



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

**CERTIFICATION TEST REPORT**

**FOR**

**MAGNETIC CHARGING CASE**

**MODEL NUMBER: A1647**

**REPORT NUMBER: 15U19950-E1, REVISION B**

**FCC ID: BCGA1647  
IC: 579C-A1647**

**ISSUE DATE: FEBRUARY 23, 2015**

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**NVLAP LAB CODE 200065-0**

Revision History

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|-------------|-------------------|---|-------------------|
| --          | 02/13/2015        | Initial Issue   | M. Mekuria        |
| A           | 02/19/2015        | Revised report to address TCB's questions               | M. Mekuria        |
| B           | 02/23/2015        | Revised report to address TCB's question on Section 5.4 | T. Chu            |

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** MAGNETIC CHARGING CASE

**MODEL:** A1647

**SERIAL NUMBER:** DLC5036000QG6L429

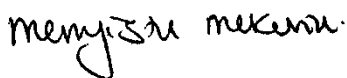
**DATE TESTED:** FEBRUARY 03 – 04, 2015

| APPLICABLE STANDARDS  |              |
|-----------------------|--------------|
| STANDARD              | TEST RESULTS |
| FCC PART 15 SUBPART C | Pass         |
| RSS-210 Issue 8       | 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.

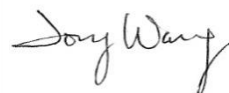
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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:



MENGISTU MEKURIA  
SENIOR ENGINEER  
UL VERIFICATION SERVICES INC.

Tested By:



TONY WANG  
EMC ENGINEER  
UL VERIFICATION SERVICES INC.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, and FCC CFR 47 Part 15, RSS-GEN Issue 4 and RSS-210 Issue 8 December 2010.

## 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 type="checkbox"/> Chamber E            |
| <input type="checkbox"/> Chamber C | <input type="checkbox"/> Chamber F            |
|                                    | <input checked="" 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:

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

### 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 | $\pm 3.52$ dB |
| Radiated Disturbance, 30 to 1000 MHz  | $\pm 4.94$ dB |
| Radiated Disturbance, 1 to 6 GHz      | $\pm 3.86$ dB |
| Radiated Disturbance, 6 to 18 GHz     | $\pm 4.23$ dB |
| Radiated Disturbance, 18 to 26 GHz    | $\pm 5.30$ dB |
| Radiated Disturbance, 26 to 40 GHz    | $\pm 5.23$ dB |

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a stainless steel magnetic charger enclosed in a plastic case. The charger includes an inductive charging coil to charge the Apple Watch.

### 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) |
|-----------------------------|---------|----------------------------------|
| 326.5                       | Standby | -18.19                           |

### 5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was v092.

### 5.4. WORST-CASE CONFIGURATION AND MODE

The EUT is a single frequency stainless steel magnetic charger enclosed in a plastic case. The For the entire radiated emissions test, the EUT was investigated on the following configuration during the test at its natural orientation.

| Configuration | Mode      | Descriptions                           |
|---------------|-----------|--|
| 1             | Standby   | EUT Alone powered by AC/DC adapter     |
| 2             | Operating | EUT and Watch powered by AC/DC adapter |

AC power line conducted emissions were also investigated with the following configurations and EUT powered by AC/DC adapter was the worst-case scenario. All final tests conducted on configuration 1 and 2.

| Configuration | Mode      | Descriptions                           |
|---------------|-----------|--|
| 1             | Standby   | EUT Alone powered by AC/DC adapter     |
| 2             | Operating | EUT and Watch powered by AC/DC adapter |
| 3             | Standby   | EUT Alone powered by laptop            |
| 4             | Operating | EUT and Watch powered by laptop        |

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |       |                  |           |
|------------------------|--------------|-------|------------------|-----------|
| Description            | Manufacturer | Model | Serial Number    | FCC ID    |
| AC/DC adapter          | Apple        | A1385 | D29236C3AFDHLHCT | N/A       |
| Watch                  | Apple        | A1554 | FG7NPOVLFY2H     | BCG-E2871 |
| Watch                  | Apple        | A1553 | FG7NG0CVFY1P     | BCG-E2870 |

### I/O CABLES

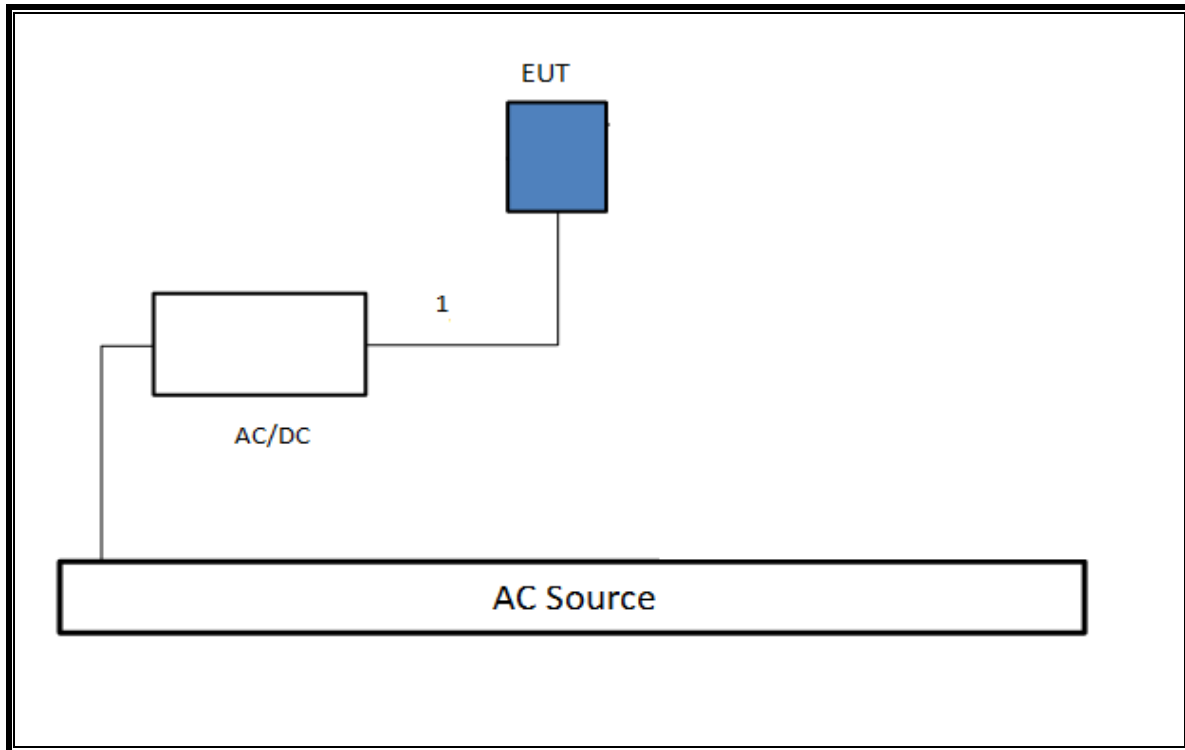
| I/O CABLE LIST |      |                      |                |             |                  |         |
|----------------|------|----------------------|----------------|-------------|------------------|---------|
| Cable No.      | Port | # of Identical Ports | Connector Type | Cable Type  | Cable Length (m) | Remarks |
| 1              | DC   | 1                    | USB            | Un-shielded | 2                | N/A     |

### TEST SETUP

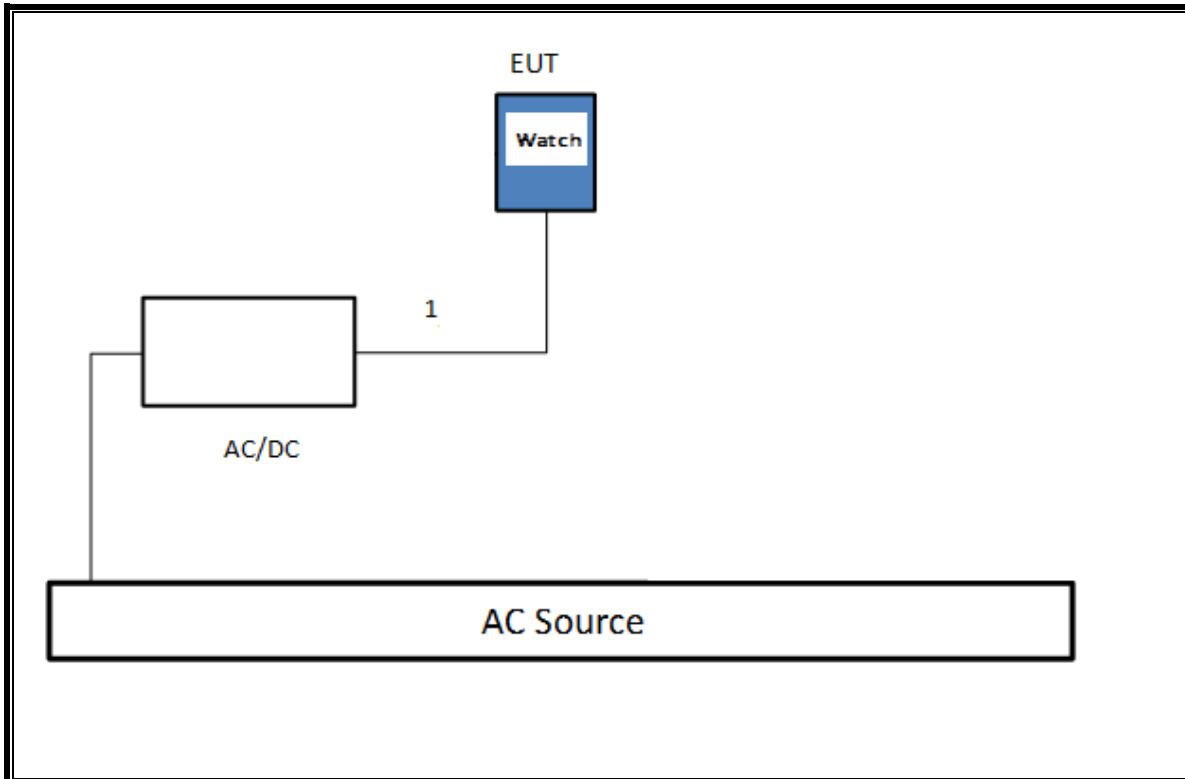
Please see the following configurations for the test setups. Both configurations indicate that the EUT is directly connected to an AC/DC adapter via USB cable.



**CONFIGURATION 1: STANDBY MODE**



**CONFIGURATION 2: OPERATING MODE**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

| Description                                 | Manufacturer   | Model       | Asset      | Cal Due  |
|---|----------------|-------------|------------|----------|
| Antenna, Broadband Hybrid, 30MHz to 2000MHz | Sunol Sciences | JB3         | A051314-2  | 06/05/15 |
| Amplifier, 10KHz to 1GHz, 32dB              | Sonoma         | 310N        | 325118     | 04/27/15 |
| Spectrum Analyzer, PXA, 3Hz to 44GHz        | Agilent        | N9030A      | MY53311010 | 05/17/15 |
| Antenna, Loop, 30 MHz                       | ETS Lindgren   | 6502        | F00366     | 10/04/15 |
| Switch Driver                               | ACS            | 11713A      | 2508A04052 | N/A      |
| Antenna, Hybrid 30MHz to 2GHz               | Sunol Sciences | JB3         | T407       | 05/05/15 |
| PXA Signal Analyzer 3Hz to 44GHz            | Agilent        | N9030A      | T340       | 03/11/15 |
| EMI Test Receiver                           | R & S          | ESCI 7      | T284       | 09/16/15 |
| LISN, 10 kHz - 30 MHz                       | FCC            | 50/250-25-2 | T24        | 01/17/16 |

## 7. OCCUPIED BANDWIDTH

The emission bandwidth ( $\times$ dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated  $\times$  dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least  $3\times$  the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

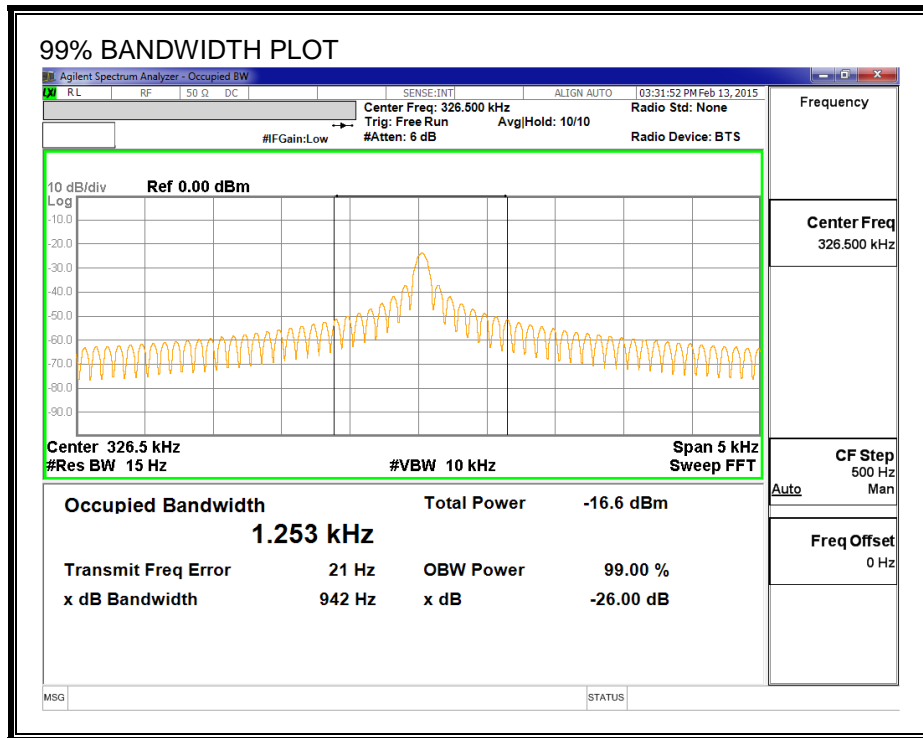
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately  $3\times$ RBW.

**Note:** Video averaging is not permitted.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.209 (a)  
IC RSS-GEN, Section 8.9 and 8.10.  
IC RSS-GEN, Section 7 (Receiver)

| 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

## 8.2. TX FUNDAMENTAL FROM 0.15 TO 30 MHz

### 8.2.1. STANDBY CONFIGURATION CHARGER

| FCC Part 15, Subpart B & C   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                | 3 Meter Distance Measurement At Chamber-G |  |
|--|-----------|-----------|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|---|--|
| <b>Company:</b>  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <b>Project #:</b> 15U19950   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <b>EUT configuration #:</b> Charger  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <b>Mode of operation:</b> Standby  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <b>Tester:</b> T Wang  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <b>Date:</b> 2/3/2015  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| 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                                     |  |
| <b>Loop Antenna Face On:</b>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| 0.3265   | 51.27     |           | 38.23     | 10.54     | 3            | -80.00                   | -18.19                        | -31.23                        | 37.33             | 17.33             | -55.5          | -48.6          |   |  |
| <b>Loop Antenna Face Off:</b>  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| 0.3265   | 47.61     |           | 32.73     | 10.54     | 3            | -80.00                   | -21.85                        | -36.73                        | 37.33             | 17.33             | -59.2          | -54.1          |   |  |
| * No more emissions were found up to 30MHz   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <p>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> |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| <p>P.K = Peak<br/>                     Q.P. = Quasi Peak Readings Below 150kHz =&gt; RBW=VBW=200 or 300Hz<br/>                     A.F. = Antenna factor Above 150kHz =&gt;RBW=VBW=9 or 10kHz (Average =&gt; VBW=10Hz)</p>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |
| Rev. 060314  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |   |  |

## 8.2.2. OPERATING CONFIGURATION CHARGER

### A1554

| FCC Part 15, Subpart B & C  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       | 3 Meter Distance Measurement At Chamber-G |  |
|---|-----------|-----------|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-------|---|--|
| <b>Company:</b>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Project #:</b> 15U19950  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>EUT configuration #:</b> Charger + Supporting Device   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Mode of operation:</b> Operating   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Tester:</b> T Wang   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Date:</b> 2/3/2015   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 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 |   |  |
| <b>Loop Antenna Face On:</b>  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 0.3265  | 42.45     |           | 32.64     | 10.54     | 3            | -80.00                   | -27.01                        | -36.82                        | 37.33             | 17.33             | -64.3          | -54.1          |       |   |  |
| <b>Loop Antenna Face Off:</b>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 0.3265  | 41.67     |           | 31.43     | 10.54     | 3            | -80.00                   | -27.79                        | -38.03                        | 37.33             | 17.33             | -65.1          | -55.4          |       |   |  |
| * 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<br>Q.P. = Quasi Peak Readings      Below 150kHz => RBW=VBW=200 or 300Hz<br>A.F. = Antenna factor              Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| Rev. 060314   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |

### A1553

| FCC Part 15, Subpart B & C  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       | 3 Meter Distance Measurement At Chamber-G |  |
|---|-----------|-----------|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-------|---|--|
| <b>Company:</b>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Project #:</b> 15U19950  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>EUT configuration #:</b> Charger + Supporting Device   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Mode of operation:</b> Operating   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Tester:</b> T Wang   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| <b>Date:</b> 2/4/2015   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 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 |   |  |
| <b>Loop Antenna Face On:</b>  |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 0.3265  | 42.49     |           | 32.41     | 10.54     | 3            | -80.00                   | -26.97                        | -37.05                        | 37.33             | 17.33             | -64.3          | -54.4          |       |   |  |
| <b>Loop Antenna Face Off:</b>   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| 0.3265  | 41.57     |           | 31.75     | 10.54     | 3            | -80.00                   | -27.89                        | -37.71                        | 37.33             | 17.33             | -65.2          | -55.0          |       |   |  |
| * 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<br>Q.P. = Quasi Peak Readings      Below 150kHz => RBW=VBW=200 or 300Hz<br>A.F. = Antenna factor              Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |
| Rev. 060314   |           |           |           |           |              |                          |                               |                               |                   |                   |                |                |       |   |  |

### 8.3. TX SPURIOUS EMISSIONS FROM 0.15 TO 30 MHz

#### 8.3.1. STANDBY CONFIGURATION CHARGER

| FCC Part 15, Subpart B & C   |           | 3 Meter Distance Measurement At Chamber-G |           |           |              |                          |                               |                               |                   |                   |                |                |       |
|--|-----------|---|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-------|
| <b>Company:</b>  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Project #:</b>  |           | 15U19950                                  |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>EUT configuration #:</b>  |           | Charger                                   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Mode of operation:</b>  |           | Standby                                   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Tester:</b>   |           | T Wang                                    |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Date:</b>   |           | 2/3/2015                                  |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 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 |
| <b>Face On</b>   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.653  | 39.15     | 33.11                                     | -         | 10.53     | 3            | -40.00                   | 3.64                          | -                             | 31.31             | -                 | -27.7          | -              |       |
| 0.978  | 35.27     | 29.36                                     | -         | 10.6      | 3            | -40.00                   | -0.04                         | -                             | 27.80             | -                 | -27.8          | -              |       |
| 1.307  | 30.38     | 24.27                                     | -         | 10.6      | 3            | -40.00                   | -5.13                         | -                             | 25.28             | -                 | -30.4          | -              |       |
| <b>Face Off:</b>   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.658  | 36.36     | 30.23                                     | -         | 10.53     | 3            | -40.00                   | 0.76                          | -                             | 31.24             | -                 | -30.5          | -              |       |
| 1.305  | 27.98     | 21.76                                     | -         | 10.6      | 3            | -40.00                   | -7.64                         | -                             | 25.29             | -                 | -32.9          | -              |       |
| * No more emissions were found up to 30MHz   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <p>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> <p>P.K. = Peak<br/>                     Q.P. = Quasi Peak Readings      Below 150kHz =&gt; RBW=VBW=200 or 300Hz<br/>                     A.F. = Antenna factor              Above 150kHz =&gt;RBW=VBW=9 or 10kHz (Average =&gt; VBW=10Hz)</p> |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| Rev. 060314  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |



### 8.3.2. OPERATING CONFIGURATION CHARGER

#### A1554

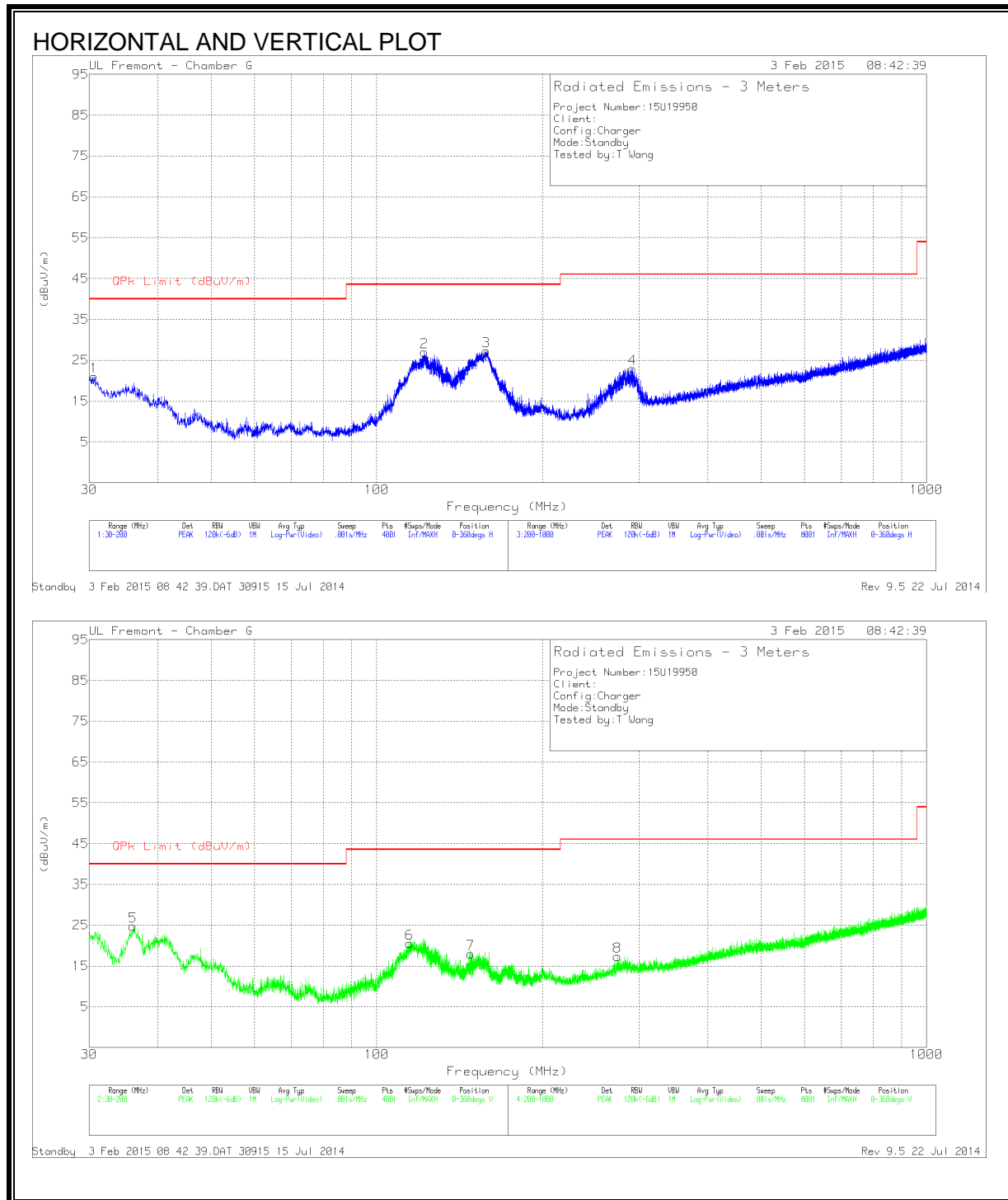
| FCC Part 15, Subpart B & C  |           | 3 Meter Distance Measurement At Chamber-G |           |           |              |                          |                               |                               |                   |                   |                |                |       |
|---|-----------|---|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-------|
| <b>Company:</b>   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Project #:</b> 15U19950  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>EUT configuration #:</b> Charger + Supporting Device   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Mode of operation:</b> Operating   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Tester:</b> T Wang   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Date:</b> 2/3/2015   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 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 |
| <b>Face On</b>  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.673   | 35.52     | 29.41                                     | -         | 10.53     | 3            | -40.00                   | -0.06                         | -                             | 31.04             | -                 | -31.1          | -              |       |
| 1.558   | 28.36     | 22.14                                     | -         | 10.6      | 3            | -40.00                   | -7.26                         | -                             | 23.75             | -                 | -31.0          | -              |       |
| 3.013   | 22.43     | 16.22                                     | -         | 10.6      | 3            | -40.00                   | -13.18                        | -                             | 29.54             | -                 | -42.7          | -              |       |
| <b>Face Off:</b>  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.738   | 34.82     | 28.59                                     | -         | 10.55     | 3            | -40.00                   | -0.86                         | -                             | 30.24             | -                 | -31.1          | -              |       |
| 1.871   | 27.7      | 21.49                                     | -         | 10.6      | 3            | -40.00                   | -7.91                         | -                             | 29.54             | -                 | -37.5          | -              |       |
| 2.671   | 23.36     | 17.03                                     | -         | 10.6      | 3            | -40.00                   | -12.37                        | -                             | 29.54             | -                 | -41.9          | -              |       |
| * 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 Below 150kHz => RBW=VBW=200 or 300Hz   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| A.F. = Antenna factor Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| Rev. 060314   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |

#### A1553

| FCC Part 15, Subpart B & C  |           | 3 Meter Distance Measurement At Chamber-G |           |           |              |                          |                               |                               |                   |                   |                |                |       |
|---|-----------|---|-----------|-----------|--------------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-------|
| <b>Company:</b>   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Project #:</b> 15U19950  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>EUT configuration #:</b> Charger + Supporting Device   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Mode of operation:</b> Operating   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Tester:</b> T Wang   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| <b>Date:</b> 2/4/2015   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 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 |
| <b>Face On</b>  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.659   | 35.52     | 29.65                                     | -         | 10.53     | 3            | -40.00                   | 0.18                          | -                             | 31.23             | -                 | -31.0          | -              |       |
| 1.058   | 30.95     | 25.19                                     | -         | 10.6      | 3            | -40.00                   | -4.21                         | -                             | 27.11             | -                 | -31.3          | -              |       |
| 2.287   | 23.92     | 17.86                                     | -         | 10.6      | 3            | -40.00                   | -11.54                        | -                             | 29.54             | -                 | -41.1          | -              |       |
| <b>Face Off:</b>  |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| 0.579   | 36.49     | 30.63                                     | -         | 10.52     | 3            | -40.00                   | 1.15                          | -                             | 32.35             | -                 | -31.2          | -              |       |
| 1.258   | 28.96     | 22.02                                     | -         | 10.6      | 3            | -40.00                   | -7.38                         | -                             | 25.61             | -                 | -33.0          | -              |       |
| 2.957   | 21.66     | 15.67                                     | -         | 10.6      | 3            | -40.00                   | -13.73                        | -                             | 29.54             | -                 | -43.3          | -              |       |
| * 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 Below 150kHz => RBW=VBW=200 or 300Hz   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| A.F. = Antenna factor Above 150kHz =>RBW=VBW=9 or 10kHz (Average => VBW=10Hz)   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |
| Rev. 060314   |           |   |           |           |              |                          |                               |                               |                   |                   |                |                |       |

## 8.4. TX SPURIOUS EMISSION 30 TO 1000 MHz

### 8.4.1. STANDBY CONFIGURATION CHARGER



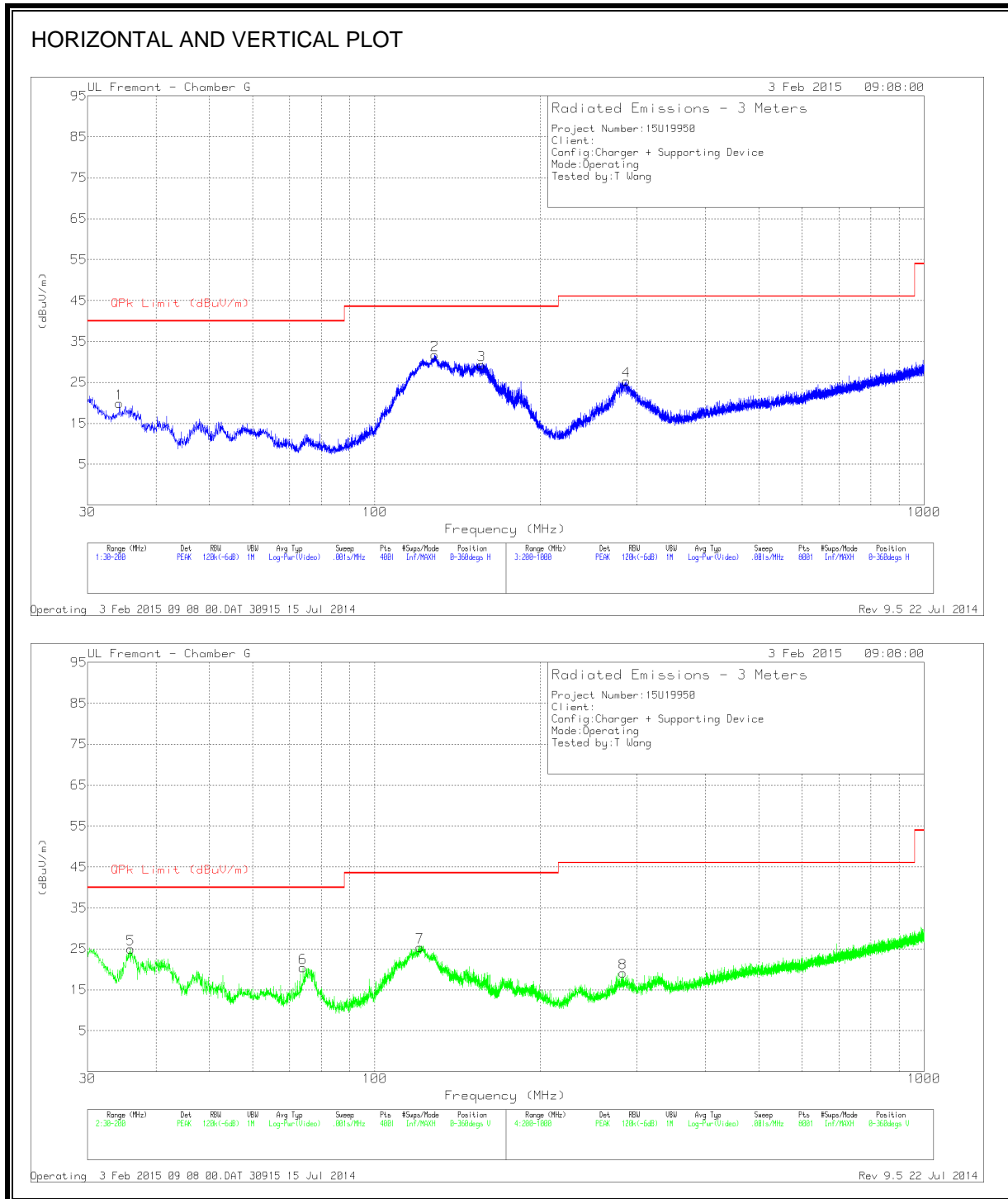
**DATA**

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | Hybrid | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------|--------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 30.6375         | 28.24                | PK  | 23.7   | -30.9        | 21.04                      | 40                 | -18.96      | 0-360          | 301         | H        |
| 2      | * 122.055       | 40.27                | PK  | 16.6   | -29.9        | 26.97                      | 43.52              | -16.55      | 0-360          | 201         | H        |
| 3      | 158.265         | 41.54                | PK  | 15.3   | -29.6        | 27.24                      | 43.52              | -16.28      | 0-360          | 201         | H        |
| 4      | 292             | 35.08                | PK  | 16.4   | -28.5        | 22.98                      | 46.02              | -23.04      | 0-360          | 100         | H        |
| 5      | 36.035          | 35.73                | PK  | 19.9   | -30.9        | 24.73                      | 40                 | -15.27      | 0-360          | 100         | V        |
| 6      | * 114.7875      | 34.46                | PK  | 16.1   | -30          | 20.56                      | 43.52              | -22.96      | 0-360          | 100         | V        |
| 7      | 148.1075        | 31.83                | PK  | 15.8   | -29.6        | 18.03                      | 43.52              | -25.49      | 0-360          | 100         | V        |
| 8      | * 274           | 29.93                | PK  | 16     | -28.6        | 17.33                      | 46.02              | -28.69      | 0-360          | 201         | V        |

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band  
 PK - Peak detector  
 Standby 3 Feb 2015 08 42 39.DAT 30915 15 Jul 2014  
 Rev 9.5 22 Jul 2014

### 8.4.2. OPERATING CONFIGURATION CHARGER

**A1554**



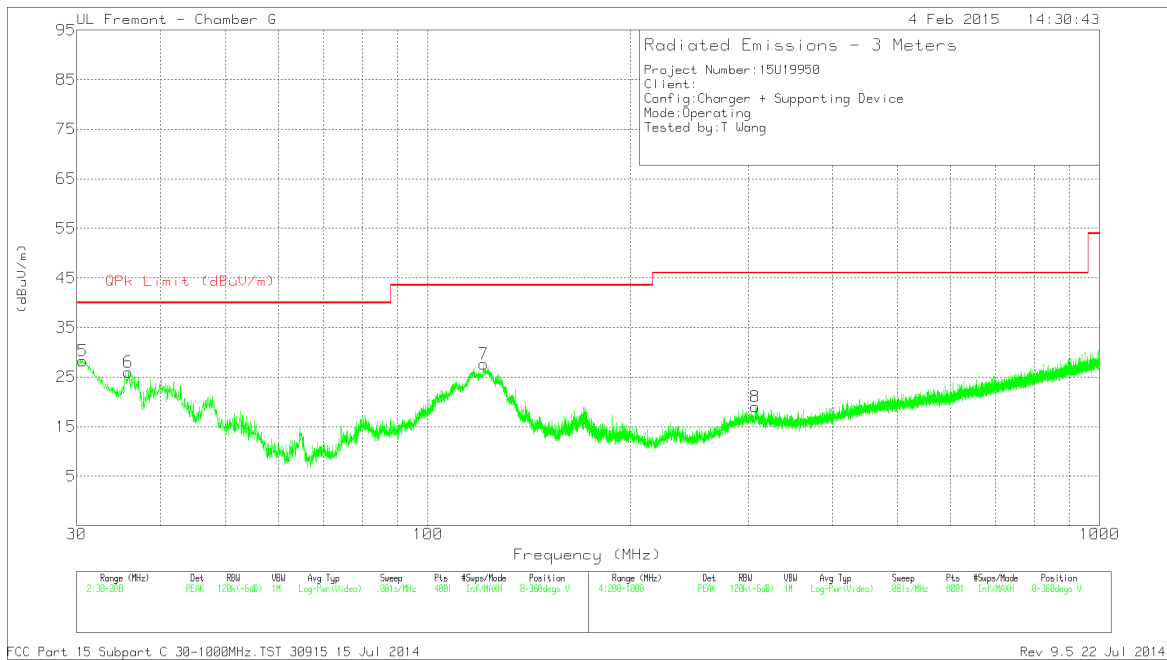
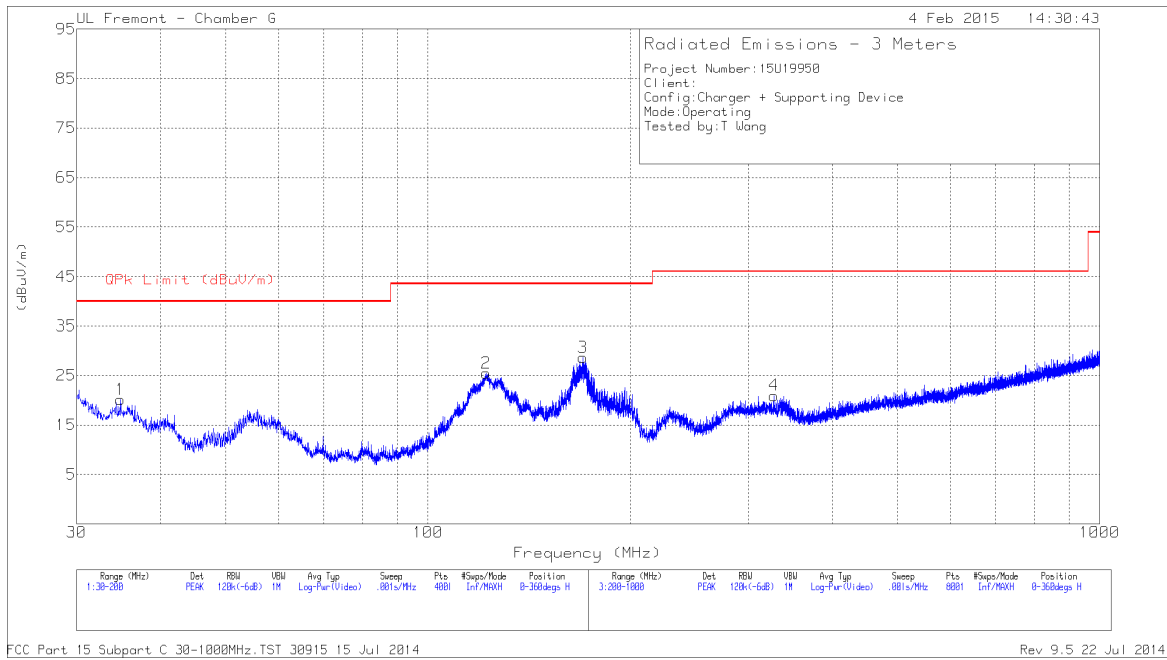
**DATA**

| Marker | Frequency (MHz) | Meter Reading (dBUV) | Det | Hybrid | Amp/Cbl (dB) | Corrected Reading (dBUV/m) | QPk Limit (dBUV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------|--------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 34.2925         | 29.69                | PK  | 21.1   | -30.9        | 19.89                      | 40                 | -20.11      | 0-360          | 301         | H        |
| 2      | * 128.7275      | 44.68                | PK  | 16.8   | -29.8        | 31.68                      | 43.52              | -11.84      | 0-360          | 201         | H        |
| 3      | 156.6075        | 43.61                | PK  | 15.3   | -29.6        | 29.31                      | 43.52              | -14.21      | 0-360          | 201         | H        |
| 4      | 286.9           | 37.67                | PK  | 16.3   | -28.6        | 25.37                      | 46.02              | -20.65      | 0-360          | 100         | H        |
| 5      | 35.9925         | 35.82                | PK  | 20     | -30.9        | 24.92                      | 40                 | -15.08      | 0-360          | 100         | V        |
| 6      | * 73.9875       | 39.64                | PK  | 11     | -30.3        | 20.34                      | 40                 | -19.66      | 0-360          | 100         | V        |
| 7      | * 120.9075      | 38.71                | PK  | 16.6   | -29.9        | 25.41                      | 43.52              | -18.11      | 0-360          | 100         | V        |
| 8      | * 282.8         | 31.37                | PK  | 16.3   | -28.6        | 19.07                      | 46.02              | -26.95      | 0-360          | 100         | V        |

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band  
 PK - Peak detector

**A1553**

**HORIZONTAL AND VERTICAL PLOT**



**DATA**

| Marker | Frequency (MHz) | Meter Reading (dBUV) | Det | Hybrid | Amp/Cbl (dB) | Corrected Reading (dBUV/m) | QPk Limit (dBUV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------|--------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 34.8875         | 30.32                | PK  | 20.7   | -30.9        | 20.12                      | 40                 | -19.88      | 0-360          | 103         | H        |
| 2      | * 122.0975      | 38.82                | PK  | 16.6   | -29.9        | 25.52                      | 43.52              | -18         | 0-360          | 201         | H        |
| 3      | * 170.08        | 43.25                | PK  | 14.9   | -29.5        | 28.65                      | 43.52              | -14.87      | 0-360          | 103         | H        |
| 4      | * 327.7         | 32.47                | PK  | 16.8   | -28.3        | 20.97                      | 46.02              | -25.05      | 0-360          | 100         | H        |
| 5      | 30.595          | 35.45                | PK  | 23.7   | -30.9        | 28.25                      | 40                 | -11.75      | 0-360          | 100         | V        |
| 6      | 35.8225         | 36.75                | PK  | 20.1   | -30.9        | 25.95                      | 40                 | -14.05      | 0-360          | 100         | V        |
| 7      | * 121.1625      | 40.92                | PK  | 16.6   | -29.9        | 27.62                      | 43.52              | -15.9       | 0-360          | 100         | V        |
| 8      | 307.2           | 30.98                | PK  | 16.5   | -28.5        | 18.98                      | 46.02              | -27.04      | 0-360          | 201         | V        |

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band  
 PK - Peak detector  
 FCC Part 15 Subpart C 30-1000MHz.TST 30915 15 Jul 2014  
 Rev 9.5 22 Jul 2014

## 8.5. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207 (a)

IC RSS-GEN, Section 8.8

| Frequency of emission<br>(MHz) | Conducted Limit (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        |

\* Decreases with the logarithm of the frequency.

### TEST PROCEDURE

ANSI C63.4-2009

### RESULTS



## 8.5.1. STANDBY CONFIGURATION CHARGER

### 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 dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 1      | .303            | 45.7                 | PK  | .5             | 0                  | 46.2                   | 60.2                | -14                  | -                    | -                    |
| 2      | .303            | 40.12                | Av  | .5             | 0                  | 40.62                  | -                   | -                    | 50.2                 | -9.58                |
| 3      | .6045           | 46.78                | PK  | .3             | 0                  | 47.08                  | 56                  | -8.92                | -                    | -                    |
| 4      | .6045           | 40.09                | Av  | .3             | 0                  | 40.39                  | -                   | -                    | 46                   | -5.61                |
| 5      | .906            | 45.27                | PK  | .3             | 0                  | 45.57                  | 56                  | -10.43               | -                    | -                    |
| 6      | .906            | 37.73                | Av  | .3             | 0                  | 38.03                  | -                   | -                    | 46                   | -7.97                |

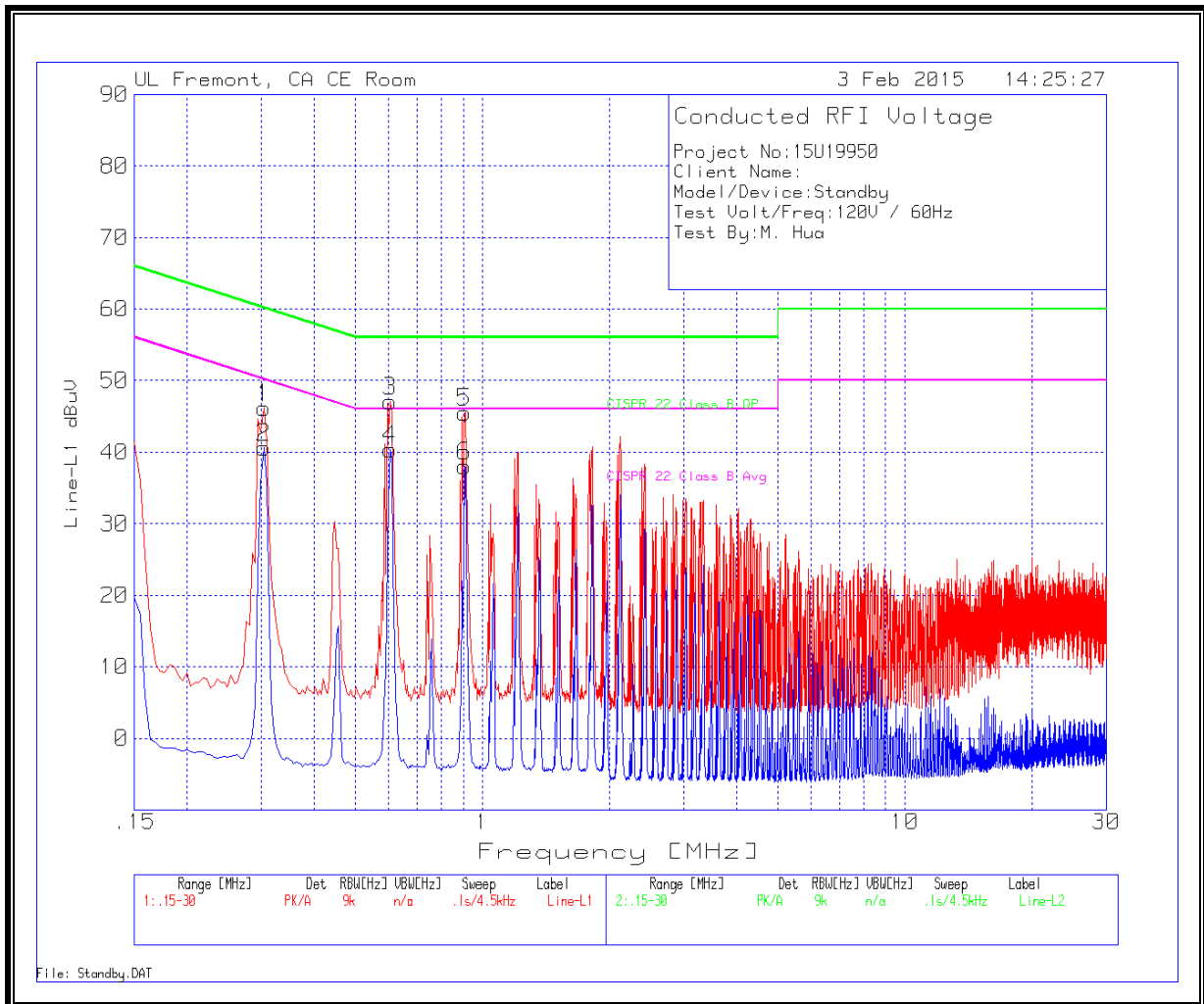
#### Line-L2 .15 - 30MHz

##### Trace Markers

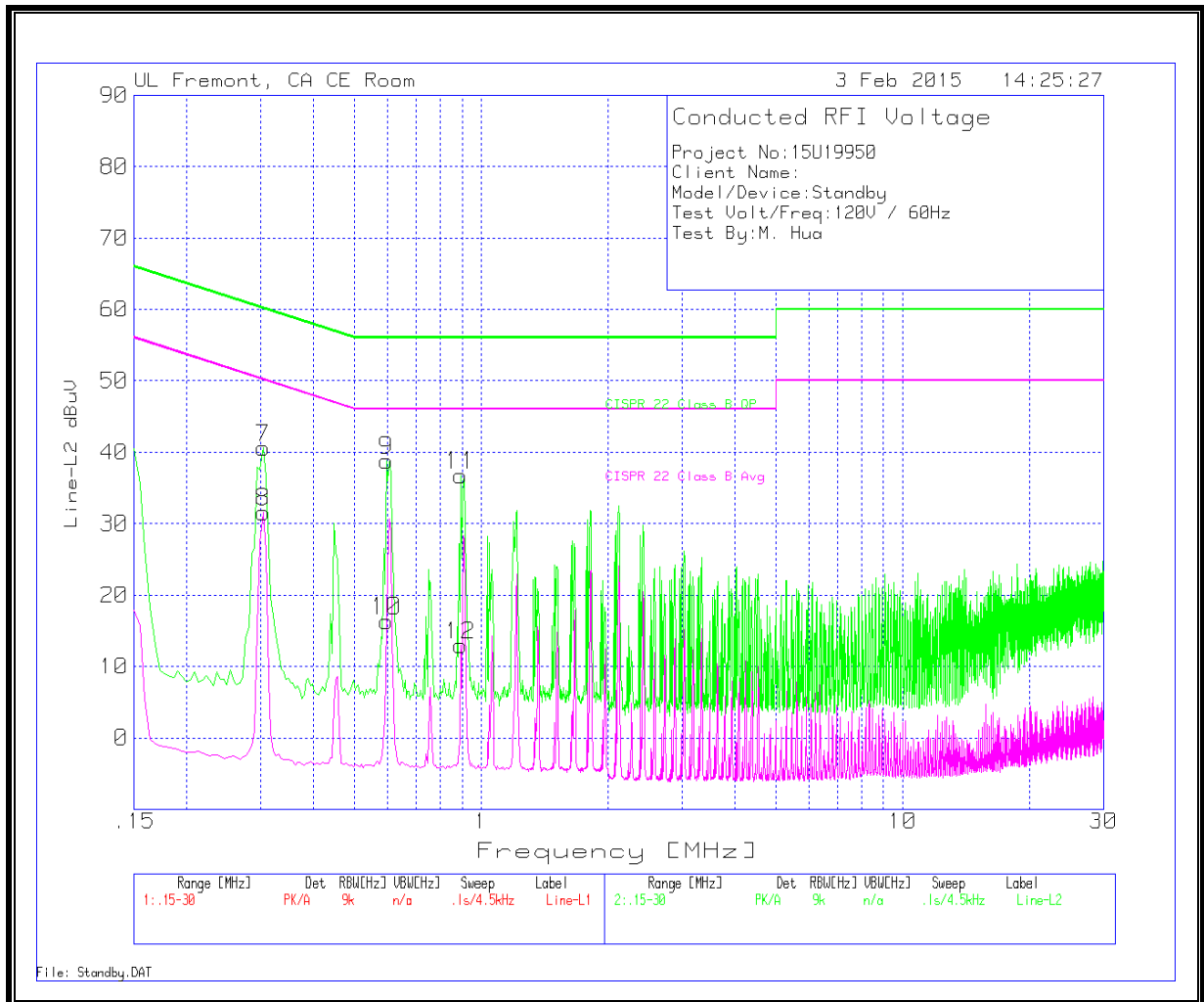
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | T24 IL L2 (dB) | LC Cables 2&3 (dB) | Corrected Reading dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 7      | .303            | 39.98                | PK  | .6             | 0                  | 40.58                  | 60.2                | -19.62               | -                    | -                    |
| 8      | .303            | 30.96                | Av  | .6             | 0                  | 31.56                  | -                   | -                    | 50.2                 | -18.64               |
| 9      | .5955           | 38.55                | PK  | .3             | 0                  | 38.85                  | 56                  | -17.15               | -                    | -                    |
| 10     | .5955           | 16.08                | Av  | .3             | 0                  | 16.38                  | -                   | -                    | 46                   | -29.62               |
| 11     | .8925           | 36.44                | PK  | .3             | 0                  | 36.74                  | 56                  | -19.26               | -                    | -                    |
| 12     | .8925           | 12.63                | Av  | .3             | 0                  | 12.93                  | -                   | -                    | 46                   | -33.07               |

PK - Peak detector  
 Av - average detection

**LINE 1 RESULTS**



**LINE 2 RESULTS**



## 8.5.2. OPERATING CONFIGURATION CHARGER

### A1554

#### 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 dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 1      | .24             | 50.2                 | PK  | .7             | 0                  | 50.9                   | 62.1                | -11.2                | -                    | -                    |
| 2      | .24             | 40.25                | Av  | .7             | 0                  | 40.95                  | -                   | -                    | 52.1                 | -11.15               |
| 3      | .474            | 45.66                | PK  | .4             | 0                  | 46.06                  | 56.4                | -10.34               | -                    | -                    |
| 4      | .474            | 39.82                | Av  | .4             | 0                  | 40.22                  | -                   | -                    | 46.4                 | -6.18                |
| 5      | 1.14            | 42.66                | PK  | .2             | 0                  | 42.86                  | 56                  | -13.14               | -                    | -                    |
| 6      | 1.14            | 25.1                 | Av  | .2             | 0                  | 25.3                   | -                   | -                    | 46                   | -20.7                |

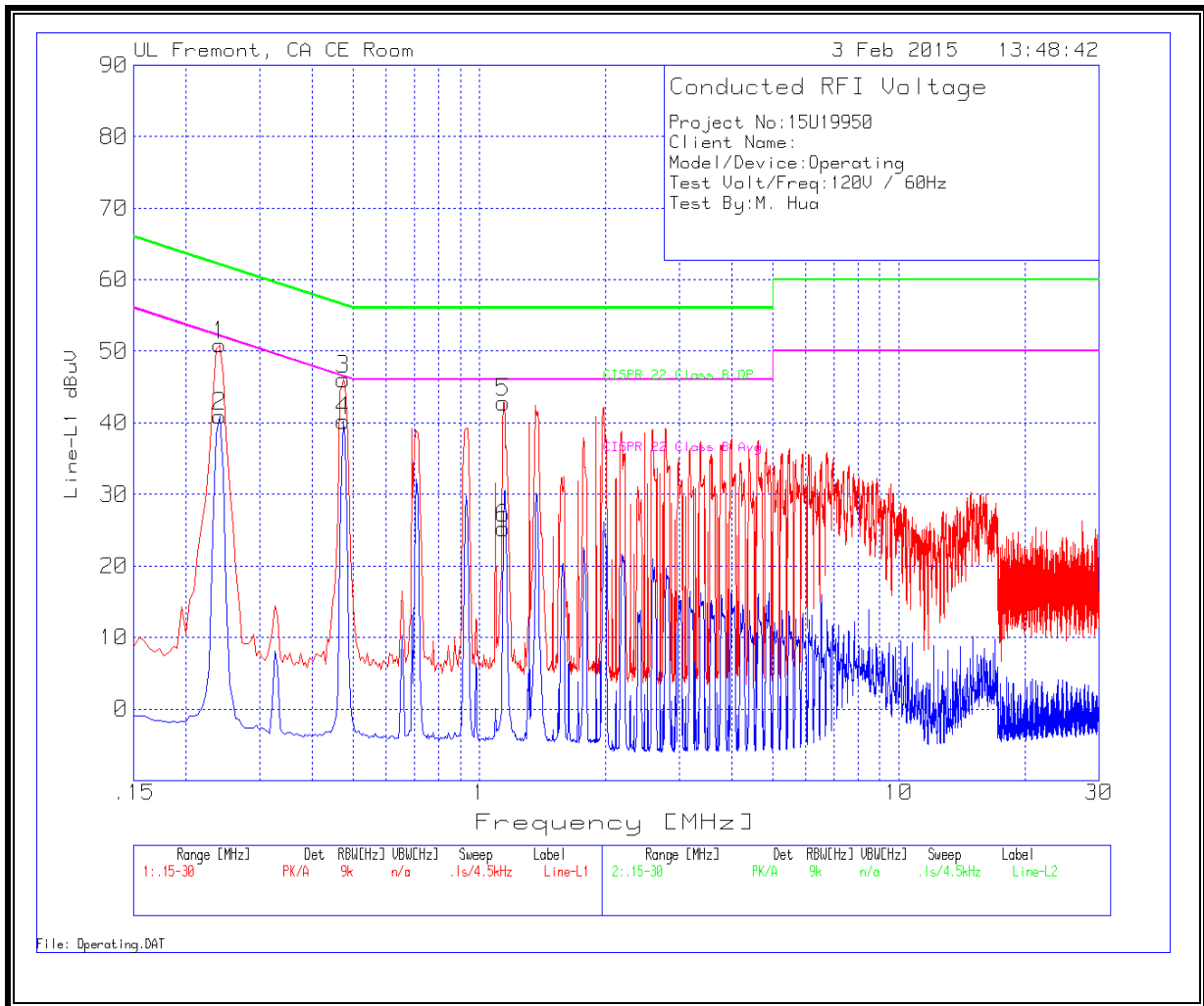
#### Line-L2 .15 - 30MHz

##### Trace Markers

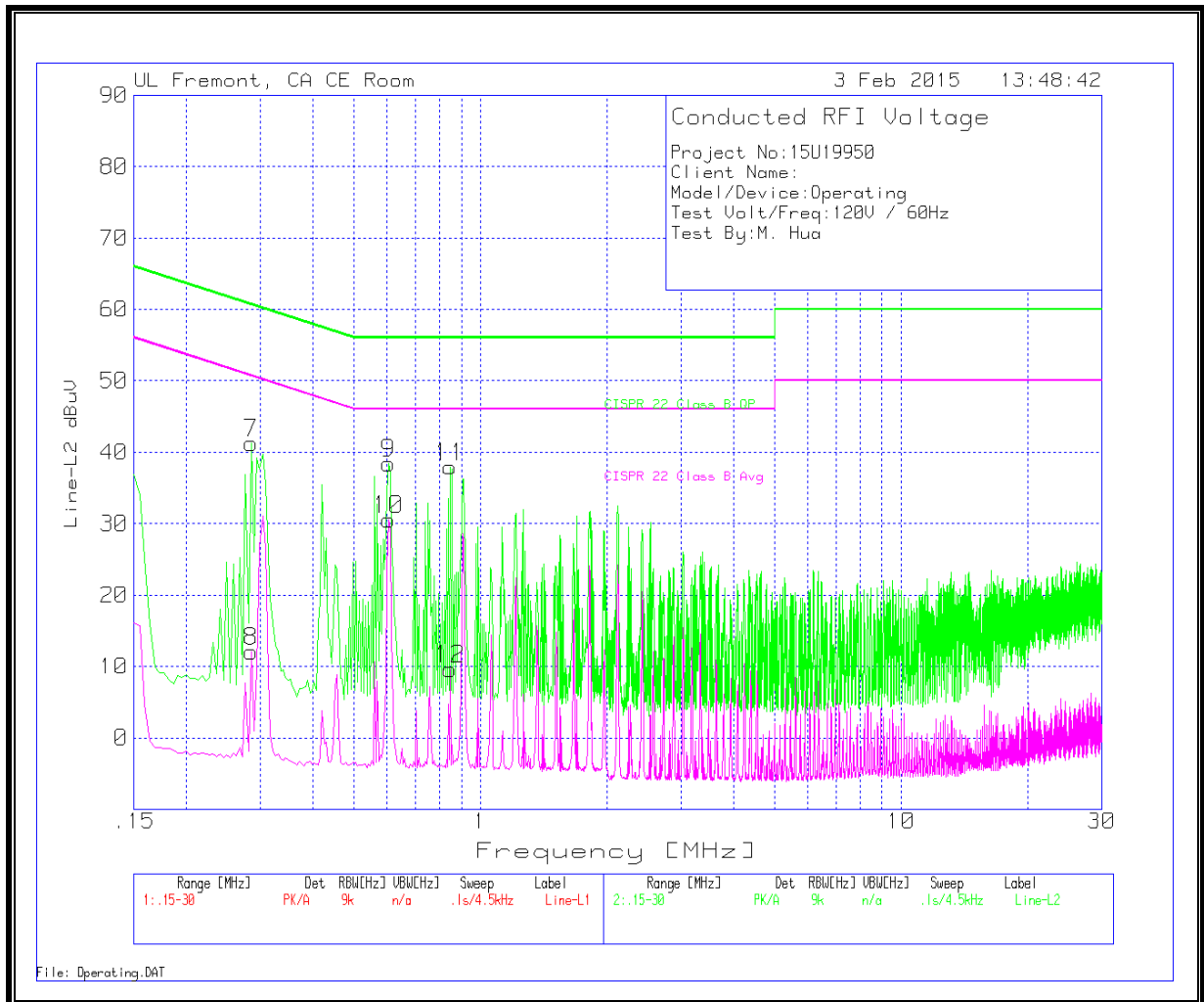
| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | T24 IL L2 (dB) | LC Cables 2&3 (dB) | Corrected Reading dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 7      | .285            | 40.66                | PK  | .6             | 0                  | 41.26                  | 60.7                | -19.44               | -                    | -                    |
| 8      | .285            | 11.48                | Av  | .6             | 0                  | 12.08                  | -                   | -                    | 50.7                 | -38.62               |
| 9      | .6045           | 38.16                | PK  | .3             | 0                  | 38.46                  | 56                  | -17.54               | -                    | -                    |
| 10     | .6045           | 30.31                | Av  | .3             | 0                  | 30.61                  | -                   | -                    | 46                   | -15.39               |
| 11     | .8475           | 37.68                | PK  | .3             | 0                  | 37.98                  | 56                  | -18.02               | -                    | -                    |
| 12     | .8475           | 9.38                 | Av  | .3             | 0                  | 9.68                   | -                   | -                    | 46                   | -36.32               |

PK - Peak detector  
 Av - average detection

**LINE 1 RESULTS**



**LINE 2 RESULTS**



**A1553**

**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 dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 1      | .1635           | 47.6                 | PK  | 1.2            | 0                  | 48.8                   | 65.3                | -16.5                | -                    | -                    |
| 2      | .1635           | 16.03                | Av  | 1.2            | 0                  | 17.23                  | -                   | -                    | 55.3                 | -38.07               |
| 3      | .2445           | 45.12                | PK  | .7             | 0                  | 45.82                  | 61.9                | -16.08               | -                    | -                    |
| 4      | .2445           | 12.38                | Av  | .7             | 0                  | 13.08                  | -                   | -                    | 51.9                 | -38.82               |
| 5      | .591            | 39.35                | PK  | .3             | 0                  | 39.65                  | 56                  | -16.35               | -                    | -                    |
| 6      | .591            | 8.25                 | Av  | .3             | 0                  | 8.55                   | -                   | -                    | 46                   | -37.45               |
| 7      | 6.1215          | 35.58                | PK  | .2             | .1                 | 35.88                  | 60                  | -24.12               | -                    | -                    |
| 8      | 6.1215          | 21.38                | Av  | .2             | .1                 | 21.68                  | -                   | -                    | 50                   | -28.32               |
| 9      | 17.6325         | 35.6                 | PK  | .3             | .2                 | 36.1                   | 60                  | -23.9                | -                    | -                    |
| 10     | 17.6325         | 19.22                | Av  | .3             | .2                 | 19.72                  | -                   | -                    | 50                   | -30.28               |

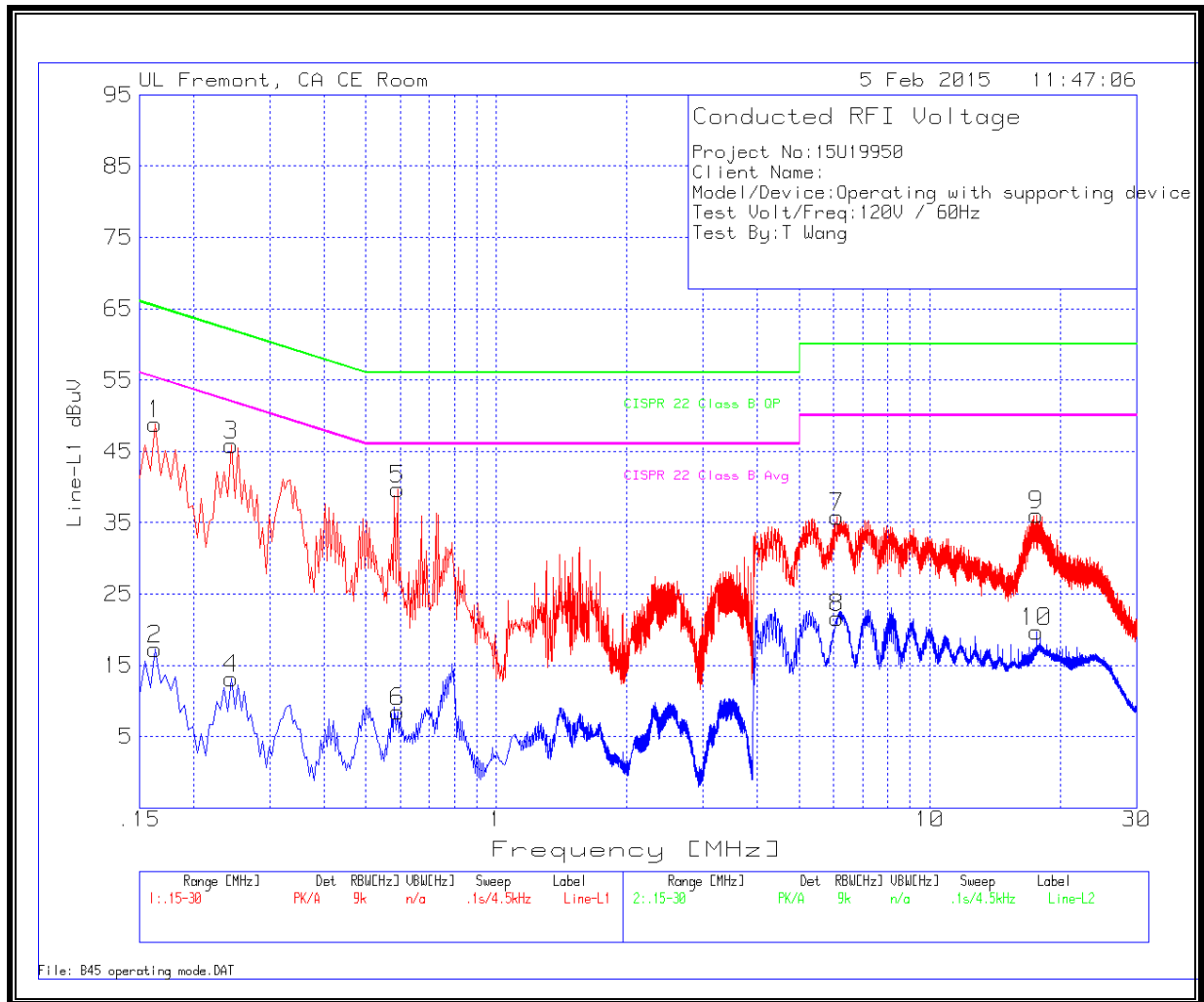
**Line-L2 .15 - 30MHz**

**Trace Markers**

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | T24 IL L2 (dB) | LC Cables 2&3 (dB) | Corrected Reading dBuV | CISPR 22 Class B QP | Margin to Limit (dB) | CISPR 22 Class B Avg | Margin to Limit (dB) |
|--------|-----------------|----------------------|-----|----------------|--------------------|------------------------|---------------------|----------------------|----------------------|----------------------|
| 11     | .1635           | 46.44                | PK  | 1.3            | 0                  | 47.74                  | 65.3                | -17.56               | -                    | -                    |
| 12     | .1635           | 12.86                | Av  | 1.3            | 0                  | 14.16                  | -                   | -                    | 55.3                 | -41.14               |
| 13     | .2445           | 42.57                | PK  | .8             | 0                  | 43.37                  | 61.9                | -18.53               | -                    | -                    |
| 14     | .2445           | 11.28                | Av  | .8             | 0                  | 12.08                  | -                   | -                    | 51.9                 | -39.82               |
| 15     | .7845           | 36.53                | PK  | .3             | 0                  | 36.83                  | 56                  | -19.17               | -                    | -                    |
| 16     | .7845           | 14.91                | Av  | .3             | 0                  | 15.21                  | -                   | -                    | 46                   | -30.79               |
| 17     | 17.565          | 31.7                 | PK  | .3             | .2                 | 32.2                   | 60                  | -27.8                | -                    | -                    |
| 18     | 17.565          | 19.99                | Av  | .3             | .2                 | 20.49                  | -                   | -                    | 50                   | -29.51               |

PK - Peak detector  
 Av - average detection

**LINE 1 RESULTS**





**LINE 2 RESULTS**

