



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC

MODEL NUMBER: LG-D631, D631, LGD631

FCC ID: ZNFD631

REPORT NUMBER: 14U17500-6

ISSUE DATE: JUNE 16, 2014

Prepared for

**LG ELECTRONICS MOBILECOMM U.S.A., INC
1000 SYLVAN AVENUE
ENGLEWOOD CLIFFS, NEW JERSEY, 07632, U.S.A.**

Prepared by

**UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

| <u>Rev.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|------------------|-------------------|
| -- | 06/16/14 | Initial Issue | P. Kim |

TABLE OF CONTENTS

| | |
|--|-----------|
| 1. ATTESTATION OF TEST RESULTS | 4 |
| 2. TEST METHODOLOGY | 5 |
| 3. FACILITIES AND ACCREDITATION | 5 |
| 4. CALIBRATION AND UNCERTAINTY | 5 |
| 4.1. <i>MEASURING INSTRUMENT CALIBRATION</i> | <i>5</i> |
| 4.2. <i>SAMPLE CALCULATION</i> | <i>5</i> |
| 4.3. <i>MEASUREMENT UNCERTAINTY.....</i> | <i>5</i> |
| 5. EQUIPMENT UNDER TEST | 6 |
| 5.1. <i>DESCRIPTION OF EUT</i> | <i>6</i> |
| 5.2. <i>MAXIMUM OUTPUT POWER.....</i> | <i>6</i> |
| 5.3. <i>WORST-CASE CONFIGURATION AND MODE.....</i> | <i>6</i> |
| 5.4. <i>MODIFICATIONS</i> | <i>6</i> |
| 5.5. <i>DESCRIPTION OF TEST SETUP.....</i> | <i>7</i> |
| 6. TEST AND MEASUREMENT EQUIPMENT | 10 |
| 7. RADIATED EMISSION TEST RESULTS..... | 11 |
| 7.1. <i>LIMITS AND PROCEDURE.....</i> | <i>11</i> |
| 7.1.1. <i>FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)</i> | <i>13</i> |
| 7.1.2. <i>TX SPURIOUS EMISSION 30 TO 1000 MHz</i> | <i>14</i> |
| 10. SETUP PHOTOS..... | 16 |

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LG ELECTRONICS MOBILECOMM U.S.A., INC
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC.
MODEL: LG-D631, D631, LGD631
SERIAL NUMBER: 18UL4 (Radiated)
DATE TESTED: MAY 27 – JUNE 16, 2014

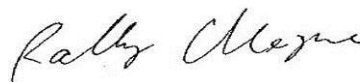
| APPLICABLE STANDARDS | |
|-----------------------|--------------|
| STANDARD | TEST RESULTS |
| FCC PART 15 SUBPART C | Pass |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

Tested By:



PHILIP KIM
CONSUMER TECHNOLOGY DIVISION
PROGRAM MANAGER
UL Verification Services Inc.

ROLLY ALEGRE
CONSUMER TECHNOLOGY DIVISION
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.

3. FACILITIES AND ACCREDITATION

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

| 47173 Benicia Street | 47266 Benicia Street |
|---|------------------------------------|
| <input type="checkbox"/> Chamber A | <input type="checkbox"/> Chamber D |
| <input checked="" type="checkbox"/> Chamber B | <input type="checkbox"/> Chamber E |
| <input type="checkbox"/> Chamber C | <input type="checkbox"/> Chamber F |

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER | UNCERTAINTY |
|---------------------------------------|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 3.52 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 GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC.

5.2. MAXIMUM OUTPUT POWER

The testing was performed at 1meter. The transmitter maximum E-field at 30m distance is 15.82 dBuV/m which convert from the 1 meters data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Y-orientation was the worst-case orientation; therefore all final radiated testing was performed with the EUT in the Y-orientation while generating continuous emissions.

5.4. MODIFICATIONS

No modifications were made during testing.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

| Support Equipment List | | | | |
|------------------------|----------------|------------------|---------------|--------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| AC Adapter | LG ELECTRONICS | MCS-01WD | DB390078751 | N/A |
| Earphone | LG ELECTRONICS | LG-D631 | N/A | N/A |
| PowerMat | DURACELL | KSAP0151800083HU | N/A | N/A |
| PMA cover | LG ELECTRONICS | N/A | N/A | N/A |

I/O CABLES

Radiated Emissions above 30 MHz, AC Line Conducted Emissions :

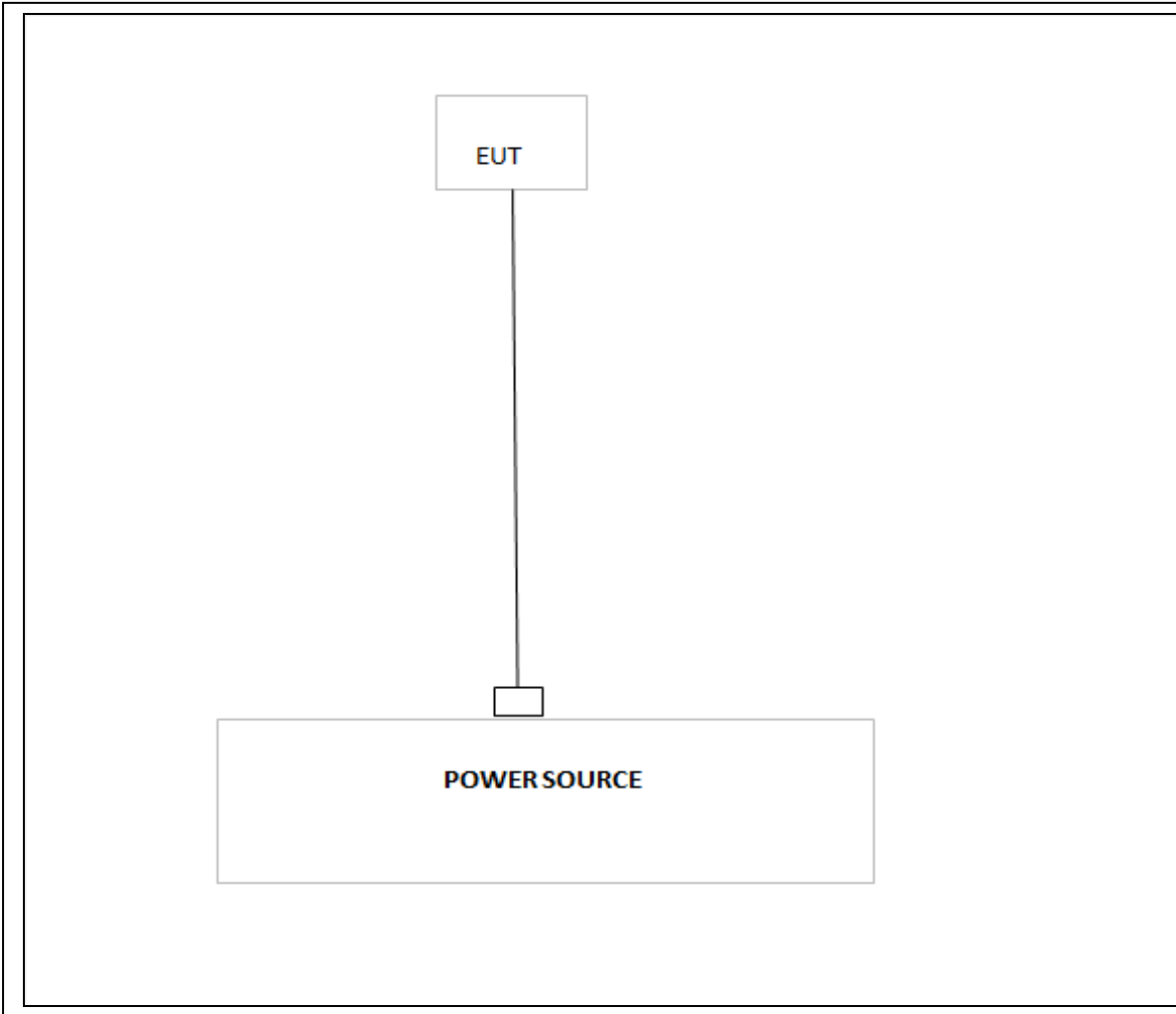
| I/O Cable List | | | | | | |
|----------------|----------|----------------------|----------------|-------------|------------------|---------|
| Cable No | Port | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1 | DC Power | 1 | Micro-USB | Shielded | 1 m | None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

TEST SETUP

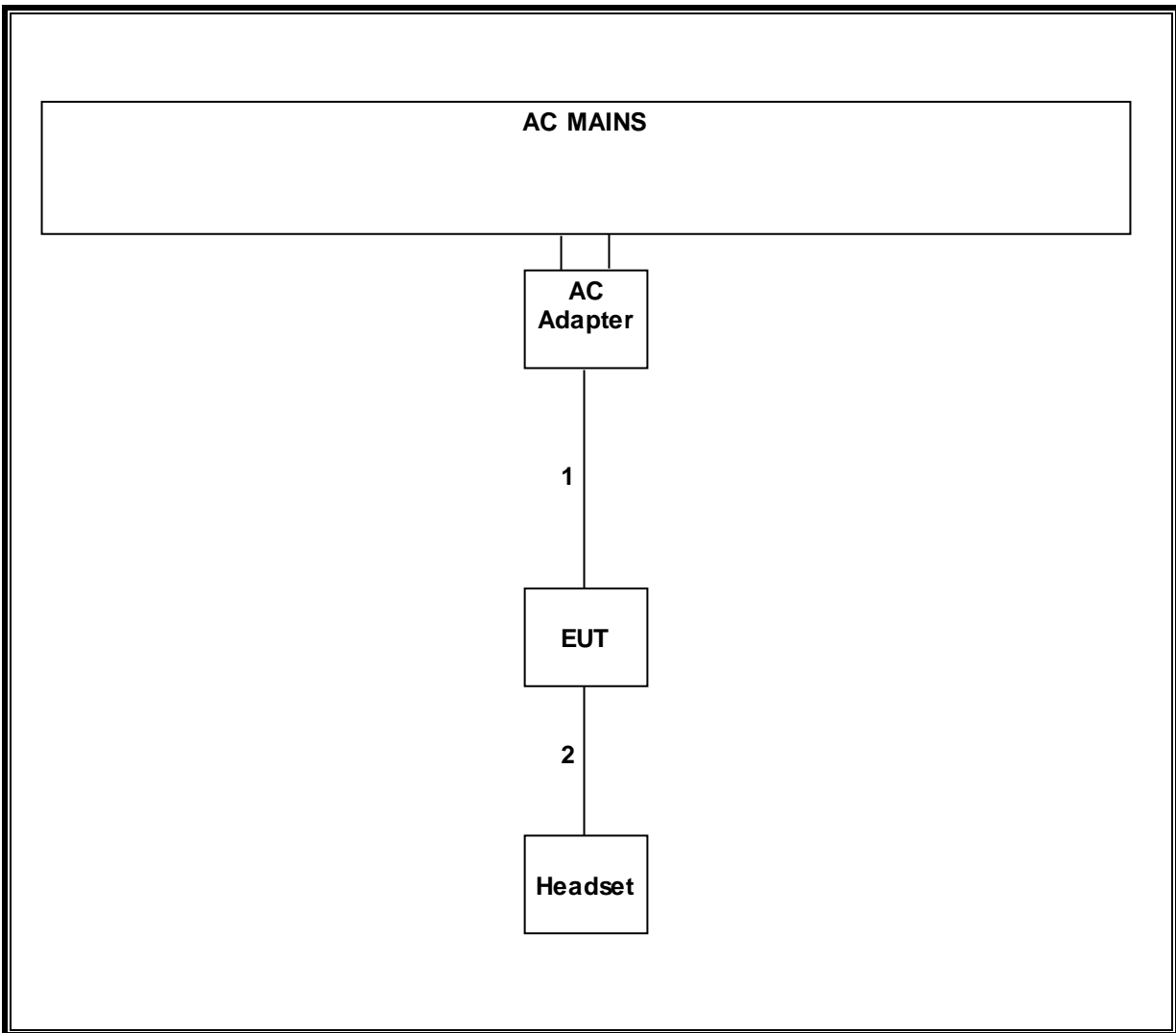
The EUT is a stand-alone device configured and tested in a worst-case setup.

SETUP DIAGRAM FOR TESTS

Radiated Emissions Below 30 MHz:



Radiated Emissions Above 30 MHz, AC Line Conducted Emissions :



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 | Asset | Cal Due |
| ESA-E Spectrum Analyzer, 9kHz-26.5 GHz | Agilent / HP | E4407B | C01098 | 04/04/15 |
| Antenna, Loop, 30 MHz | EMCO | 6502 | C00593 | 02/20/15 |
| Antenna, Bilog, 30MHz-1 GHz | Sunol Sciences | JB1 | C01011 | 03/23/15 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00580 | 01/21/15 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 08/08/14 |
| LISN, 30 MHz | FCC | 50/250-25-2 | C00626 | 01/14/15 |
| DMM | Fluke | 77-11 | N02303 | 10/31/14 |
| Digital Thermometer | Tektronix | DTM920 | None | 10/21/14 |
| Temperature Chamber | CSZ | 2PHS-8-3 | T267 | 03/04/15 |

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225

IC RSS-210, Annex 2, Section A2.6 (Transmitter)

IC RSS-GEN, Section 6 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Limits for radiated disturbance of an intentional radiator | | |
|--|-----------------|--------------------------|
| Frequency range (MHz) | Limits (µV/m) | Measurement Distance (m) |
| 0.009 – 0.490 | 2400 / F (kHz) | 300 |
| 0.490 – 1.705 | 24000 / F (kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 – 960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.4-2009

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

7.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

| FCC Part 15, Subpart B & C | | | | | | | | | | | | | 1 Meter Distance Measurement At Open Field | |
|--|-----------|-----------|-----------|-----------|--------------------------|-------------------------------|-------------------------------|-------------------|-------------------|----------------|----------------|-----------------------|--|--|
| Company: LG Project #: 14U17500 Model #: LG-D631 Tester: R. Alegre Date: 6/7/2014 | | | | | | | | | | | | | | |
| Frequency (MHz) | PK (dBuV) | QP (dBuV) | AV (dBuV) | AF (dB/m) | Distance Correction (dB) | PK Corrected Reading (dBuV/m) | AV Corrected Reading (dBuV/m) | QP Limit (dBuV/m) | AV Limit (dBuV/m) | PK Margin (dB) | AV Margin (dB) | Notes | | |
| Loop Antenna Face on: Y position worst | | | | | | | | | | | | | | |
| 13.56 | 64.35 | | N/A | 10.56 | -59.08 | 15.82 | N/A | 84.00 | N/A | -68.2 | N/A | Fundamental @ 1m Dist | | |
| 13.55 | 53.46 | | N/A | 10.56 | -59.08 | 4.93 | N/A | 50.48 | N/A | -45.5 | N/A | 13.41MHz-13.553MHz | | |
| 13.57 | 53.78 | | N/A | 10.56 | -59.08 | 5.25 | N/A | 50.48 | N/A | -45.2 | N/A | 13.567MHz-13.711MHz | | |
| 13.34 | 46.74 | | N/A | 10.53 | -59.08 | -1.81 | N/A | 40.51 | N/A | -42.3 | N/A | 13.110-13.410MHz | | |
| 13.77 | 47.28 | | N/A | 10.58 | -59.08 | -1.81 | N/A | 40.51 | N/A | -42.3 | N/A | 13.71-14.01MHz | | |
| 0.12 | 51.73 | | N/A | 10.49 | -59.08 | 3.13 | N/A | 29.54 | N/A | -26.4 | N/A | 9k-13.11MHz | | |
| 14.09 | 37.94 | | N/A | 10.61 | -59.08 | -10.54 | N/A | 29.54 | N/A | -40.1 | N/A | 14.01MHz-30MHz | | |
| Loop Antenna Face off: Y position | | | | | | | | | | | | | | |
| 13.56 | 54.33 | | N/A | 10.56 | -59.08 | 5.80 | N/A | 84.00 | N/A | -78.2 | N/A | Fundamental @ 1m Dist | | |
| 13.55 | 43.79 | | N/A | 10.56 | -59.08 | -4.74 | N/A | 50.48 | N/A | -55.2 | N/A | 13.41MHz-13.553MHz | | |
| 13.57 | 42.84 | | N/A | 10.56 | -59.08 | -5.69 | N/A | 50.48 | N/A | -56.2 | N/A | 13.567MHz-13.711MHz | | |
| 13.34 | 38.16 | | N/A | 10.53 | -59.08 | -10.39 | N/A | 40.51 | N/A | -50.9 | N/A | 13.110-13.410MHz | | |
| 13.77 | 38.75 | | N/A | 10.58 | -59.08 | -9.76 | N/A | 40.51 | N/A | -50.3 | N/A | 13.71-14.01MHz | | |
| 0.12 | 48.68 | | N/A | 10.49 | -59.08 | 0.08 | N/A | 29.54 | N/A | -29.5 | N/A | 9k-13.11MHz | | |
| 14.09 | 30.15 | | N/A | 10.61 | -59.08 | -18.33 | N/A | 29.54 | N/A | -47.9 | N/A | 14.01MHz-30MHz | | |

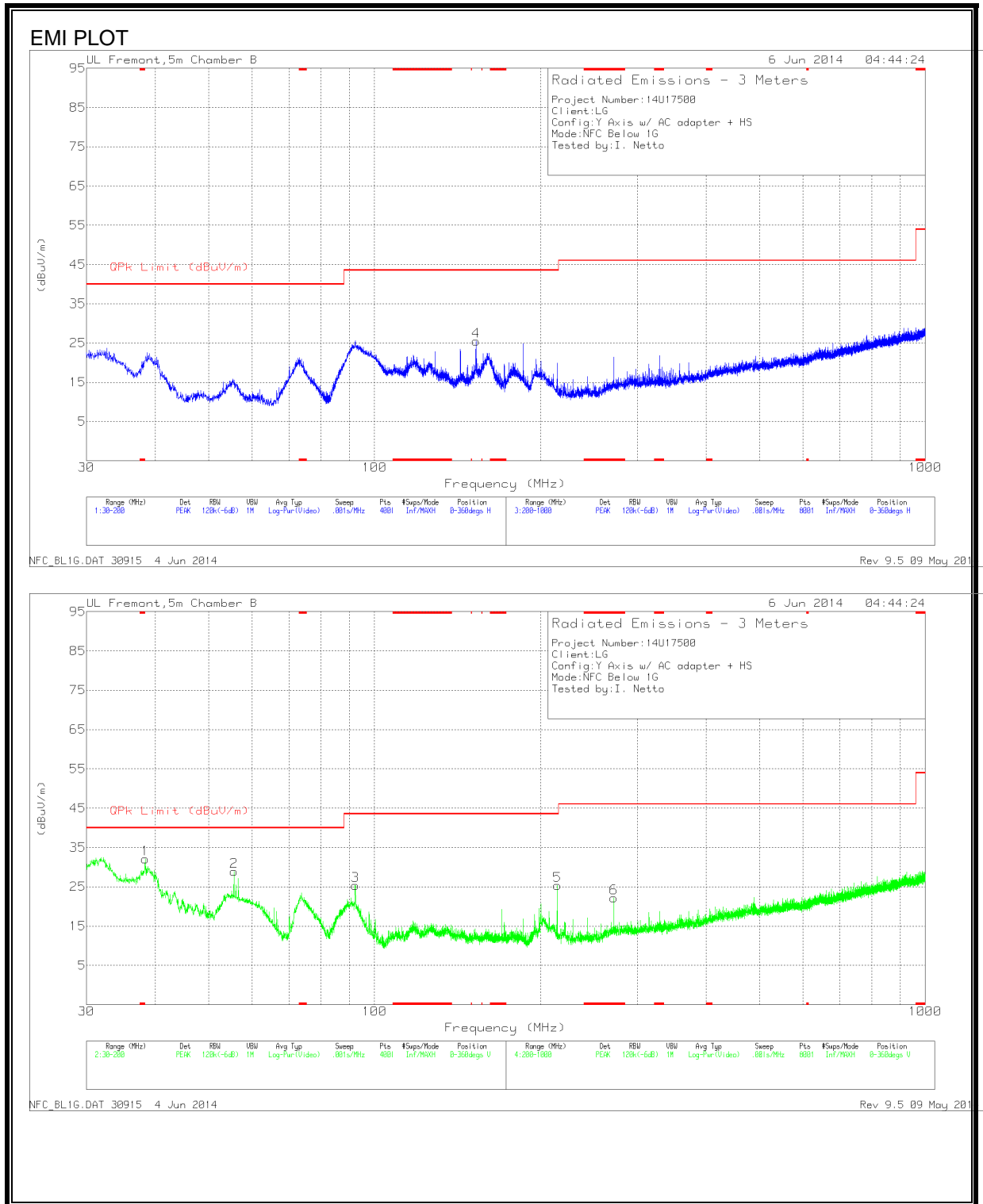
* No more emissions were found up to 30MHz

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 Reading
 A.F. = Antenna factor

Rev. 10.23.09

7.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz



| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF T243 (dB/m) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|----------------|--------------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 6 | * 272.1 | 35.12 | PK | 13.3 | -26.2 | 22.22 | 46.02 | -23.8 | 0-360 | 300 | V |
| 1 | 38.33 | 45.63 | PK | 15.2 | -28.7 | 32.13 | 40 | -7.87 | 0-360 | 101 | V |
| 2 | 55.585 | 50.16 | PK | 7.2 | -28.5 | 28.86 | 40 | -11.14 | 0-360 | 101 | V |
| 3 | 92.39 | 45.23 | PK | 8.2 | -28.1 | 25.33 | 43.52 | -18.19 | 0-360 | 101 | V |
| 4 | 152.825 | 40.55 | PK | 12.3 | -27.4 | 25.45 | 43.52 | -18.07 | 0-360 | 200 | H |
| 5 | 214.8 | 41.55 | PK | 10.6 | -26.8 | 25.35 | 43.52 | -18.17 | 0-360 | 200 | V |

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band
 PK - Peak detector