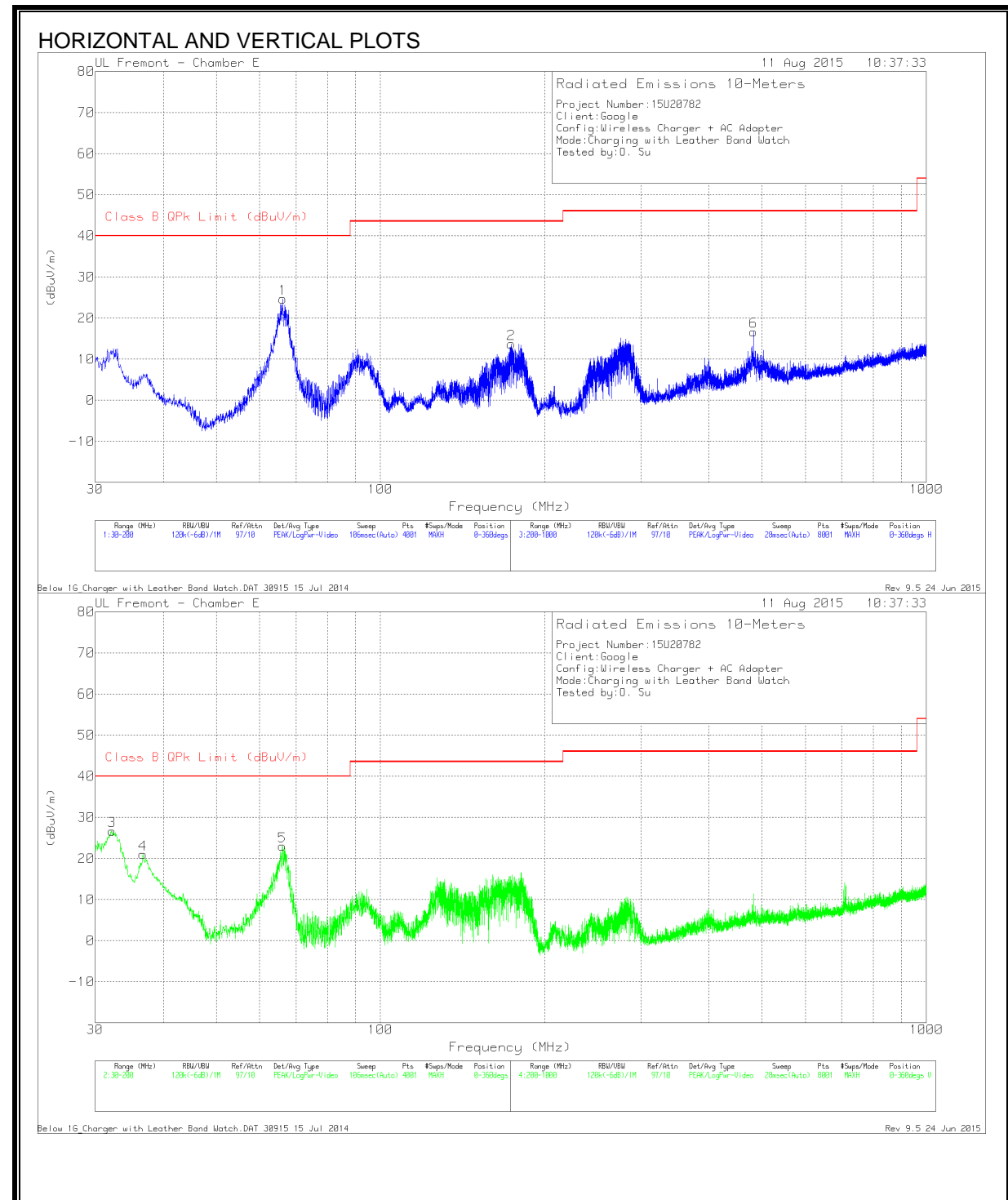


DATA SUMMARY

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB) 20Log	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	66.7625	56.26	Pk	8.1	-31.5	-10.5	22.36	40	-17.64	0-360	201	H
2	91.8375	50.07	Pk	8.2	-31.3	-10.5	16.47	43.52	-27.05	0-360	301	H
3	178.92	47.62	Pk	11.3	-30.7	-10.5	17.72	43.52	-25.8	0-360	103	H
4	32.0825	49.77	Pk	19.5	-31.9	-10.5	26.87	40	-13.13	0-360	100	V
5	65.2325	57.3	Pk	7.9	-31.6	-10.5	23.1	40	-16.9	0-360	100	V
6	712.7	42.41	Pk	20.3	-28.6	-10.5	23.61	46.02	-22.41	0-360	100	V

Pk - Peak detector

EUT WITH LEATHER BAND WATCH



DATA SUMMARY

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB) 20Log	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	66.21	58.71	Pk	8	-31.5	-10.5	24.71	40	-15.29	0-360	301	H
2	173.6075	43.32	Pk	11.6	-30.7	-10.5	13.72	43.52	-29.8	0-360	201	H
3	32.21	49.7	Pk	19.4	-31.9	-10.5	26.7	40	-13.3	0-360	100	V
4	36.715	46.79	Pk	16.5	-31.8	-10.5	20.99	40	-19.01	0-360	100	V
5	66.125	57.01	Pk	8	-31.5	-10.5	23.01	40	-16.99	0-360	100	V
6	482.1	38.91	Pk	17.6	-29.3	-10.5	16.71	46.02	-29.31	0-360	100	H

Pk - Peak detector

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)
IC RSS-GEN, Section 8.8

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 C63.10:2013

RESULTS

9.1. RESULTS – EUT WITH USB POWER ADAPTER

WORST CONDUCTED EMISSIONS – 120 V, 60 Hz

Line-L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16238	41.71	Qp	1.3	0	43.01	65.34	-22.33	-	-
.16238	25.28	Ca	1.3	0	26.58	-	-	55.34	-28.76
.57863	44.03	Qp	.3	0	44.33	56	-11.67	-	-
.57863	36.39	Ca	.3	0	36.69	-	-	46	-9.31
4.38428	36.32	Qp	.2	.1	36.62	56	-19.38	-	-
4.38428	28.43	Ca	.2	.1	28.73	-	-	46	-17.27

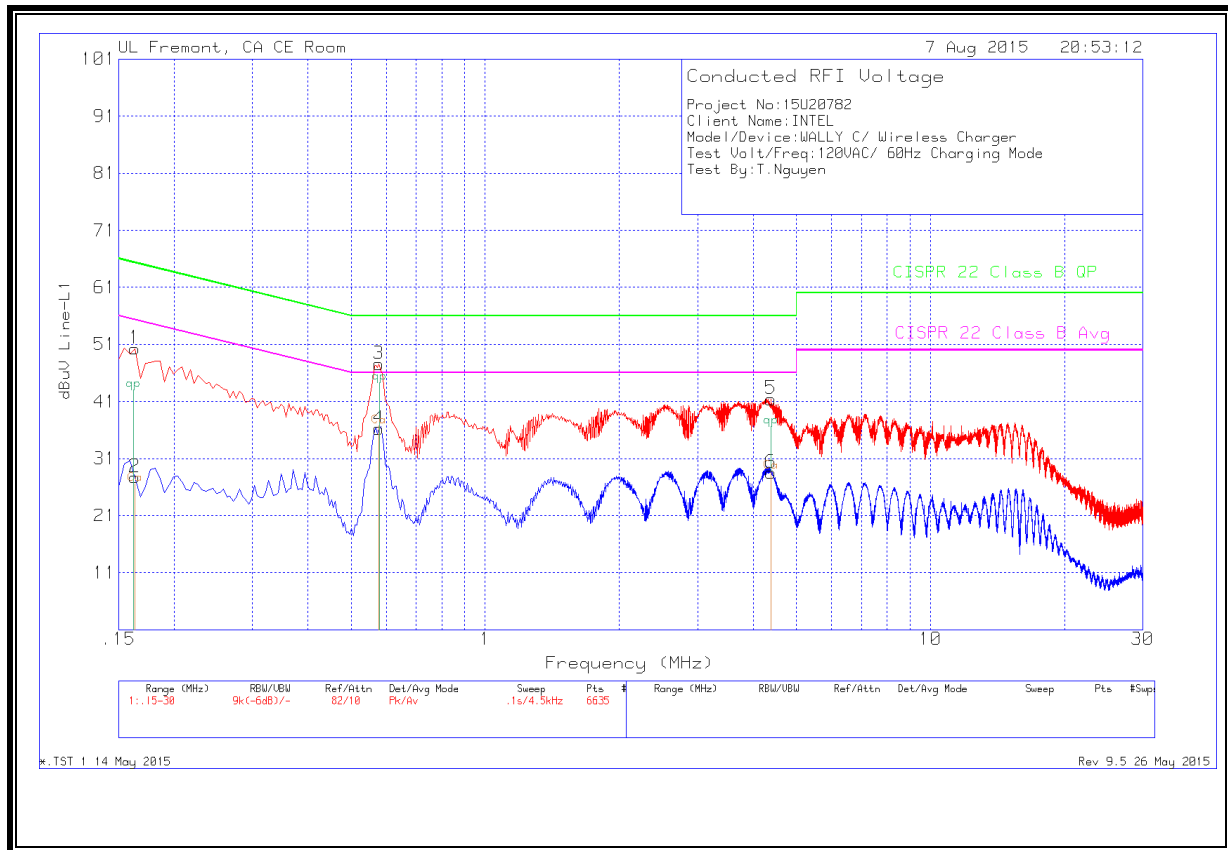
Line-L2 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16013	35.53	Qp	1.4	0	36.93	65.46	-28.53	-	-
.16013	14.85	Ca	1.4	0	16.25	-	-	55.46	-39.21
.57638	38.74	Qp	.3	0	39.04	56	-16.96	-	-
.57638	30.91	Ca	.3	0	31.21	-	-	46	-14.79
4.02428	28.04	Qp	.2	.1	28.34	56	-27.66	-	-
4.02428	19.19	Ca	.2	.1	19.49	-	-	46	-26.51

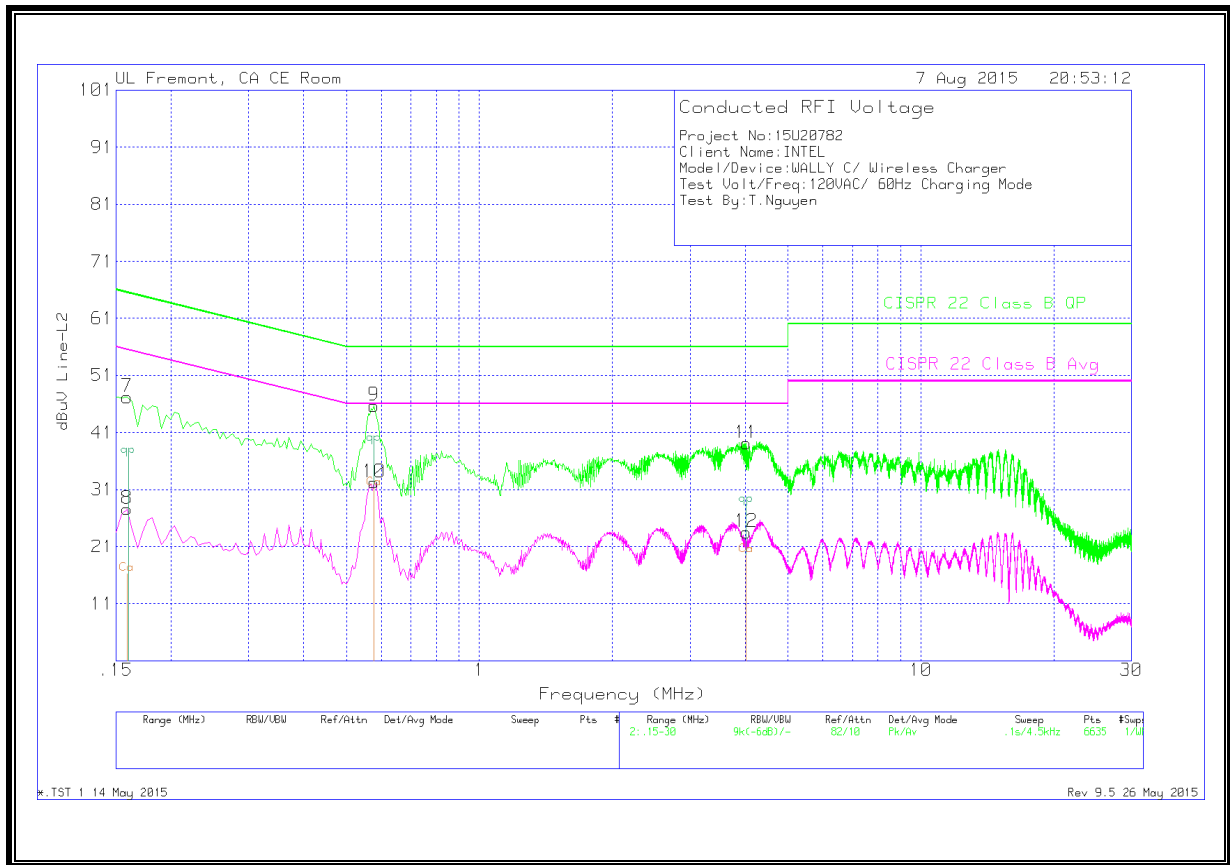
Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



9.2. RESULTS – EUT WITH LAPTOP

WORST CONDUCTED EMISSIONS – 120 V, 60 Hz

Line-L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.17318	45.4	Qp	1.1	0	46.5	64.81	-18.31	-	-
.17318	33.56	Ca	1.1	0	34.66	-	-	54.81	-20.15
.54713	29.6	Qp	.3	0	29.9	56	-26.1	-	-
.54713	24.95	Ca	.3	0	25.25	-	-	46	-20.75
.52463	25.68	Qp	.3	0	25.98	56	-30.02	-	-
.52463	21.35	Ca	.3	0	21.65	-	-	46	-24.35
2.23913	26.94	Qp	.2	.1	27.24	56	-28.76	-	-
2.23913	22.15	Ca	.2	.1	22.45	-	-	46	-23.55
2.24768	26.46	Qp	.2	.1	26.76	56	-29.24	-	-
2.24768	21.54	Ca	.2	.1	21.84	-	-	46	-24.16
3.66788	21.98	Qp	.2	.1	22.28	56	-33.72	-	-
3.66788	16.63	Ca	.2	.1	16.93	-	-	46	-29.07

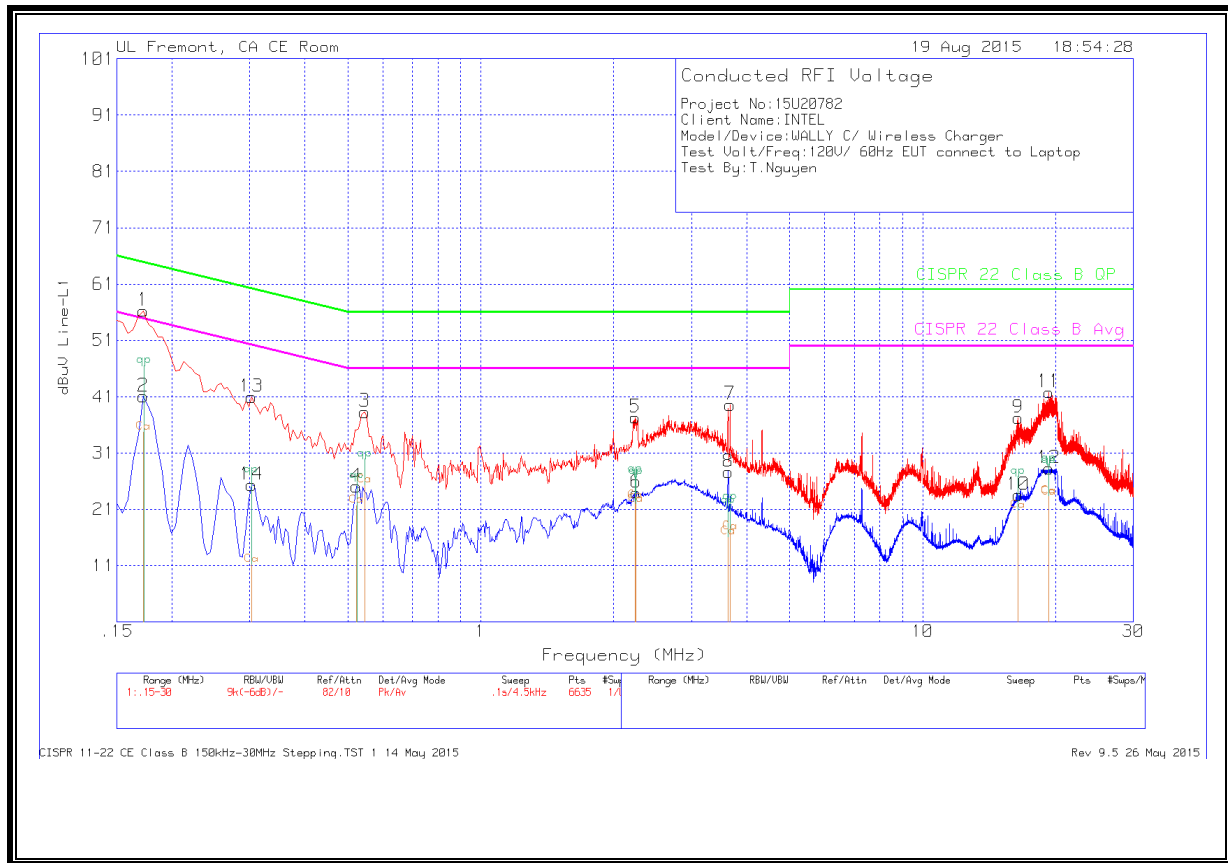
Line-L2 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.15338	44.1	Qp	1.5	0	45.6	65.81	-20.21	-	-
.15338	25.81	Ca	1.5	0	27.31	-	-	55.81	-28.5
.20378	39.12	Qp	1	0	40.12	63.46	-23.34	-	-
.20378	28.64	Ca	1	0	29.64	-	-	53.46	-23.82
.56963	32.33	Qp	.3	0	32.63	56	-23.37	-	-
.56963	27.18	Ca	.3	0	27.48	-	-	46	-18.52
2.76113	27.88	Qp	.2	.1	28.18	56	-27.82	-	-
2.76113	23.3	Ca	.2	.1	23.6	-	-	46	-22.4
18.5516	31.23	Qp	.3	.2	31.73	60	-28.27	-	-
18.5516	26.13	Ca	.3	.2	26.63	-	-	50	-23.37

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS

