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CERTIFICATION TEST REPORT

Applicant: U-Blox
12626 High Bluff Drive, Suite 200
San Diego, CA 92130

Equipment Under Test (EUT): CDMA 1xRTT Module
Model: LISA-C200

FCC ID: XU9-LISAC200
IC ID: 8694A-LISAC200

In Accordance With: FCC Part 22, Subpart H
RSS-132, Issue 2 September 2005

FCC Part 24 Subpart E
RSS 133 Issue 5 February 2009
RSS GEN Issue 3 December 2010

Tested By: Nemko USA Inc.
2210 Faraday Avenue, Suite 150
Carlsbad, CA 92008

Date: April 11, 2012
Report Number: 2012 04203246 FCC
Project Number: 10222569
Nex Number: 203246
Total Number of Pages: 54



Section 1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC rules parts CFR47 Part 2 and 24 subpart E for the United States and RSS132 Issue 2, RSS133 Issue 5, and RSS-Gen Issue 3 for Canada. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

| | |
|------------------------------|--|
| Apparatus Assessed: | CDMA 1xRTT Module |
| Model: | LISA-C200 |
| Serial: | A10000157EFF5A, A10000157EFF49 |
| Specifications: | FCC Part 22, Subpart H Industry Canada RSS-132, Issue 2, September 2005 FCC Part 2, Part 24 Subpart E RSS 133 Issue 5, February 2009 RSS-GEN Issue 3 December 2010 |
| Date Received in Laboratory: | March 19, 2012 |
| Compliance Status: | Complies |
| Exclusions: | None |
| Non-compliances: | None |





1.1 Report Release History

| REVISION | DATE | COMMENTS |
|----------|----------------|--------------------------------|
| - | APRIL 11, 2012 | Prepared By: Andreas Gillmeier |
| - | APRIL 11, 2012 | Initial Release: Alan Laudani |

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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY:  Date: APRIL 11, 2012
Andreas Gillmeier, Sr. EMC Wireless Engineer



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Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was identified as follows:

| Sample No. | Description | Serial No. |
|------------|---------------------------------|-----------------------------------|
| LISA-C200 | CDMA 1xRTT Module, LISA-C200 | A10000157EFF5A, A10000157EFF49 |

2.2 Technical Specifications of the EUT

Manufacturer: U-Blox

Transmit Frequency: Cellular Band: 824.70 to 848.31 MHz
PCS Band: 1851.25 to 1908.75 MHz

Rated Power: Cellular Band: 0.348 W
PCS Band: 0.256 W

Modulation: CDMA

Emission Designator: Cellular Band: 1M36F9W
PCS Band: 1M36F9W

Antenna: taoglas Part No. TG.09.0113
1.0 (Cell)/ 2.8 (PCS) dBi penta-band cellular hinged
SMA(M) monopole

Antenna Connector: SMA

Power Source: 3.4 – 4.3 V DC from host (supplied by 115V AC).

Section 3: Test Conditions

3.1 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 19-24 °C
 Humidity range : 25-35 %
 Pressure range : 101.2 kPa
 Power supply range : N/A

3.2 Test Equipment

| Nemko ID | Device | Manufacturer | Model | Serial Number | Cal Date | Cal Due Date |
|--------------------|--------------------------------|---------------------|------------------|---------------|---------------------|---------------------|
| 835 | Spectrum Analyzer | Rohde & Schwarz | RHDFSEK | 829058/005 | Jul. 22, 2011 | Jul. 22, 2012 |
| 911 | Spectrum Analyzer | Agilent | E4440A | US41421266 | Oct. 27, 2011 | Oct. 27, 2012 |
| E1017 | 9kHz to 7GHz Spectrum Analyzer | Rohde & Schwarz | FSP7 | 839337/0022 | 3/8/2012 | 3/8/2013 |
| E1018 | 9kHz to 7GHz Spectrum Analyzer | Rohde & Schwarz | FSP7 | 835363/0003 | 2/23/2012 | 2/23/2013 |
| E1026 | EMI Test Receiver 9kHz to 7GHz | Rohde & Schwarz | ESCI 7 | 100800 | 6/1/2011 | 6/1/2012 |
| Customer furnished | Radio Communications Tester | Rohde & Schwarz | CMU200 | 117618 | Verified with E1017 | Verified with E1017 |
| E1020 | Two Line V-Network | Rohde & Schwarz | ENV216 | 101044 | 4/4/2011 | 4/4/2012 |
| 384 | LISN | Solar | 9348-50-R-24-BNC | 941716 | 9/26/2011 | 9/26/2012 |
| 128 | Antenna, Bicon | EMCO | 3104 | 2882 | 3/21/2011 | 3/21/2013 |
| 110 | Antenna, LPA | Electrometrics | LPA-25 | 1217 | Apr. 01, 2011 | Apr. 01, 2013 |
| 752 | Antenna, DRWG | EMCO | 3115 | 4943 | Dec. 02, 2010 | Dec. 02, 2012 |
| 836 | Signal Generator | Agilent | E8254A | US41140229 | 3/7/2012 | 3/7/2013 |
| NA | 10 dB Attenuator | Narda | 768-10 | 05109 | Verified with 835 | Verified with 835 |
| 901 | Preamplifier | Sonoma | 310 N | 130607 | Oct. 27, 2011 | Oct. 27, 2012 |
| 317 | Preamplifier | HP | 8449A | 2749A00167 | 5/16/2011 | 5/16/2012 |
| 941 | Power Meter | Agilent | E4418B | MY40510887 | Aug. 22, 2011 | Aug. 22, 2012 |
| 814 | Multimeter | Fluke | 111 | 78130063 | 10/17/2011 | 10/17/2012 |
| N149 | Environmental Chamber | Cincinnati Sub-Zero | ZPHS-32-2-2-H/AC | ZP0552665 | Apr. 29, 2011 | Apr. 29, 2012 |

Registrations of the 10m Semi-anechoic chamber are on file with the Federal Communications Commission and with Industry Canada under Site Number 2040B-3.

Section 4: Observations

- 4.1 Modifications Performed During Assessment
None
- 4.2 Record Of Technical Judgments
No technical judgments were made during the assessment.
- 4.3 EUT Parameters Affecting Compliance
The user of the apparatus could not alter parameters that would affect compliance.
- 4.4 Test Deleted
No Tests were deleted from this assessment.
- 4.5 Additional Observations
There were no additional observations made during this assessment.

Section 5: Results Summary

5.1 Test Result summary table

FCC Part 2 Subpart J: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations. Equipment Authorization Procedures.

FCC CFR 47 Part 24 Subpart E – Personal Communications Services – Broadband PCS
 RSS-GEN Issue 3 (December 2010) – General requirements and information for the Certification of Radiocommunication Equipment
 RSS-132, Issue 2 September 2005-- Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
 RSS-133 Issue 5 (February 2009) – 2 GHz Personal Communications Services

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No: not applicable / not relevant
- Y Yes: Mandatory i.e. the apparatus shall conform to these test.
- N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

| FCC Part 2 Part 22/24 | RSS Paragraph RSS-GEN/RSS-133 | Test/Requirement Description | Required | Result |
|-----------------------|--|---|----------|----------|
| 15.207 (A) | RSS-GEN 7.2.4 | Power line conducted emissions | Y | COMPLIES |
| 2.1046/24.232 | RSS-133 6.4 4.8/6.4 | RF Power Output | Y | COMPLIES |
| 22.913 | RSS-132/4.4 | RF Power Output | Y | COMPLIES |
| 2.1049/24.238 | 4.6.1/6.5 | Occupied Bandwidth | Y | COMPLIES |
| 22.917(D) | | Occupied Bandwidth | Y | COMPLIES |
| 2.1051/24.238 | RSS-133 6.5.1 4.9/6.5 | Spurious Emissions at antenna Terminals | Y | COMPLIES |
| 22.917(B) | RSS-132/4.5 | Spurious Emissions at antenna Terminals | Y | COMPLIES |
| 2.1053/24.238 | RSS-133 4.2/6.5 | Field Strength of Spurious Emissions | Y | COMPLIES |
| 22.917(B) | | Field Strength of Spurious Emissions | Y | COMPLIES |
| 2.1055/24.235 | RSS-133 6.3 4.7/6.3 | Frequency Stability | Y | COMPLIES |
| 22.355 | RSS-132/4.3 | Frequency Stability | Y | COMPLIES |
| | RSS-132/4.6 RSS-133 6.7 4.10/6.6 | Receiver Spurious | Y | COMPLIES |



Appendix A: Test Results

A1. Powerline conducted emissions

15.207(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of emission (MHz) | Conducted limit (dB μ V) | |
|-----------------------------|------------------------------|-----------|
| | Quasi-peak | Average |
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| .5–5 | 5 | 46 |
| 5–30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

Conditions:

| | | | |
|---------------------|----------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 19°C |
| Date: | March 20, 2012 | Humidity: | 33% |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

Test Results: EUT complies

See attached plots

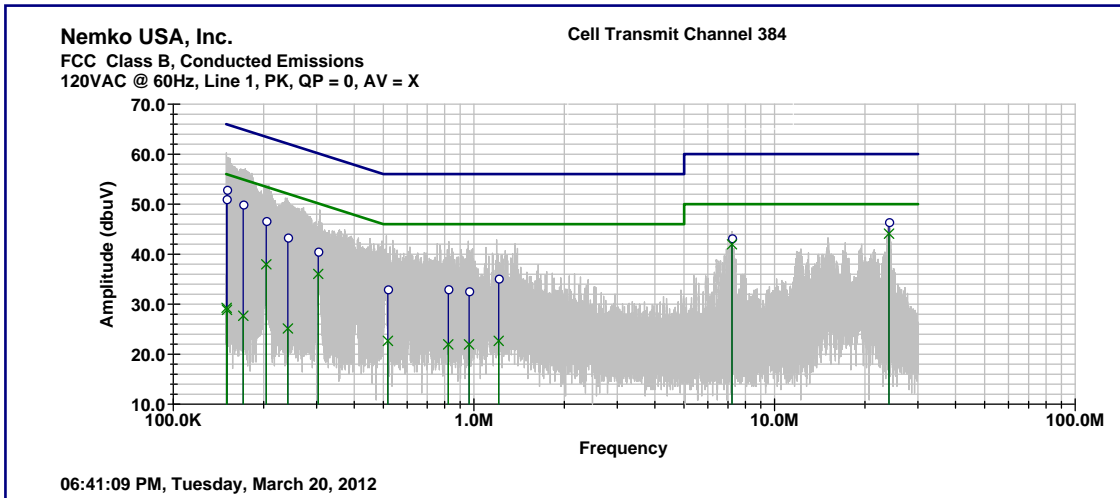
Additional Observations:

- Measurement was done on host's AC power supply
- EUT was tested using the following modes: Low channel TX, Mid channel TX, High channel TX and Receive Test Mode for each band. Only the worst case for each band is reported.
- Green limit line is Average limit and blue limit line is Quasi-peak limit.
- o represents final quasi peak measurements while x represent final average measurements.
- Instrumentation settings are 9kHz RBW/30kHz VBW for Average measurements and 120kHz RBW/300kHz VBW for Quasi-Peak measurements.



Cell band worst case TX: channel 384

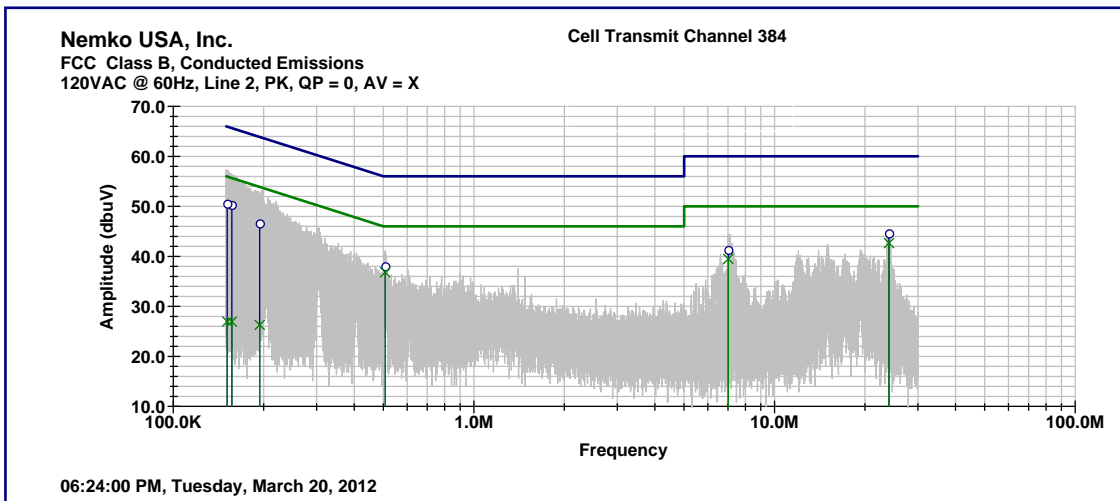
Line 1:



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 150.504 | 51.0 | 29.2 | 66.0 | 56.0 | -15.0 | -26.7 |
| 150.925 | 52.9 | 28.8 | 65.9 | 55.9 | -13.1 | -27.1 |
| 171.024 | 49.9 | 27.7 | 64.9 | 54.9 | -15.0 | -27.3 |
| 203.959 | 46.6 | 38.0 | 63.4 | 53.4 | -16.8 | -15.5 |
| 240.580 | 43.3 | 25.1 | 62.1 | 52.1 | -18.7 | -26.9 |
| 303.626 | 40.5 | 36.0 | 60.1 | 50.1 | -19.6 | -14.1 |
| 517.376 | 33.0 | 22.7 | 56.0 | 46.0 | -23.0 | -23.3 |
| 821.347 | 33.0 | 22.0 | 56.0 | 46.0 | -23.0 | -24.1 |
| 963.422 | 32.6 | 22.0 | 56.0 | 46.0 | -23.4 | -24.1 |
| 1208.680 | 35.1 | 22.6 | 56.0 | 46.0 | -20.9 | -23.4 |
| 7215.370 | 43.2 | 42.0 | 60.0 | 50.0 | -16.8 | -8.0 |
| 24001.000 | 46.4 | 44.1 | 60.0 | 50.0 | -13.6 | -5.9 |

Cell band worst case TX: channel 384

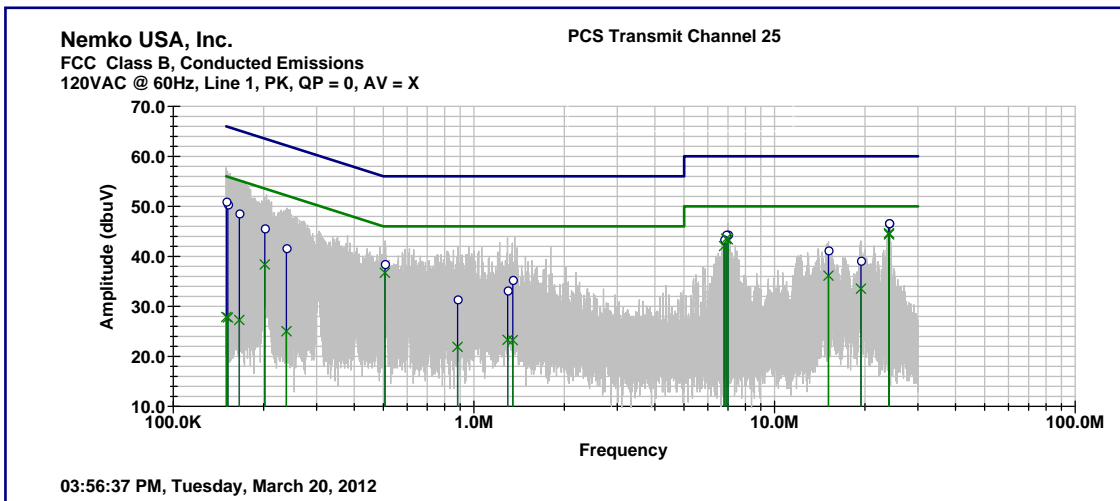
Line 2 (N):



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 151.203 | 50.5 | 27.0 | 65.9 | 55.9 | -15.4 | -29.0 |
| 156.514 | 50.3 | 26.9 | 65.6 | 55.6 | -15.4 | -28.7 |
| 193.970 | 46.6 | 26.3 | 63.9 | 53.9 | -17.3 | -27.6 |
| 506.921 | 38.0 | 36.8 | 56.0 | 46.0 | -18.0 | -9.2 |
| 7012.110 | 41.3 | 39.5 | 60.0 | 50.0 | -18.7 | -10.5 |
| 24001.900 | 44.6 | 42.7 | 60.0 | 50.0 | -15.4 | -7.3 |

PCS band worst case TX: channel 25

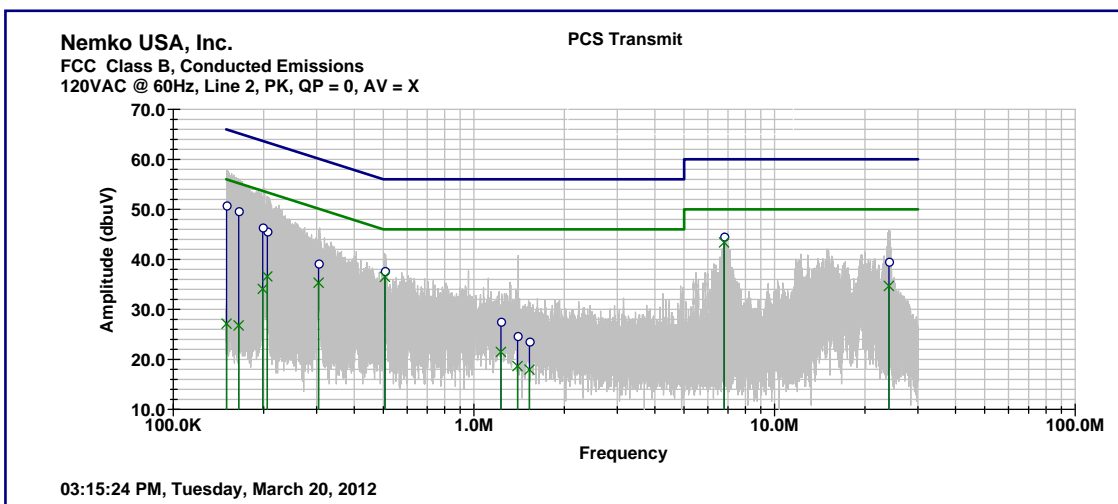
Line 1:



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 150.174 | 51.0 | 27.9 | 66.0 | 56.0 | -15.0 | -28.1 |
| 151.945 | 50.4 | 27.8 | 65.9 | 55.9 | -15.5 | -28.1 |
| 165.856 | 48.6 | 27.3 | 65.2 | 55.2 | -16.6 | -27.9 |
| 201.562 | 45.6 | 38.4 | 63.5 | 53.5 | -18.0 | -15.2 |
| 238.016 | 41.6 | 25.0 | 62.2 | 52.2 | -20.5 | -27.1 |
| 505.613 | 38.5 | 36.7 | 56.0 | 46.0 | -17.5 | -9.3 |
| 881.972 | 31.4 | 21.9 | 56.0 | 46.0 | -24.6 | -24.1 |
| 1294.890 | 33.2 | 23.3 | 56.0 | 46.0 | -22.8 | -22.7 |
| 1346.580 | 35.3 | 23.2 | 56.0 | 46.0 | -20.7 | -22.8 |
| 6792.830 | 43.4 | 42.1 | 60.0 | 50.0 | -16.6 | -7.9 |
| 6892.800 | 44.3 | 43.5 | 60.0 | 50.0 | -15.7 | -6.5 |
| 6994.520 | 44.3 | 43.4 | 60.0 | 50.0 | -15.7 | -6.6 |
| 15102.600 | 41.2 | 36.1 | 60.0 | 50.0 | -18.8 | -13.9 |
| 19369.500 | 39.1 | 33.5 | 60.0 | 50.0 | -20.9 | -16.5 |
| 23999.300 | 46.7 | 44.6 | 60.0 | 50.0 | -13.3 | -5.4 |
| 24000.900 | 46.6 | 44.4 | 60.0 | 50.0 | -13.4 | -5.6 |

PCS band worst case TX: channel 25

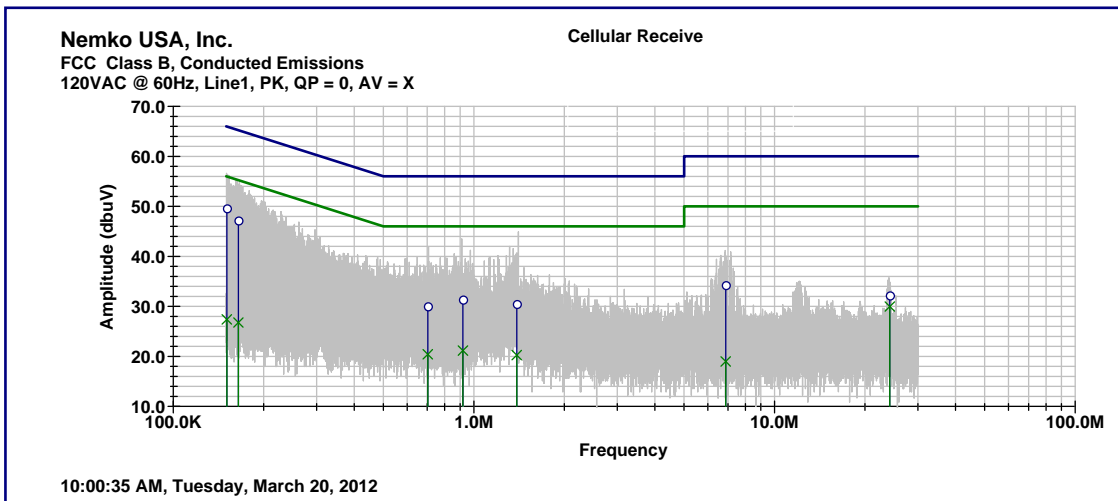
Line 2 (N):



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 150.397 | 50.8 | 27.1 | 66.0 | 56.0 | -15.2 | -28.9 |
| 165.052 | 49.7 | 26.8 | 65.2 | 55.2 | -15.6 | -28.4 |
| 198.471 | 46.4 | 34.1 | 63.7 | 53.7 | -17.3 | -19.6 |
| 205.586 | 45.6 | 36.6 | 63.4 | 53.4 | -17.8 | -16.8 |
| 304.341 | 39.2 | 35.3 | 60.1 | 50.1 | -20.9 | -14.8 |
| 505.558 | 37.7 | 36.5 | 56.0 | 46.0 | -18.3 | -9.5 |
| 1229.690 | 27.5 | 21.5 | 56.0 | 46.0 | -28.5 | -24.5 |
| 1396.870 | 24.7 | 18.6 | 56.0 | 46.0 | -31.3 | -27.4 |
| 1530.370 | 23.6 | 17.9 | 56.0 | 46.0 | -32.4 | -28.1 |
| 6791.780 | 44.6 | 43.4 | 60.0 | 50.0 | -15.4 | -6.6 |
| 23993.200 | 39.5 | 34.7 | 60.0 | 50.0 | -20.5 | -15.3 |

Cell band RX

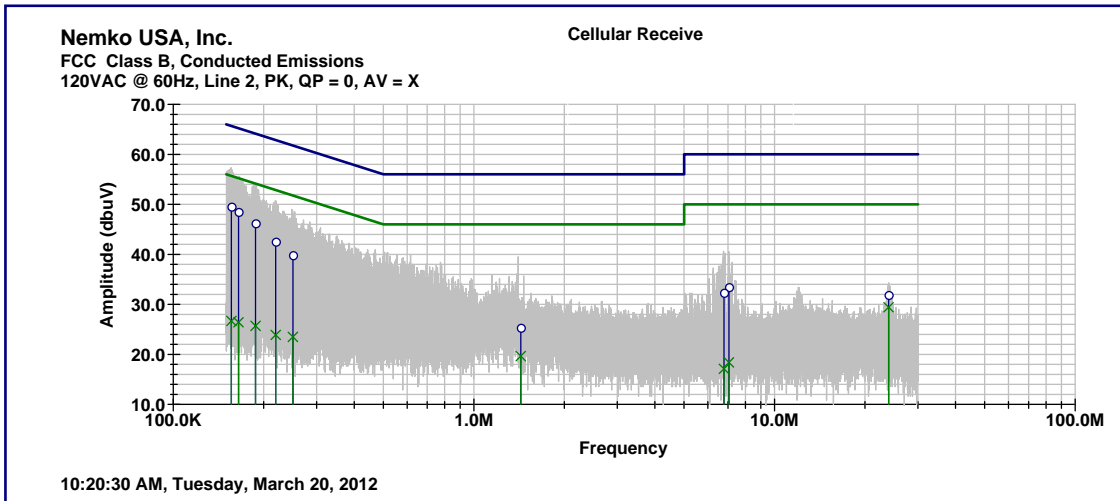
Line 1:



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 150.749 | 49.6 | 27.4 | 66.0 | 56.0 | -16.3 | -28.6 |
| 164.769 | 47.2 | 26.8 | 65.2 | 55.2 | -18.0 | -28.5 |
| 702.321 | 30.0 | 20.4 | 56.0 | 46.0 | -26.0 | -25.6 |
| 919.458 | 31.4 | 21.2 | 56.0 | 46.0 | -24.6 | -24.9 |
| 1387.820 | 30.5 | 20.2 | 56.0 | 46.0 | -25.5 | -25.8 |
| 6875.270 | 34.2 | 19.0 | 60.0 | 50.0 | -25.8 | -31.0 |
| 24158.000 | 32.2 | 30.0 | 60.0 | 50.0 | -27.8 | -20.0 |

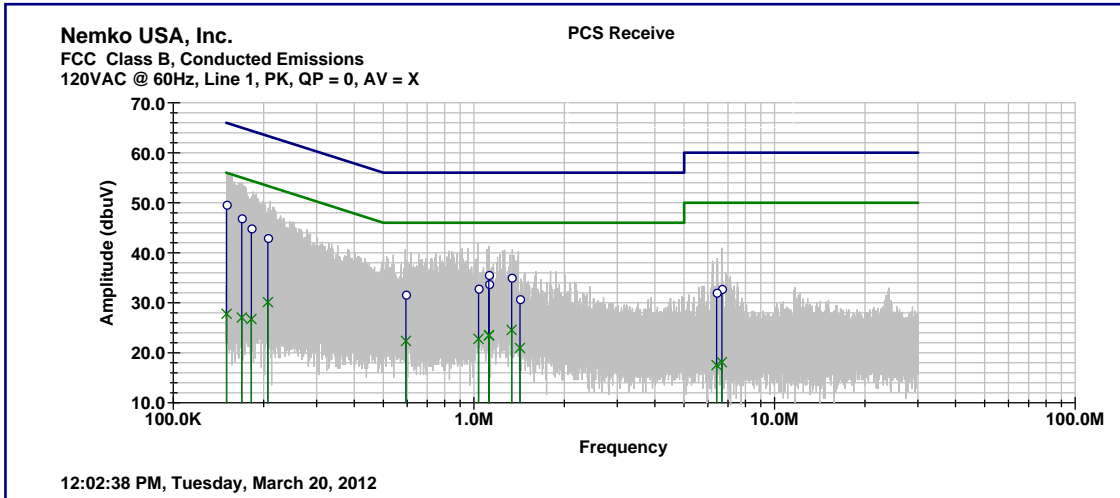
Cell band RX

Line 2 (N):



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 156.166 | 49.5 | 26.7 | 65.7 | 55.7 | -16.1 | -29.0 |
| 164.858 | 48.5 | 26.4 | 65.2 | 55.2 | -16.7 | -28.8 |
| 187.817 | 46.2 | 25.7 | 64.1 | 54.1 | -17.9 | -28.4 |
| 219.279 | 42.5 | 23.9 | 62.8 | 52.8 | -20.3 | -29.0 |
| 250.115 | 39.8 | 23.5 | 61.8 | 51.8 | -21.9 | -28.3 |
| 1430.710 | 25.3 | 19.6 | 56.0 | 46.0 | -30.7 | -26.4 |
| 6784.910 | 32.3 | 17.1 | 60.0 | 50.0 | -27.7 | -32.9 |
| 7043.090 | 33.5 | 18.4 | 60.0 | 50.0 | -26.5 | -31.6 |
| 23920.800 | 31.9 | 29.4 | 60.0 | 50.0 | -28.1 | -20.6 |

PCS band RX

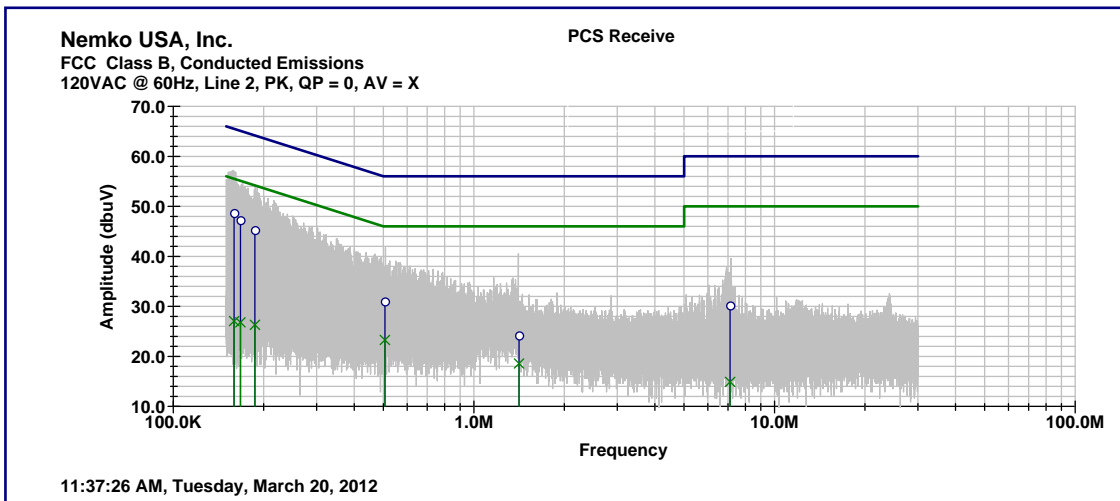


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| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 150.580 | 49.6 | 27.8 | 66.0 | 56.0 | -16.4 | -28.2 |
| 169.009 | 46.9 | 27.0 | 65.0 | 55.0 | -18.1 | -28.0 |
| 181.990 | 44.9 | 26.7 | 64.4 | 54.4 | -19.5 | -27.7 |
| 206.392 | 43.0 | 30.1 | 63.3 | 53.3 | -20.4 | -23.2 |
| 594.046 | 31.6 | 22.4 | 56.0 | 46.0 | -24.4 | -23.6 |
| 1036.060 | 32.8 | 22.8 | 56.0 | 46.0 | -23.2 | -23.2 |
| 1120.980 | 35.6 | 23.4 | 56.0 | 46.0 | -20.4 | -22.6 |
| 1123.410 | 33.7 | 23.5 | 56.0 | 46.0 | -22.3 | -22.5 |
| 1335.730 | 35.0 | 24.6 | 56.0 | 46.0 | -21.0 | -21.4 |
| 1422.650 | 30.7 | 20.9 | 56.0 | 46.0 | -25.3 | -25.1 |
| 6410.940 | 32.0 | 17.5 | 60.0 | 50.0 | -28.0 | -32.5 |
| 6675.670 | 32.8 | 18.1 | 60.0 | 50.0 | -27.2 | -31.9 |

Cell band RX

Line 2 (N):



| Frequency (kHz) | Measured | | Limit | | Margin | |
|--------------------|------------|---------|------------|---------|------------|---------|
| | Quasi-Peak | Average | Quasi-Peak | Average | Quasi-Peak | Average |
| 159.479 | 48.7 | 27.0 | 65.5 | 55.5 | -16.8 | -28.5 |
| 167.356 | 47.2 | 26.8 | 65.1 | 55.1 | -17.9 | -28.3 |
| 186.969 | 45.3 | 26.3 | 64.2 | 54.2 | -18.9 | -27.9 |
| 505.546 | 31.0 | 23.3 | 56.0 | 46.0 | -25.0 | -22.7 |
| 1412.300 | 24.2 | 18.6 | 56.0 | 46.0 | -31.8 | -27.4 |
| 7114.630 | 30.2 | 14.9 | 60.0 | 50.0 | -29.8 | -35.1 |



A2. RF Power Output

Para. No. : FCC 2.1046 & RSS-GEN 4.8

§ 22.913
 The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232.
 (b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
 (c) Mobile/portable stations are limited to 2 watts EIRP power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
 (d) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

RSS-132
 4.4 Transmitter Output Power
 The transmitter output power shall not exceed the limits given in SRSP-503.
 NOTE: From SRSP-503 issue 7, Feb 2008:
 5.1.3 The maximum EIRP shall be 11.5 watts for mobile stations.

RSS-133
 6.4 Transmitter Output Power
 The average equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.
 NOTE: From SRSP-510 issue 5, Feb 2009:
 5.1.2 Mobile Stations
 Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

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Conditions:

| | | | |
|---------------------|----------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 24°C |
| Date: | April 04, 2012 | Humidity: | 33% |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |



Observations:

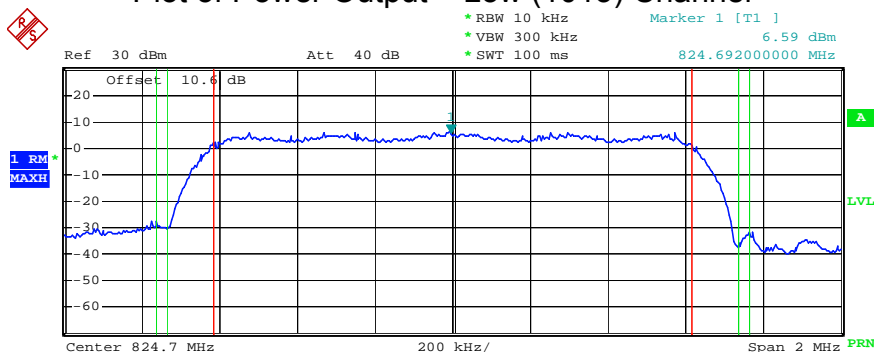
- Input voltage varied from 3.4 to 4.3 VDC
- Cellular macro of standard used in spectrum analyzer for conducted power measurement. 10.6 dB offset measured prior to test.
- PCS macro of standard used in spectrum analyzer for conducted power measurement. 10.7 dB offset measured prior to test.
- Peak, max hold used for Peak output power with RBW > EBW.

Test Results: Complies

| Carrier Frequency (MHz) | Channel | Voltage Nom +/- 15% VDC | Output Power (dBm) | Output Power (W) |
|-------------------------|---------|-------------------------|--------------------|------------------|
| 824.70 | 1013 | 3.4 | 24.30 | |
| | | 3.9 | 24.28 | |
| | | 4.3 | 24.43 | 0.277 |
| 836.52 | 384 | 3.4 | 24.63 | |
| | | 3.9 | 25.41 | 0.348 |
| | | 4.3 | 24.87 | |
| 848.31 | 777 | 3.4 | 24.90 | |
| | | 3.9 | 24.97 | 0.314 |
| | | 4.3 | 24.96 | |

| Carrier Frequency (MHz) | Channel | Voltage Nom +/- 15% VDC | Output Power (dBm) | Output Power (W) | Peak Output Power (dBm) | Peak to Average Ratio (dB) |
|-------------------------|---------|-------------------------|--------------------|------------------|-------------------------|----------------------------|
| 1851.25 | 25 | 3.4 | 23.73 | | | |
| | | 3.9 | 23.83 | | | |
| | | 4.3 | 24.08 | 0.256 | 25.24 | 1.05 |
| 1880.00 | 600 | 3.4 | 23.23 | | | |
| | | 3.9 | 23.40 | | | |
| | | 4.3 | 23.43 | 0.221 | 24.85 | 1.06 |
| 1908.75 | 1175 | 3.4 | 23.64 | | | |
| | | 3.9 | 24.03 | 0.253 | 24.92 | 1.04 |
| | | 4.3 | 23.61 | | | |

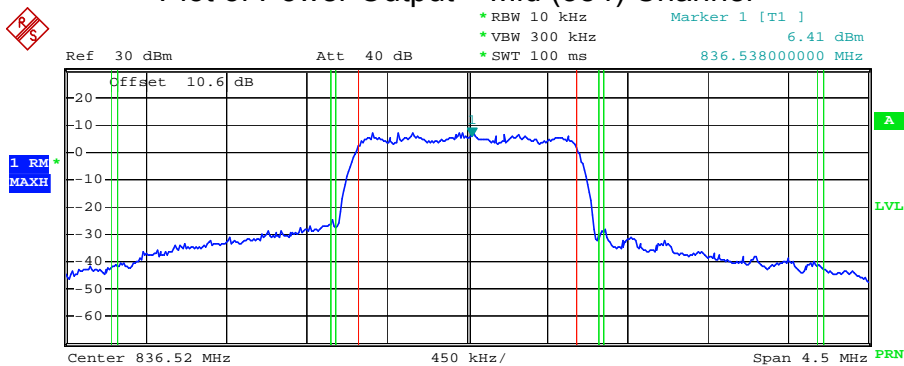
Plot of Power Output – Low (1013) Channel



| | | | |
|--------------------------|------------|-----------------------|-----------|
| Tx Channel | | CDMA IS95A FWD | |
| Bandwidth | 1.2288 MHz | Power | 24.43 dBm |
| Adjacent Channel | | Lower | -49.47 dB |
| Bandwidth | 30 kHz | Upper | -53.82 dB |
| Spacing | 750 kHz | | |
| Alternate Channel | | Lower | ---- |
| Bandwidth | 30 kHz | Upper | ---- |
| Spacing | 1.98 MHz | | |

Date: 4.APR.2012 02:23:55

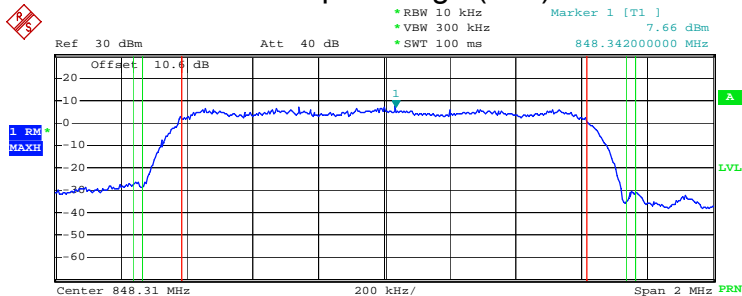
Plot of Power Output – Mid (384) Channel



| | | | |
|--------------------------|------------|-----------------------|-----------|
| Tx Channel | | CDMA IS95A FWD | |
| Bandwidth | 1.2288 MHz | Power | 25.41 dBm |
| Adjacent Channel | | Lower | -47.15 dB |
| Bandwidth | 30 kHz | Upper | -50.29 dB |
| Spacing | 750 kHz | | |
| Alternate Channel | | Lower | -62.61 dB |
| Bandwidth | 30 kHz | Upper | -62.36 dB |
| Spacing | 1.98 MHz | | |

Date: 1.JAN.1997 01:49:23

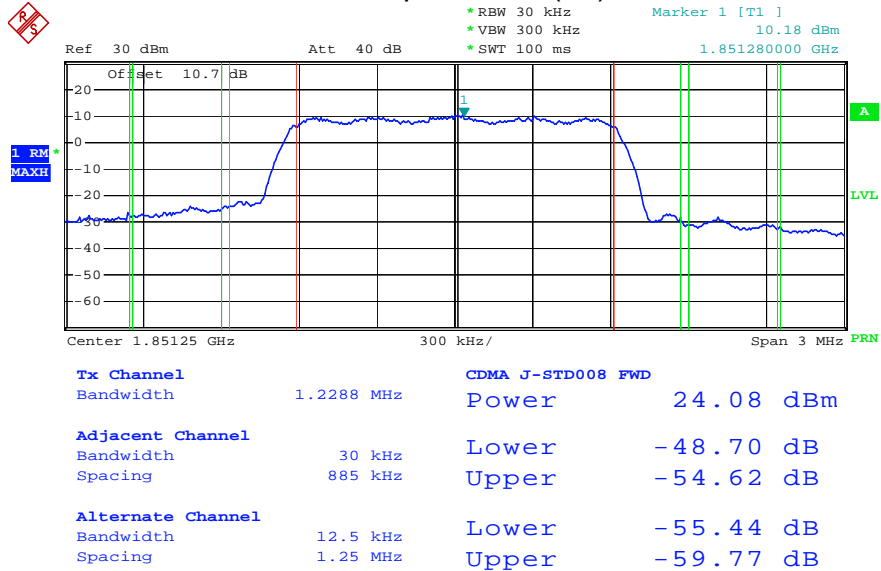
Plot of Power Output – High (777) Channel



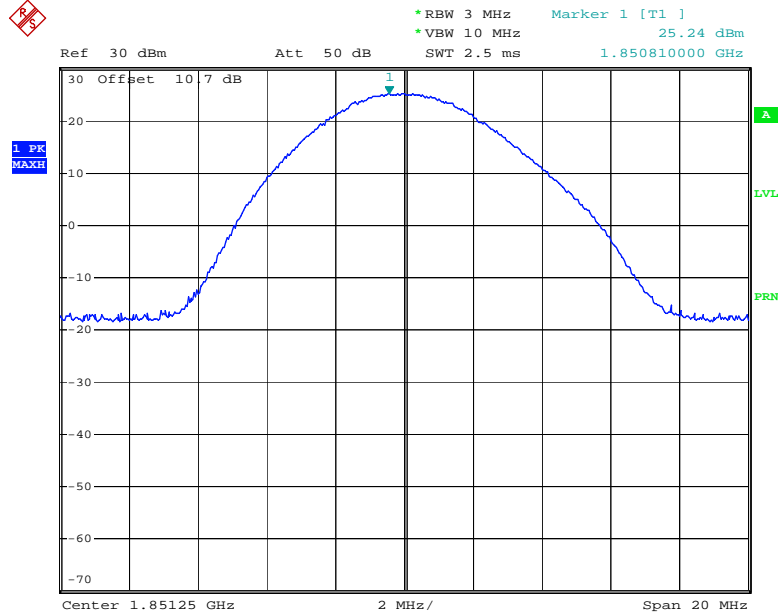
| Tx Channel | | CDMA IS95A FWD | |
|-------------------|------------|----------------|-----------|
| Bandwidth | 1.2288 MHz | Power | 24.97 dBm |
| Adjacent Channel | | Lower | -48.01 dB |
| Bandwidth | 30 kHz | Upper | -52.42 dB |
| Spacing | 750 kHz | | |
| Alternate Channel | | Lower | ----- |
| Bandwidth | 30 kHz | Upper | ----- |
| Spacing | 1.98 MHz | | |

Date: 4.APR.2012 02:30:31

Plot of Power Output – Low (25) Channel

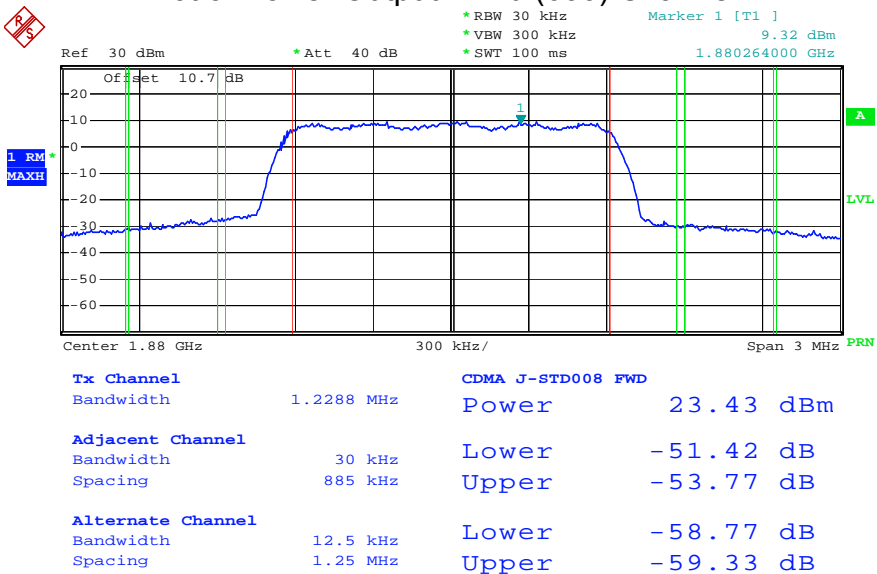


Date: 4.APR.2012 03:35:42

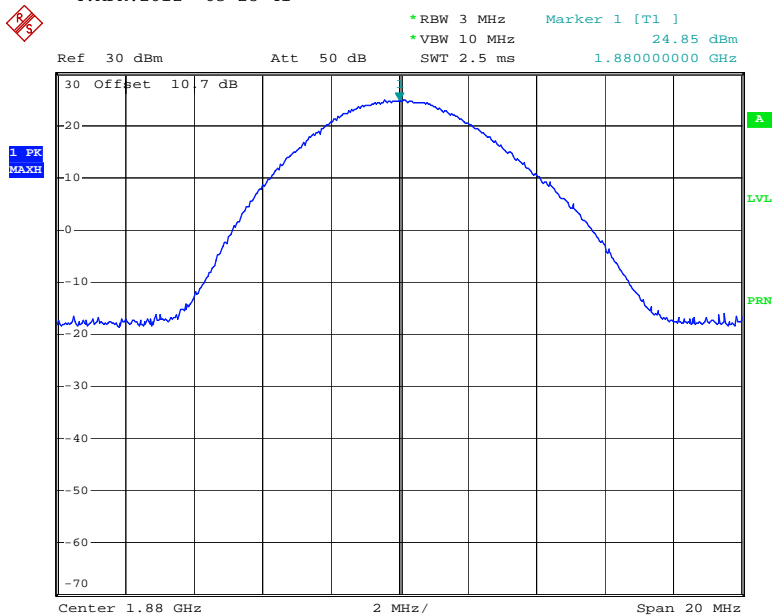


Date: 4.APR.2012 03:44:02

Plot of Power Output – Mid (600) Channel

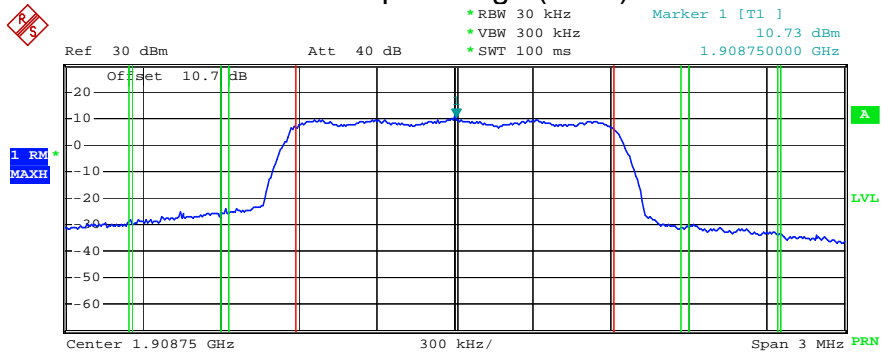


Date: 4.APR.2012 03:28:41



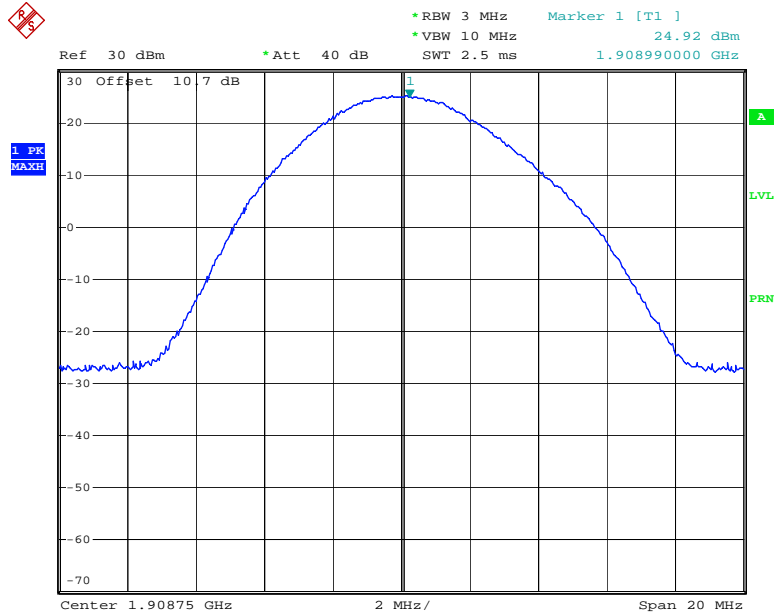
Date: 4.APR.2012 03:31:13

Plot of Power Output – High (1175) Channel



| | | | |
|--------------------------|------------|--------------------------|-----------|
| Tx Channel | | CDMA J-STD008 FWD | |
| Bandwidth | 1.2288 MHz | Power | 24.03 dBm |
| Adjacent Channel | | Lower | -49.75 dB |
| Bandwidth | 30 kHz | Upper | -55.22 dB |
| Spacing | 885 kHz | | |
| Alternate Channel | | Lower | -56.85 dB |
| Bandwidth | 12.5 kHz | Upper | -61.88 dB |
| Spacing | 1.25 MHz | | |

Date: 4.APR.2012 03:00:38



Date: 4.APR.2012 03:13:35



A3. Occupied Bandwidth

Para. No.: 2.1049 and RSS-GEN 4.6

Part 22.917

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

24.238

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-GEN 4.6.1 Occupied Bandwidth

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 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 shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear 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. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

www.nemko.com

Conditions:

| | | | |
|---------------------|----------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 24°C |
| Date: | April 04, 2012 | Humidity: | 34% |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

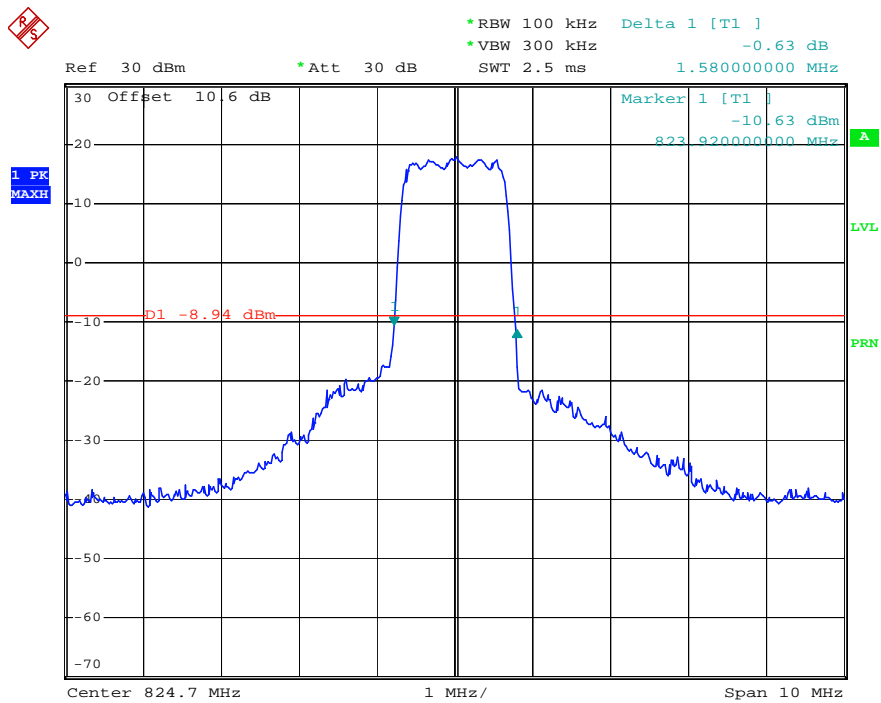
Observations: None

Test Results: Complies

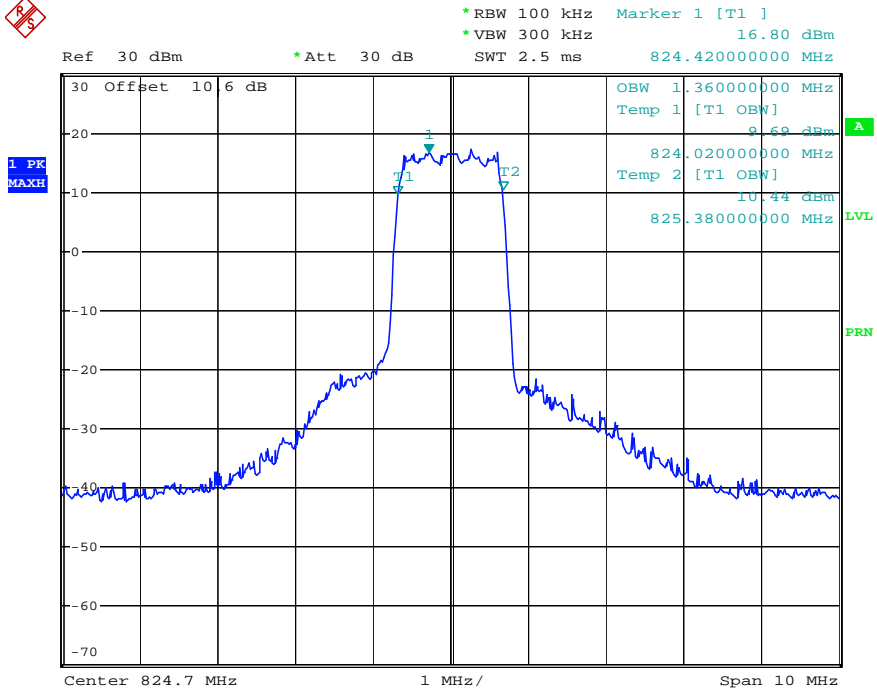


Test Data:

| Frequency | 26 dB Bandwidth | 99% Bandwidth |
|-------------|-----------------|---------------|
| 824.70 MHz | 1.58 MHz | 1.36 MHz |
| 836.52 MHz | 1.58 MHz | 1.36 MHz |
| 848.31 MHz | 1.58 MHz | 1.35 MHz |
| 1851.25 MHz | 1.55 MHz | 1.35 MHz |
| 1880.00 MHz | 1.55 MHz | 1.36 MHz |
| 1908.75 MHz | 1.55 MHz | 1.35 MHz |



Date: 4.APR.2012 05:40:23

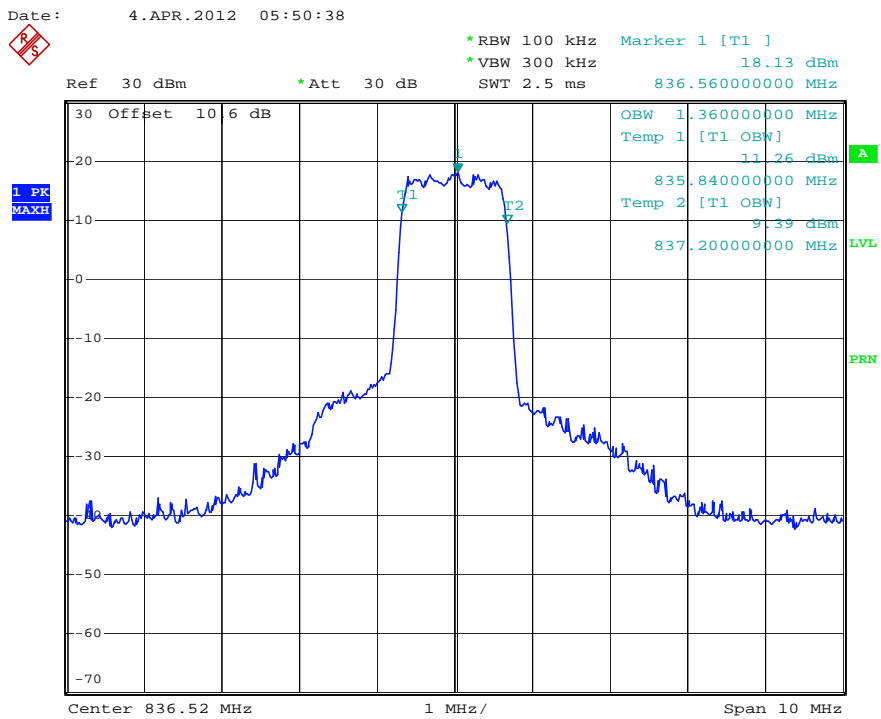
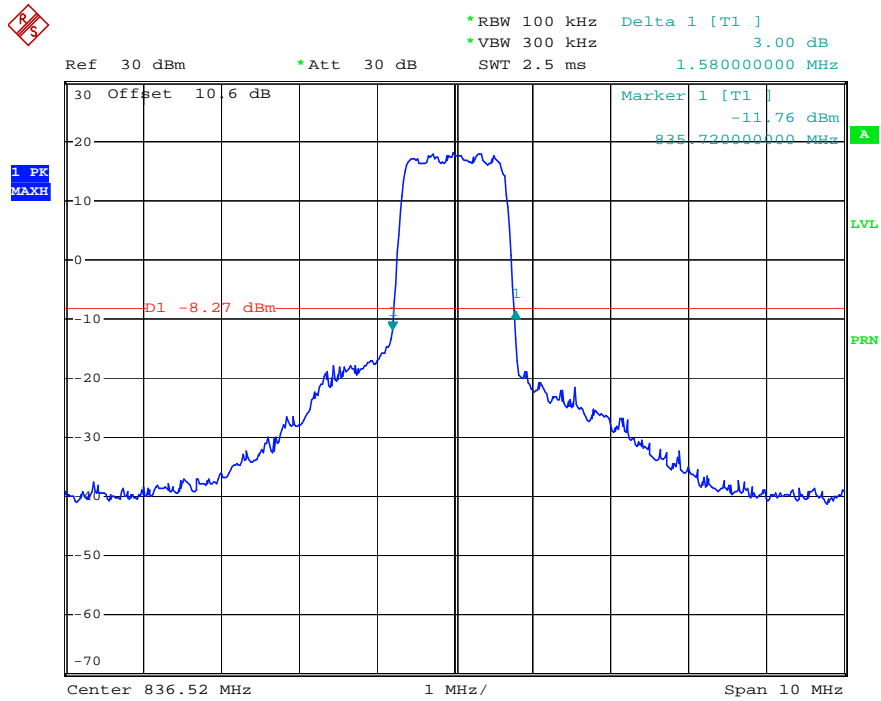


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Date: 4.APR.2012 05:41:43

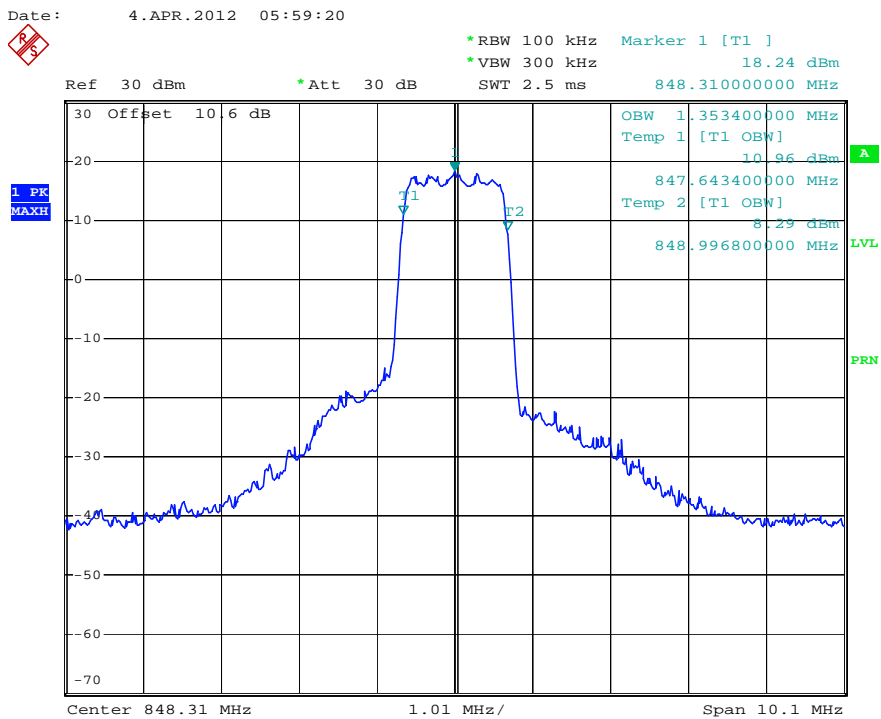
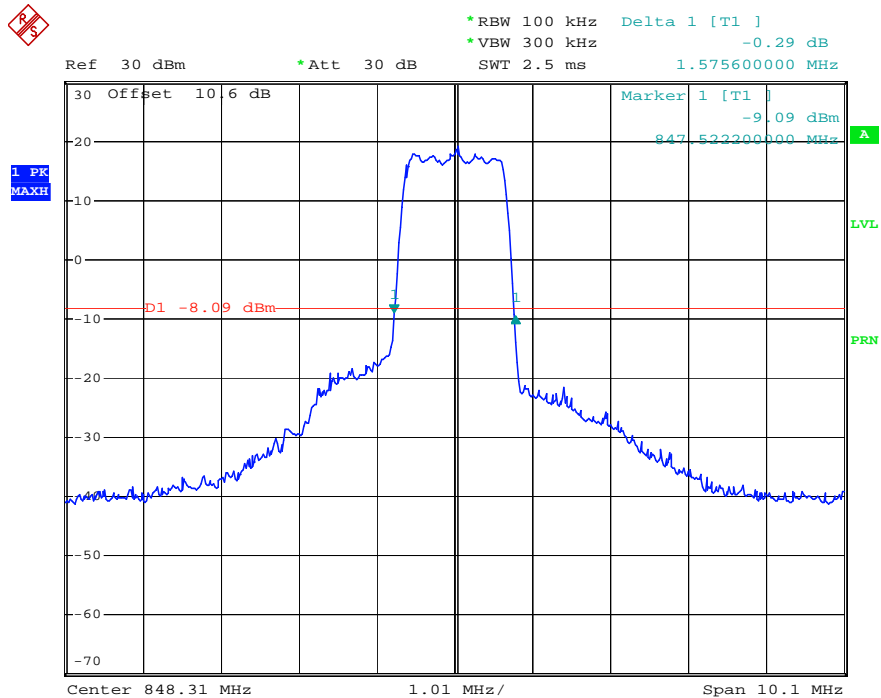
Cellular Band Frequency Low Channel (1013) – 824.70 MHz



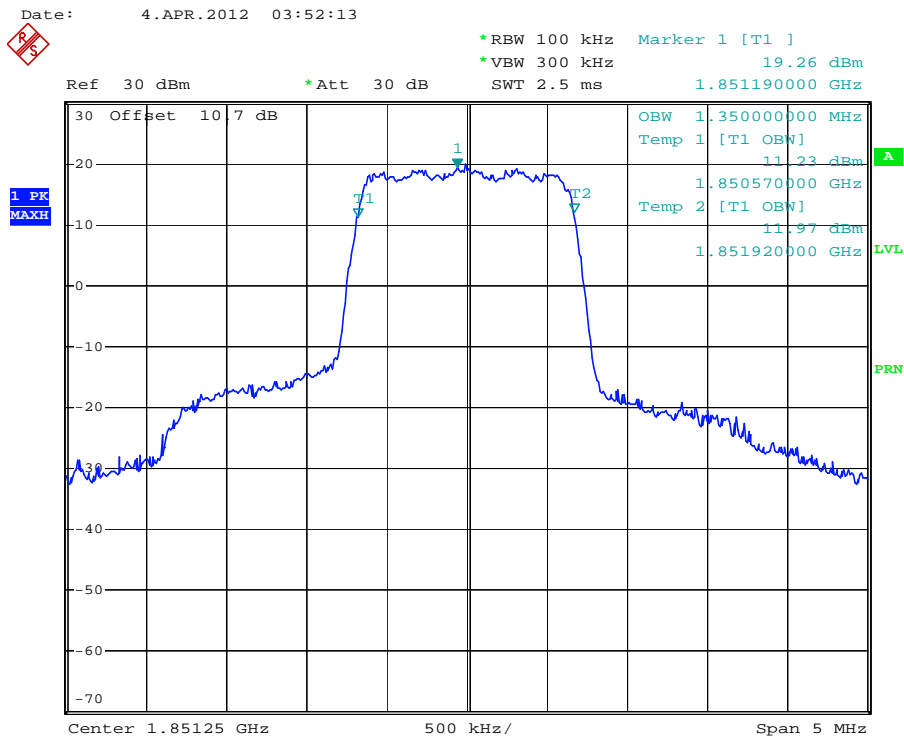
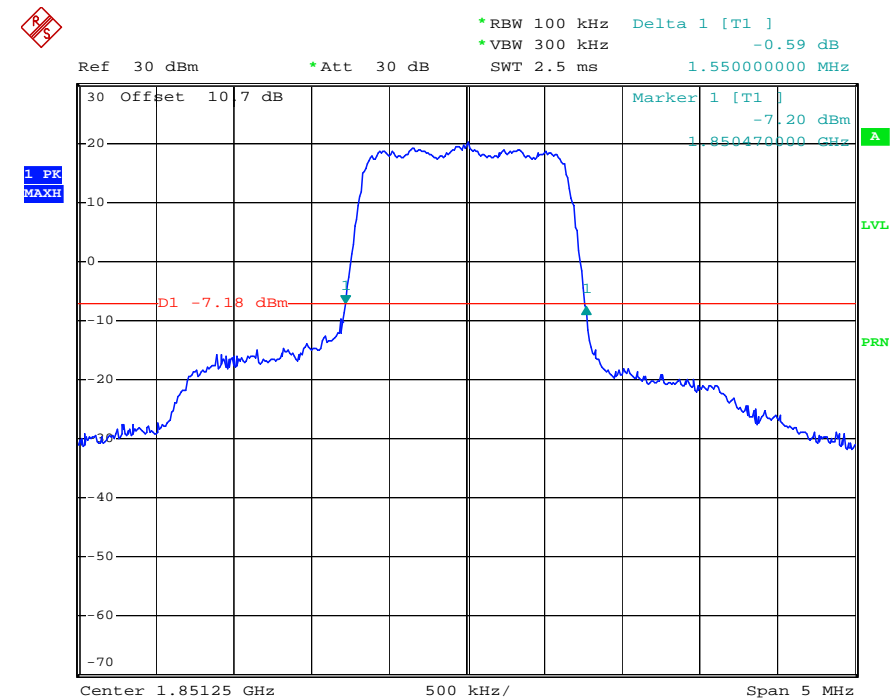


Date: 4.APR.2012 05:47:12

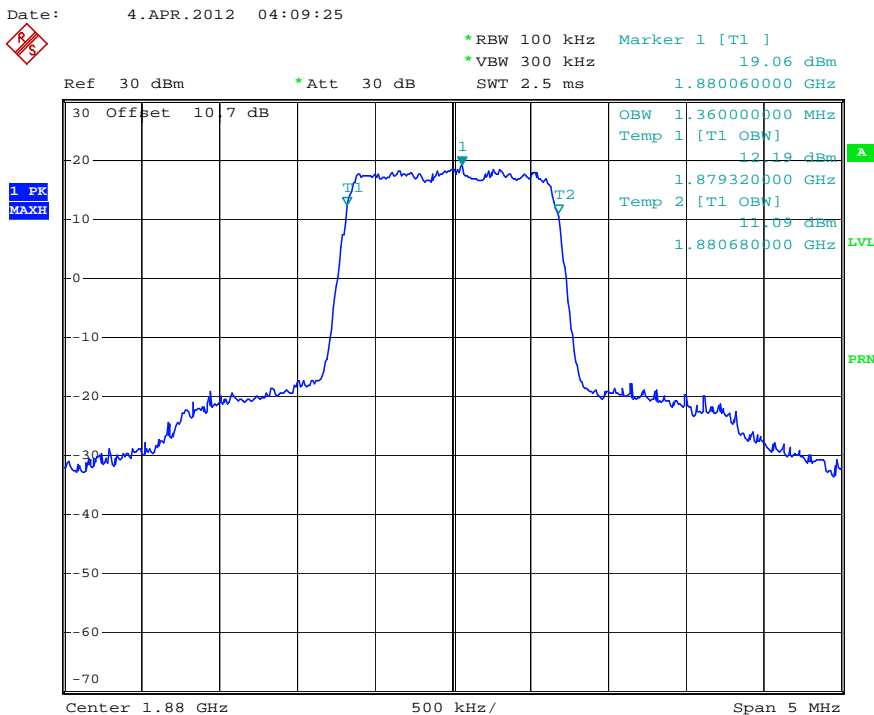
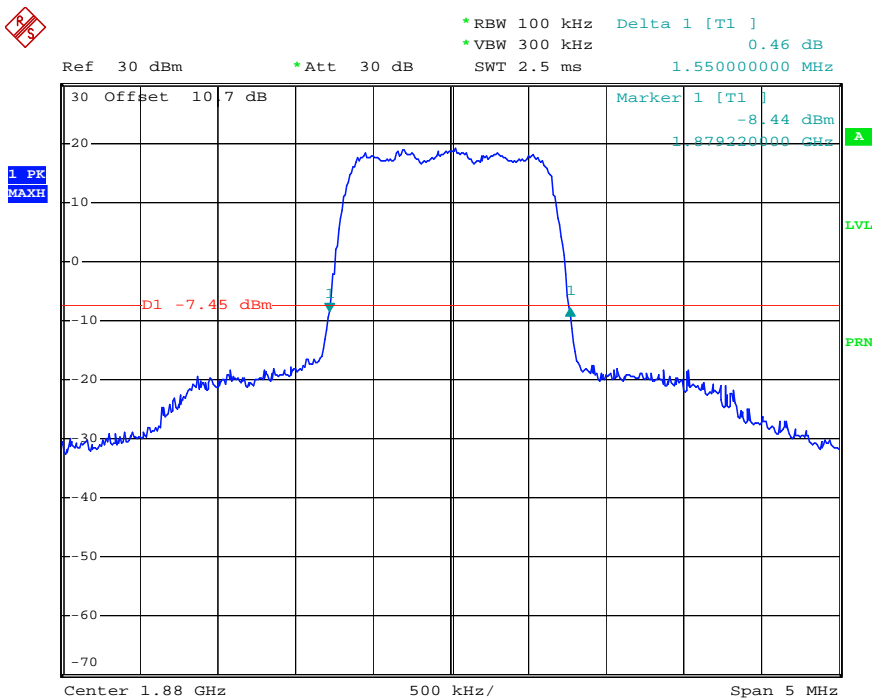
Cellular Band Frequency Mid Channel (384) – 836.52 MHz



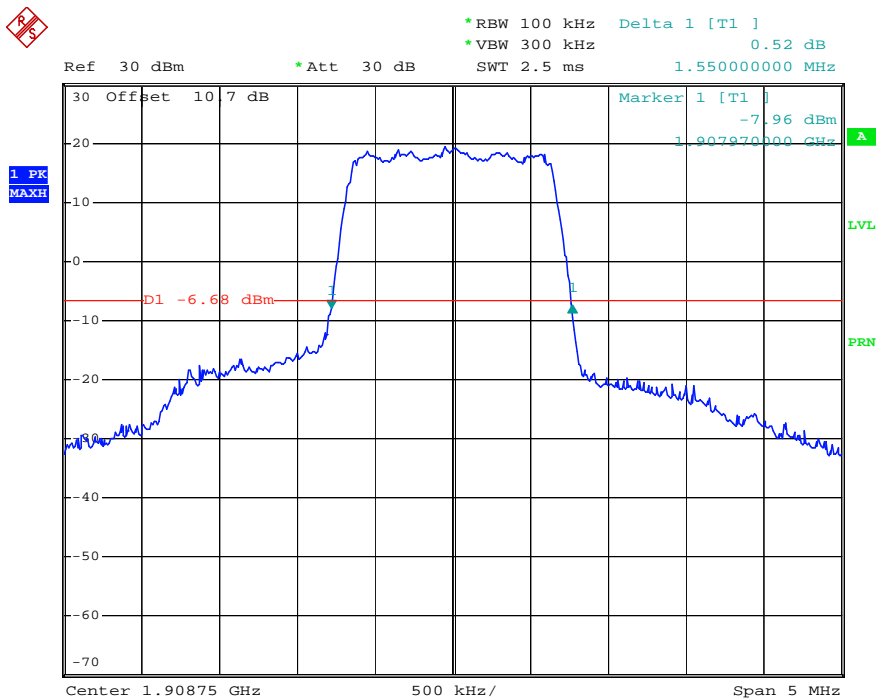
Date: 4.APR.2012 06:00:40



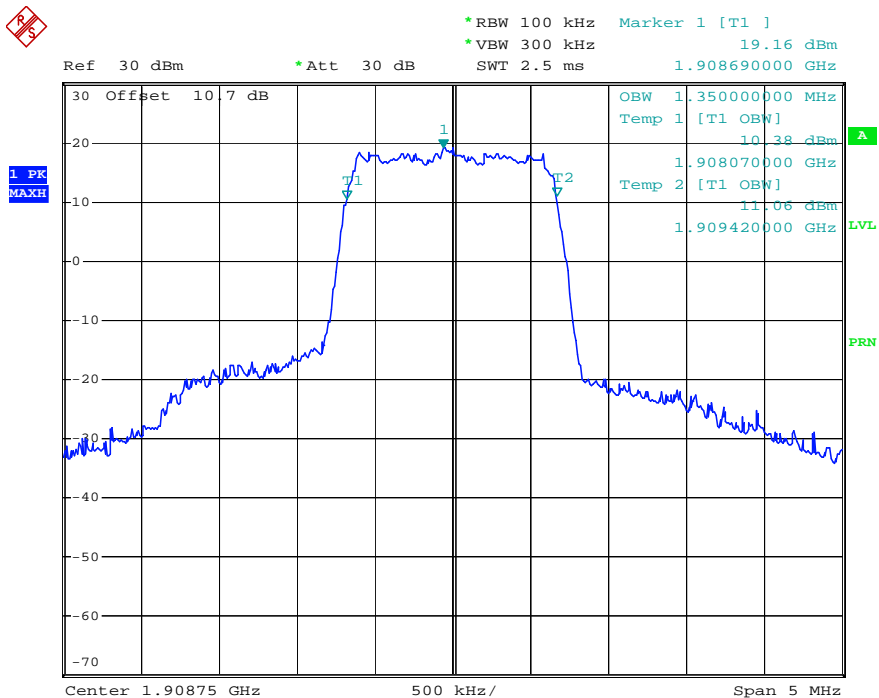
Date: 4.APR.2012 04:02:04



Date: 4.APR.2012 04:05:45



Date: 4.APR.2012 04:13:17



Date: 4.APR.2012 04:16:52

PCS Band Frequency High Channel (1175) – 1908.75 MHz



A4. Spurious Emissions At Antenna Terminals

Para. No.: FCC 2.1051 & RSS-GEN 4.9

Part 22.917
 (a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

24.238
 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
 (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified).

RSS 132 4.5 Transmitter Unwanted Emissions
 RSS 133 6.5 Transmitter Unwanted Emissions
 6.5.1 Out-of-Block Emissions (Mobile and Base Stations)
 (a) Mobile stations shall comply with subsection (i) below. Base stations shall comply with either subsection (i) or subsection (ii).
 (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least 43 + 10 log10(P), dB.

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Conditions:

| | | | |
|---------------------|---------------------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 20 – 22 °C |
| Date: | March 21 – April 10, 2012 | Humidity: | 25 -35 % |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

Observations:

1. Video (100 sample) averaging was used to demonstrate compliance within the band edges. RBW > 1 % of emission bandwidth.
2. 1 MHz RBW, 3 MHz VBW, Max Hold is used outside the band.
3. Screenshots below demonstrate compliance at band edges. Plots show compliance from 30 MHz to 10 x Transmit Frequencies.

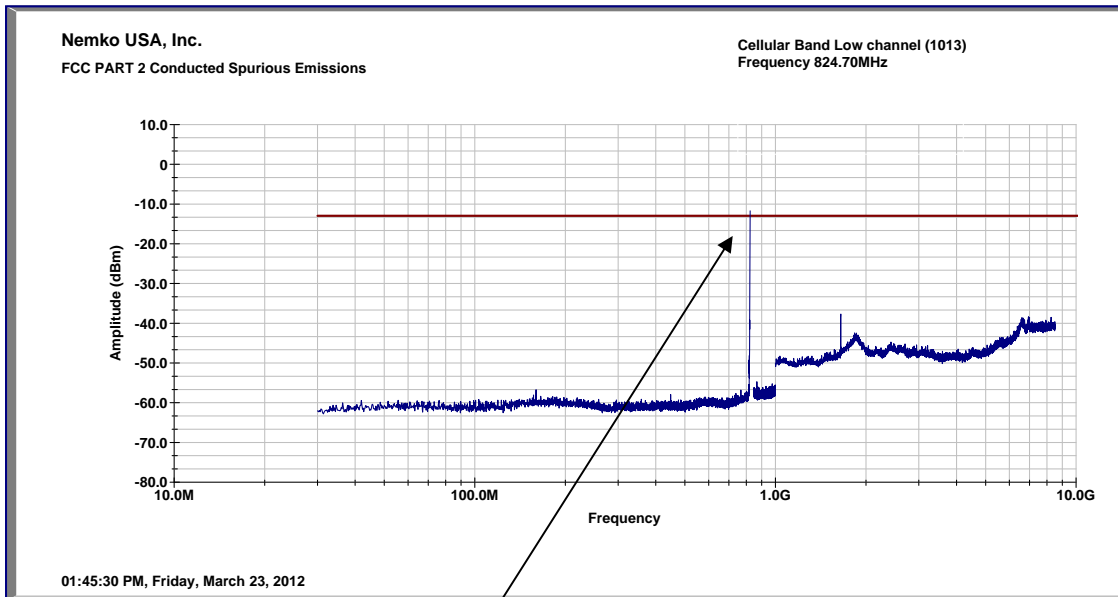
Test Results: Complies

Test Data: See attached graphs.

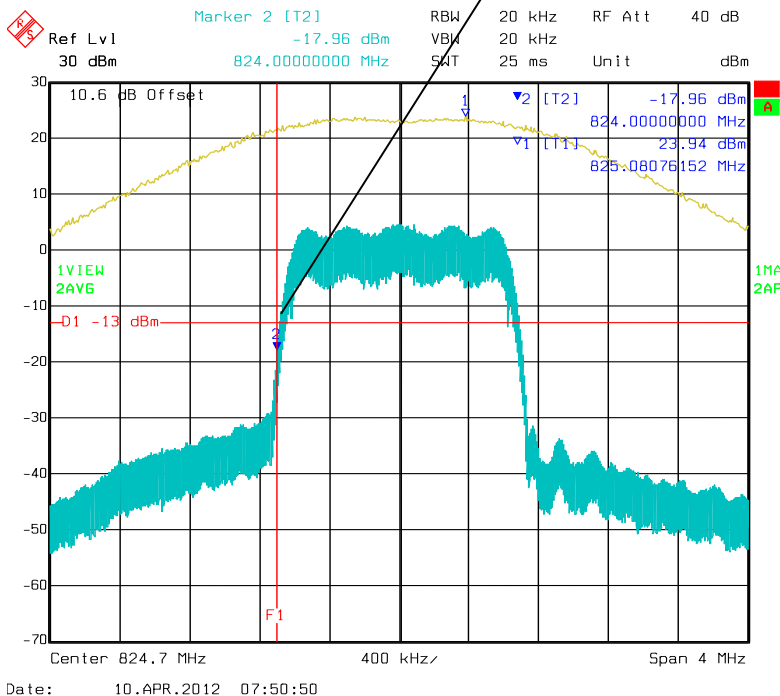




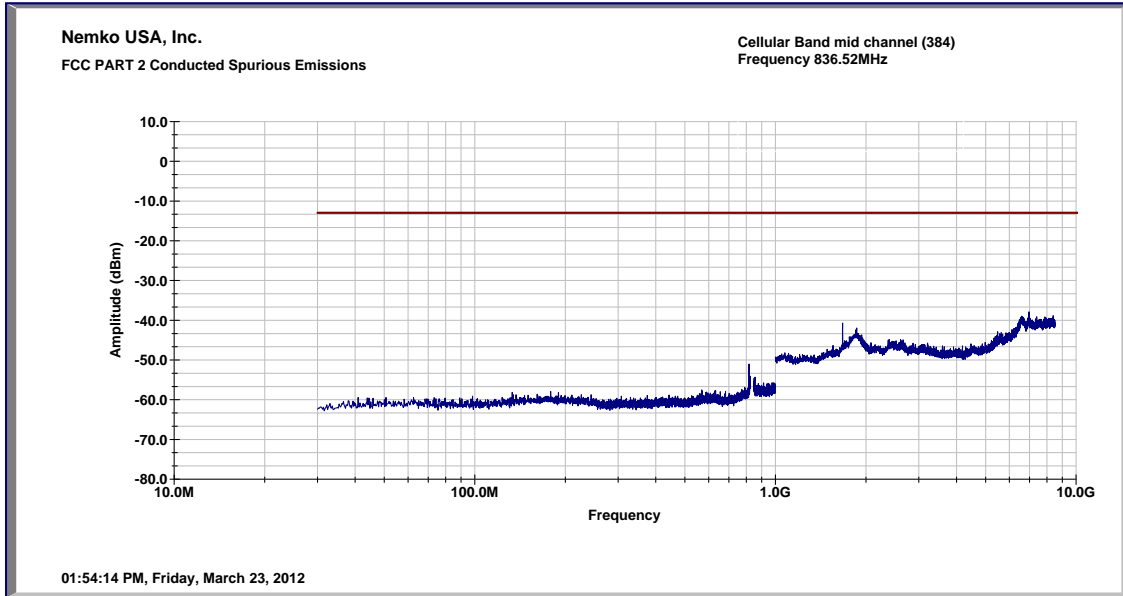
Channel 1013 Spurious Emissions – Cellular Band Low Channel



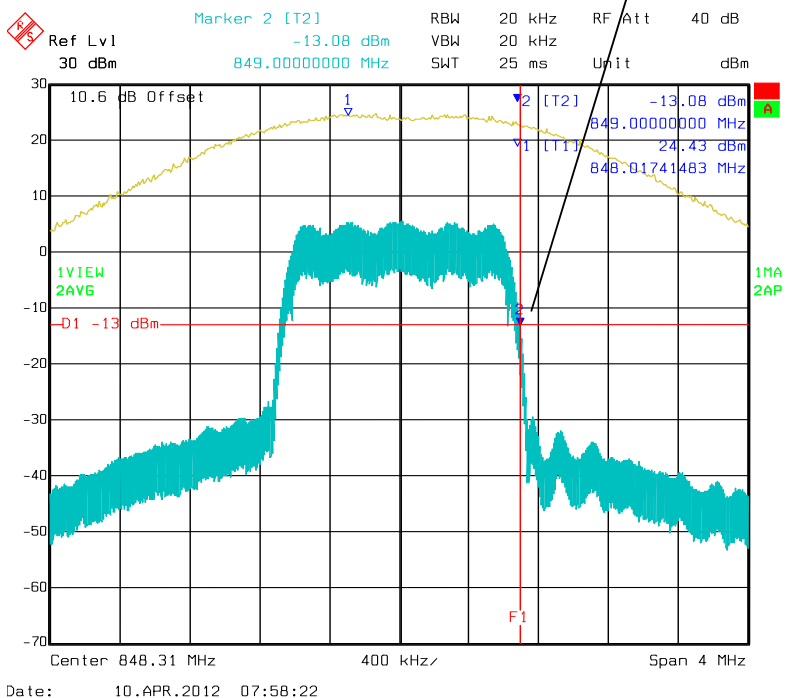
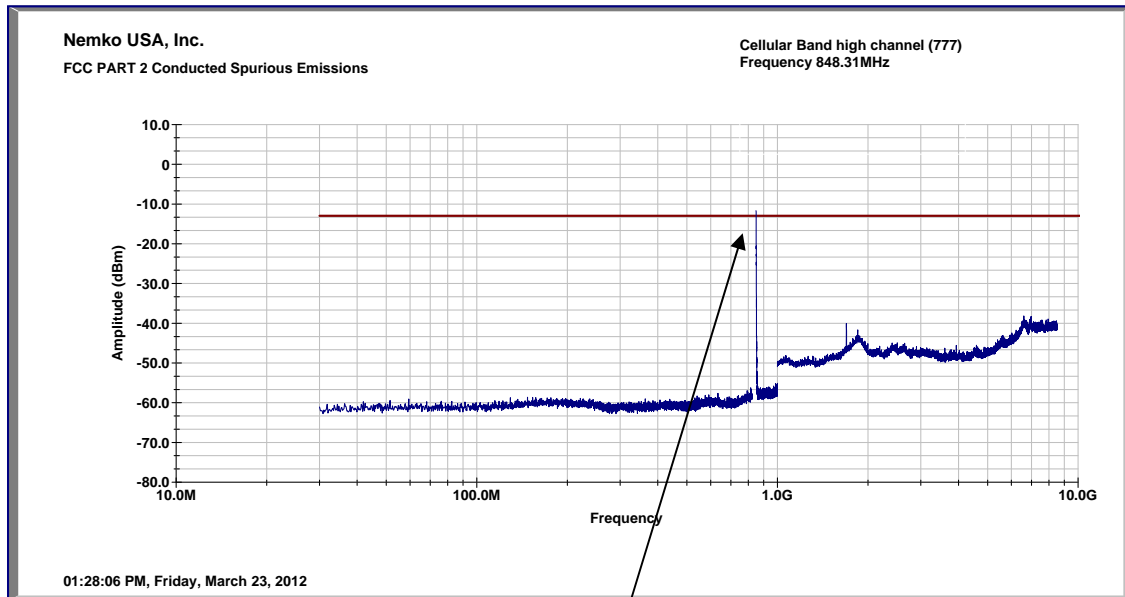
www.nemko.com



Channel Band 384 Spurious Emissions – Cellular Band Mid Channel

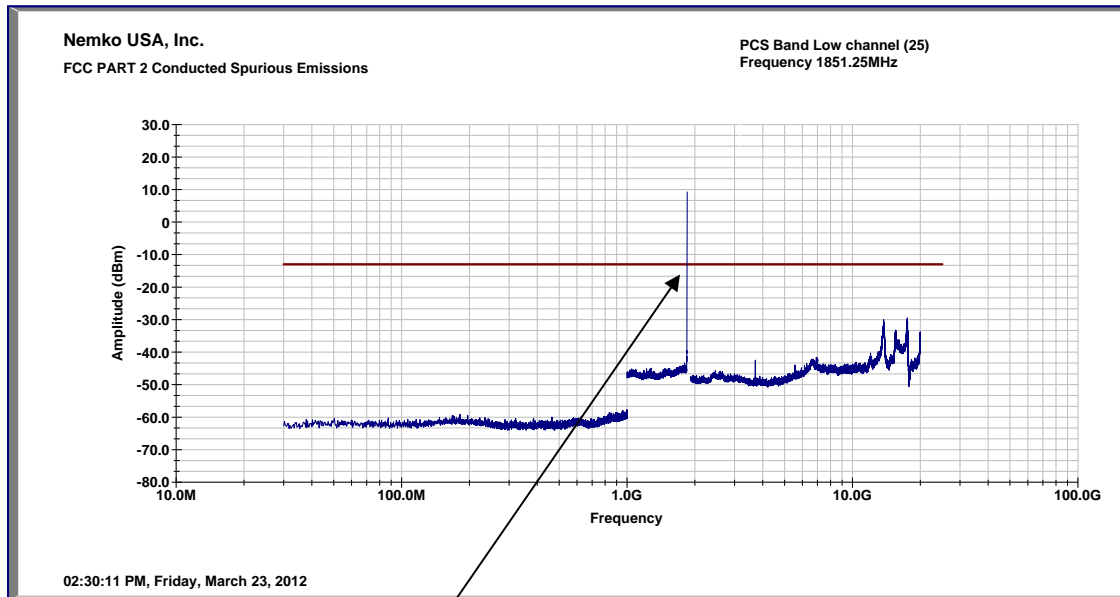


Channel 777 Spurious Emissions – Cellular Band High Channel

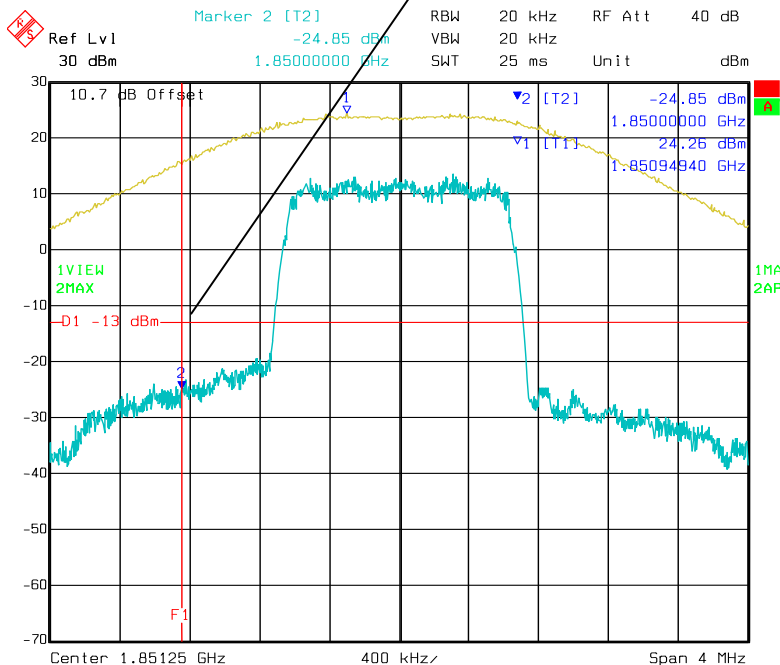




Channel 25 Spurious Emissions – PCS Band Low Channel



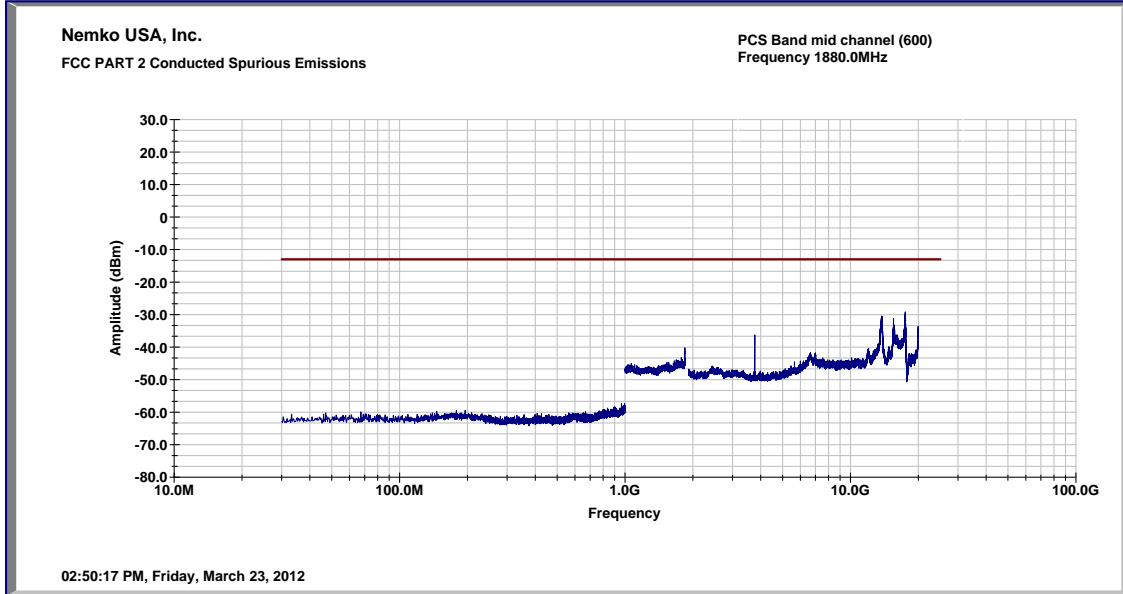
www.nemko.com



Date: 10.APR.2012 08:06:26

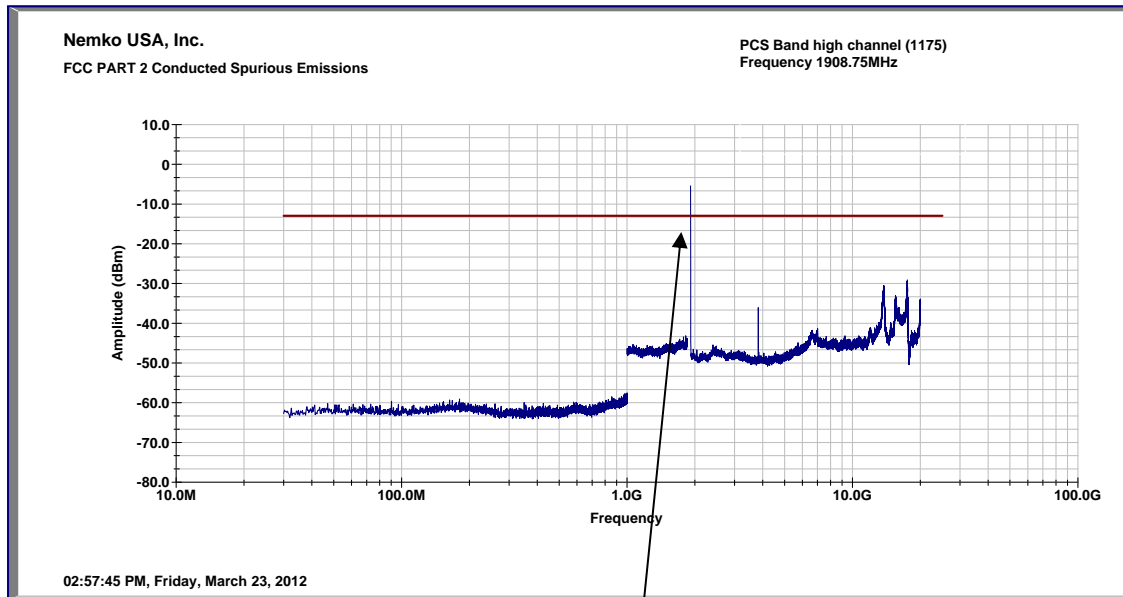


Channel 600 Spurious Emissions - PCS Band Mid Channel

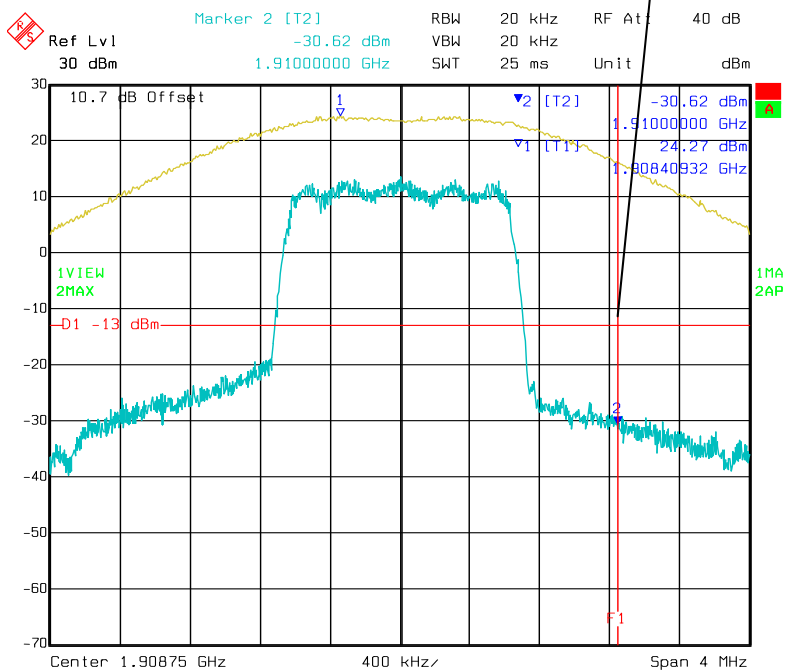




Channel 1175 Spurious Emissions – PCS Band High Channel



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Date: 10.APR.2012 08:15:07





A5. Field strength of Spurious Emissions

Para. No.: FCC 2.1053 & RSS-GEN 6.5.2

Minimum Standard is part 22
 Minimum Standard is part 24.236 and 24.238 for FCC see description of Spurious emission above
 RSS-133 4.9 Transmitter Unwanted Emissions
 The measurement method shall be described in the test report. The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements.
 The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.
 Unless otherwise specified, compliance with the emission limits shall be demonstrated using a CISPR quasi-peak detector and the related measurement bandwidth for emissions below 1000 MHz and, an average detector with a minimum resolution bandwidth of 1 MHz for emissions above 1 GHz.

RSS 132 and
 RSS 133 6.5 Field Receiver Spurious Emissions

If a radiated measurement is made, all spurious emissions shall comply with the limits of the following table. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emissions measurements below 1.0 GHz, and 1.0 MHz for measurements above 1.0 GHz.

| Spurious Frequency (MHz) | Field Strength (microvolts/m at 3 metres) |
|--------------------------|--|
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960 | 500 |

For CDMA and FM, 960 to 1610 is 500 μ V/m at 3 meters and above 1610 is 1000 μ V/m.

Conditions:

| | | | |
|---------------------|---------------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 20 – 21 °C |
| Date: | March 21 - 22, 2012 | Humidity: | 33 – 35 % |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

Observations:

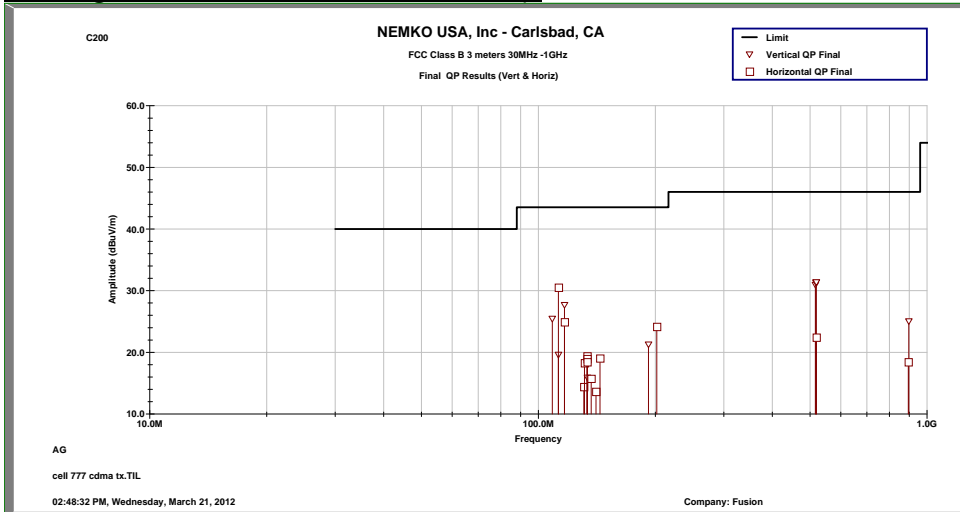
No Emissions were noted or measured above 3rd harmonic of the transmitter frequency, however the emission's range was searched up to and including the 10th Harmonic.

Test Results: Passed



Test Data:

TX CDMA Cell band ch 777 30-1000 MHz spurious emissions (worst case of low, mid and high channel tested in Cell band):



Vertical:

| Frequency | QP Measured | Adjustments | Final Result | Final Result | Limit | Limit | QP Margin | dBm Margin | Ant. Ht. | EUT Rotation |
|-----------|-------------|-------------|--------------|--------------|--------|-------|-----------|------------|----------|--------------|
| MHz | dBuV | dB/m | dBuV/m | dBm | dBuV/m | dBm | dB | dB | cm | degrees |
| 108.54 | 47.0 | -21.5 | 25.4 | -69.8 | 43.5 | -13 | -18.1 | -56.8 | 111 | 131 |
| 112.632 | 40.5 | -20.9 | 19.6 | -75.6 | 43.5 | -13 | -23.9 | -62.6 | 110 | 9 |
| 116.73 | 48.0 | -20.3 | 27.7 | -67.5 | 43.5 | -13 | -15.8 | -54.5 | 111 | 189 |
| 133.667 | 34.3 | -18.4 | 15.9 | -79.3 | 43.5 | -13 | -27.6 | -66.3 | 111 | 9 |
| 192.032 | 36.4 | -15.1 | 21.3 | -73.9 | 43.5 | -13 | -22.2 | -60.9 | 111 | 145 |
| 516.259 | 45.0 | -14.0 | 31.0 | -64.2 | 46.0 | -13 | -15.1 | -51.2 | 109 | 93 |
| 517.609 | 45.3 | -14.0 | 31.3 | -63.9 | 46.0 | -13 | -14.7 | -50.9 | 111 | 11 |
| 518.943 | 45.3 | -14.0 | 31.4 | -63.8 | 46.0 | -13 | -14.7 | -50.8 | 111 | 4 |
| 897.906 | 29.0 | -4.0 | 25.0 | -70.2 | 46.0 | -13 | -21.0 | -57.2 | 111 | 198 |

Horizontal:

| Frequency | QP Measured | Adjustments | Final Result | Final Result | Limit | Limit | QP Margin | dBm Margin | Ant. Ht. | EUT Rotation |
|-----------|-------------|-------------|--------------|--------------|-------|-------|-----------|------------|----------|--------------|
| 112.639 | 51.4 | -20.9 | 30.5 | -64.7 | 43.5 | -13 | -13.0 | -51.7 | 257 | 56 |
| 116.724 | 45.2 | -20.3 | 24.9 | -70.3 | 43.5 | -13 | -18.6 | -57.3 | 390 | 206 |
| 130.940 | 32.9 | -18.5 | 14.4 | -80.8 | 43.5 | -13 | -29.1 | -67.8 | 389 | 349 |
| 131.419 | 36.8 | -18.5 | 18.3 | -76.9 | 43.5 | -13 | -25.3 | -63.9 | 389 | 356 |
| 133.494 | 37.8 | -18.4 | 19.4 | -75.8 | 43.5 | -13 | -24.1 | -62.8 | 389 | 360 |
| 133.547 | 37.3 | -18.4 | 19.0 | -76.2 | 43.5 | -13 | -24.6 | -63.2 | 389 | 360 |
| 133.583 | 36.8 | -18.4 | 18.4 | -76.8 | 43.5 | -13 | -25.1 | -63.8 | 389 | 360 |
| 136.676 | 33.9 | -18.2 | 15.7 | -79.5 | 43.5 | -13 | -27.8 | -66.5 | 390 | 360 |
| 140.639 | 31.5 | -17.9 | 13.6 | -81.6 | 43.5 | -13 | -29.9 | -68.6 | 389 | 361 |
| 143.976 | 36.8 | -17.8 | 19.0 | -76.2 | 43.5 | -13 | -24.5 | -63.2 | 389 | 361 |
| 201.723 | 43.9 | -19.8 | 24.2 | -71.0 | 43.5 | -13 | -19.4 | -58.0 | 110 | 33 |
| 518.942 | 36.4 | -14.0 | 22.4 | -72.8 | 46.0 | -13 | -23.6 | -59.8 | 111 | 247 |
| 895.124 | 22.6 | -4.1 | 18.4 | -76.8 | 46.0 | -13 | -27.6 | -63.8 | 112 | 349 |

TX CDMA PCS band 30-1000 MHz spurious emissions:

No emissions found within 20 dB of the limits from 30 MHz to 1000 MHz.
Results QP - 95.26 dbm/ dB μ V/m = dBm

Example: A=RR+CL+AF

A = Amplitude dB μ V/m

RR = Receiver Reading dB μ V

CL = cable loss dB

AF = antenna factor dB/m

Example Frequency = 3817.5 MHz

72.3 dB μ V (spectrum analyzer reading)

+10.6 dB (cable loss @ frequency)

82.9 dB μ V

+31.1 dB/m (antenna factor @ frequency)

114.0 dB μ V/m

-36.4 dB amplifier gain

77.6 dB μ V/m

-95.26 dbm/ dB μ V/m

-17.7 dBm Final adjusted value

TX CDMA Cell and PCS band: 1 - 20 GHz spurious emissions:

Radiated Emissions Data

| | | | | | | | |
|-----------------|--------------------------|---------|------------------------|----------------------|------------|----|----------|
| Job # : | <u>10222569</u> | Date : | <u>3/22/12</u> | Page | <u>1</u> | of | <u>1</u> |
| NEX #: | <u>203246</u> | Time : | <u>1:45pm</u> | | | | |
| | | Staff : | <u>AG</u> | | | | |
| Client Name : | <u>Fusion Wireless</u> | | | EUT Voltage : | <u>120</u> | | |
| EUT Name : | <u>CDMA 1xRTT Module</u> | | | EUT Frequency : | <u>60</u> | | |
| EUT Model # : | <u>LISA C200</u> | | | Phase: | <u>1</u> | | |
| EUT Serial # : | <u>A10000157EFF5A</u> | | | | | | |
| EUT Config. : | <u>CDMA TX</u> | | | | | | |
| | | | | Distance < 1000 MHz: | <u>3 m</u> | | |
| | | | | Distance > 1000 MHz: | <u>3 m</u> | | |
| Specification : | <u>CFR47 Part 22</u> | | | | | | |
| Loop Ant. #: | <u>NA</u> | | Temp. (°C) : | <u>20</u> | | | |
| Bicon Ant.#: | <u>NA</u> | | Humidity (%) : | <u>35</u> | | | |
| Log Ant.#: | <u>NA</u> | | Spec Analyzer #: | <u>911</u> | | | |
| DRG Ant. # | <u>752</u> | | Analyzer Display #: | <u>911</u> | | | |
| Cable LF#: | <u>NA</u> | | Quasi-Peak Detector #: | <u>NA</u> | | | |
| Cable HF#: | <u>WCC</u> | | | | | | |
| Preamp LF#: | <u>NA</u> | | | | | | |
| Preamp HF#: | <u>317</u> | | | | | | |

| | |
|------|-----------------------|
| Peak | RBW: 1 MHz |
| | Video Bandwidth 3 MHz |
| | |

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

| Meas. Freq. (MHz) | Meter Reading Vertical | Meter Reading Horizontal | Det. | EUT Side DEG | Ant. Height cm | Max. Reading (dBµV) | Corrected Reading (dBm) | Spec. limit (dBm) | CR/SL Diff. (dB) | Pass Fail | Comment |
|-------------------|------------------------|--------------------------|------|--------------|----------------|---------------------|-------------------------|-------------------|------------------|-----------|-----------|
| 1648.4 | 55.7 | 46.1 | P | 80 | 118.0 | 55.7 | -43.3 | -13.0 | -30.3 | Pass | cell 1013 |
| 2474.1 | 56.7 | 45.7 | P | 95 | 115.0 | 56.7 | -39.9 | -13.0 | -26.9 | Pass | cell 1013 |
| 1673.0 | 58.7 | 49.7 | P | 278 | 119.0 | 58.7 | -40.3 | -13.0 | -27.3 | Pass | cell 384 |
| 2409.5 | 55.9 | 46.0 | P | 280 | 115.0 | 55.9 | -40.7 | -13.0 | -27.7 | Pass | cell 384 |
| 1696.6 | 65.6 | 52.6 | P | 67 | 124.0 | 65.6 | -33.4 | -13.0 | -20.4 | Pass | cell 777 |
| 2544.9 | 51.7 | 44.9 | P | 99 | 136.0 | 51.7 | -43.8 | -13.0 | -30.8 | Pass | cell 777 |
| 3702.5 | 66.1 | 60.6 | P | 8 | 140.0 | 66.1 | -23.9 | -13.0 | -10.9 | Pass | PCS 25 |
| 5553.8 | 48.6 | 44.1 | P | 97 | 156.0 | 48.6 | -34.8 | -13.0 | -21.8 | Pass | PCS 25 |
| 3760.0 | 65.8 | 59.5 | P | 322.0 | 135.0 | 65.8 | -24.2 | -13.0 | -11.2 | Pass | PCS 600 |
| 5640.0 | 46.4 | 41.4 | P | 92.0 | 162.0 | 46.4 | -36.0 | -13.0 | -23.0 | Pass | PCS 600 |
| 3817.5 | 72.3 | 65.4 | P | 333.0 | 236.0 | 72.3 | -17.7 | -13.0 | -4.7 | Pass | PCS 1175 |
| 5726.3 | 48.0 | 44.2 | P | 85.0 | 151.0 | 48.0 | -34.4 | -13.0 | -21.4 | Pass | PCS 1175 |
| | | | | | | | | | | | |
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Substitution Method For Radiated Emissions

| | | | |
|-----------------|--------------------------|-------------------------|-------------------------------|
| Client Name : | <u>Fusion</u> | Date : | <u>3/22/2012</u> |
| EUT Name : | <u>CDMA 1XRTT Module</u> | Time : | <u>1000</u> |
| EUT Model # : | <u>Lisa C200</u> | Staff : | <u>AG</u> |
| EUT Serial # : | <u>A10000157EFF5A</u> | | |
| EUT Config. : | <u>CDMA Tx</u> | | |
| | | | |
| Specification : | <u>FCC Part 24</u> | | |
| | | | |
| Log Ant. RX#: | <u>NA</u> | Temp. (deg. C) : | <u>20</u> |
| Dipole Ant TX#: | <u>NA</u> | Humidity (%) : | <u>35</u> |
| DRG Ant. RX # | <u>529</u> | Location: | <u>10mWC</u> |
| DRG Ant. TX # | <u>752</u> | Distance: | <u>3m</u> |
| Cable RX#: | <u>WCC</u> | | |
| Preamp#: | <u>357</u> | Peak Bandwidth < 1 GHz: | <u>RBW-100kHz, VBW-300kHz</u> |
| Spec An.#: | <u>911</u> | Peak Bandwidth > 1 GHz: | <u>RBW-1MHz, VBW-1MHz</u> |

| target | | Horn | cable | Signal | Total | Spec | Margin |
|-----------|--------|------|-------|-----------|--------|------|--------|
| Frequency | level | Gain | loss | Generator | (EIRP) | | |
| mHz | dBuV/m | dBi | dB | dBm | dBm | dBm | dBm |
| 3702.0 | 66.1 | 9.87 | 3.7 | -29.70 | -23.53 | -13 | -10.5 |
| 3760.0 | 65.8 | 9.88 | 3.7 | -30.00 | -23.82 | -13 | -10.8 |
| 3817.5 | 72.3 | 9.88 | 3.7 | -23.50 | -17.32 | -13 | -4.3 |





Frequency Stability

Para. No.: FCC 2.1055 & RSS-GEN 4.7

24.235 Frequency stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS 132

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations and ± 1.5 ppm for base stations.

RSS 133

6.3 Frequency Stability

The carrier frequency shall not depart from the reference frequency, in excess of ± 2.5 ppm for mobile Stations.

Conditions:

| | | | |
|---------------------|---------------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 23°C |
| Date: | April 03 - 05, 2012 | Humidity: | 30 – 34 % |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

Observations:

Test Results: Passed



Frequency Stability data:

| Channel | | 384 | Cellular band | | |
|-----------|-------|------------|---------------|-----------|--|
| Frequency | | 836.52 | MHz | | |
| Voltage | Temp. | Peak Power | Frequency | Frequency | |
| Volt | °C | dBm | Error | Error | |
| | | | HZ | (PPM) | |
| 3.4 | 20 | 24.63 | -25 | -0.0299 | |
| 3.9 | | 25.41 | -30 | -0.0359 | |
| 4.3 | | 24.87 | -24 | -0.0287 | |
| 3.9 | 0 | | 33 | 0.0394 | |
| 3.9 | 10 | | -44 | -0.0526 | |
| 3.9 | 30 | | -26 | -0.0311 | |
| 3.9 | 40 | | -27 | -0.0323 | |
| 3.9 | 50 | | -27 | -0.0323 | |
| 3.9 | -10 | | 43 | 0.0514 | |
| 3.9 | -20 | | -32 | -0.0383 | |
| 3.9 | -30 | | -42 | -0.0502 | |

| Channel | | 25 | PCS band | | |
|-----------|-------|------------|-----------|-----------|--|
| Frequency | | 1851.25 | MHz | | |
| Voltage | Temp. | Peak Power | Frequency | Frequency | |
| Volt | °C | dBm | Error | Error | |
| | | | HZ | (PPM) | |
| 3.4 | 20 | 23.73 | -58 | -0.0313 | |
| 3.9 | | 23.83 | -50 | -0.0270 | |
| 4.3 | | 24.08 | 46 | 0.0248 | |
| 3.9 | 0 | | -45 | -0.0243 | |
| 3.9 | 10 | | -46 | -0.0248 | |
| 3.9 | 30 | | 55 | 0.0297 | |
| 3.9 | 40 | | 53 | 0.0286 | |
| 3.9 | 50 | | 57 | 0.0308 | |
| 3.9 | -10 | | 45 | 0.0243 | |
| 3.9 | -20 | | -44 | -0.0238 | |
| 3.9 | -30 | | 40 | 0.0216 | |

Frequency Stability over low voltage conditions

| | | | | |
|----------|----------|-----------|-----------|-------------|
| Date: | 5-Apr-12 | | | |
| Mode: | CDMA 800 | | CDMA 1900 | |
| Channel: | 384 | 836.52MHz | 25 | 1851.25 MHz |

| Voltage | Frequency Error | Frequency Error | Frequency Error | Frequency Error |
|---------|-----------------|-----------------|-----------------|-----------------|
| Volt DC | Hz | (PPM) | Hz | (PPM) |
| 2.55Vdc | | | EUT turns OFF | |
| 2.60Vdc | | | 86 | 0.046 |
| 2.65Vdc | EUT turns OFF | | -101 | -0.055 |
| 2.70Vdc | -42 | -0.050 | -95 | -0.051 |
| 2.75Vdc | -32 | -0.038 | 88 | 0.048 |
| 2.80Vdc | 32 | 0.038 | -73 | -0.039 |
| 2.85Vdc | -36 | -0.043 | 85 | 0.046 |
| 2.90Vdc | -23 | -0.027 | 78 | 0.042 |
| 2.95Vdc | -24 | -0.029 | 75 | 0.041 |
| 3.00Vdc | -26 | -0.031 | 93 | 0.050 |
| 3.10Vdc | 23 | 0.027 | -67 | -0.036 |
| 3.20Vdc | 26 | 0.031 | -71 | -0.038 |
| 3.30Vdc | 23 | 0.027 | -63 | -0.034 |
| 3.40Vdc | -47 | -0.056 | -73 | -0.039 |
| 3.50Vdc | -31 | -0.037 | -64 | -0.035 |
| 3.60Vdc | 23 | 0.027 | -71 | -0.038 |
| 3.70Vdc | -47 | -0.056 | -84 | -0.045 |
| 3.80Vdc | -38 | -0.045 | -70 | -0.038 |

A6. Receiver Spurious

Para. No.: RSS-GEN 4.10

RSS 132
4.6 Receiver Spurious Emissions
Receiver spurious emissions shall comply with the limits specified in RSS-Gen.

RSS 133
6.6 Receiver Spurious Emissions
Receiver spurious emissions shall comply with the limits specified in RSS-Gen.

4.10 Receiver Spurious Emissions
The receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate.
Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions.
Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port.

6. Receiver Spurious Emission Standard
The following receiver spurious emission limits shall be complied with: (b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

| | | | |
|---------------------|----------------|--------------|-------------------|
| Model: | LISA-C200 | Temperature: | 21°C |
| Date: | March 23, 2012 | Humidity: | 33% |
| Modification State: | None | Tester: | Andreas Gillmeier |
| | | Laboratory: | Nemko |

Observations:

Selecting receive versus frequency (high, mid or low) did not result in any noticeable differences.

Test Results: Complies

Test Data: See attached plots.

Direct conducted measurement

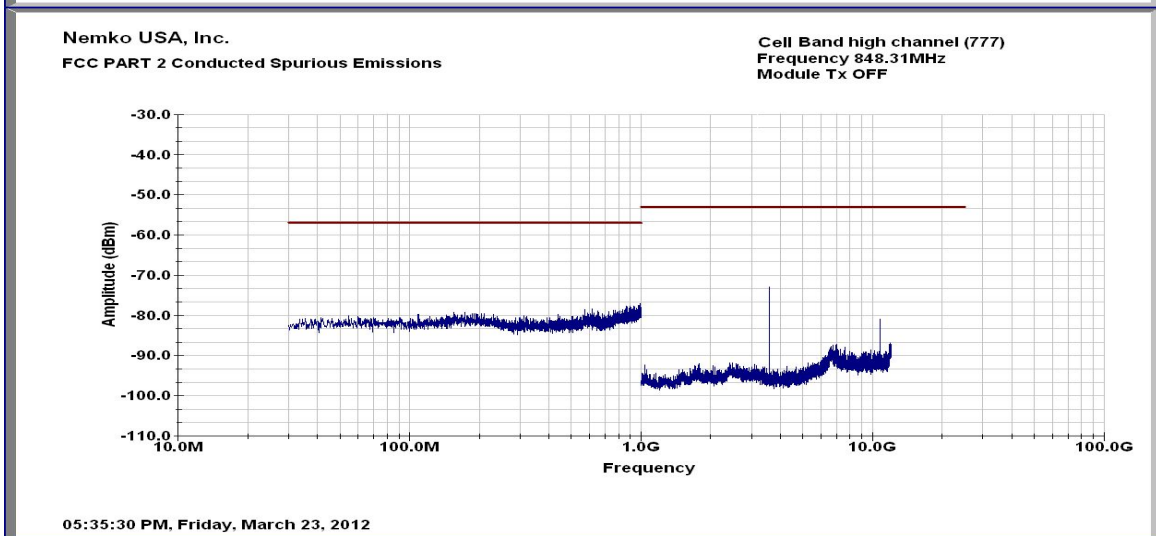
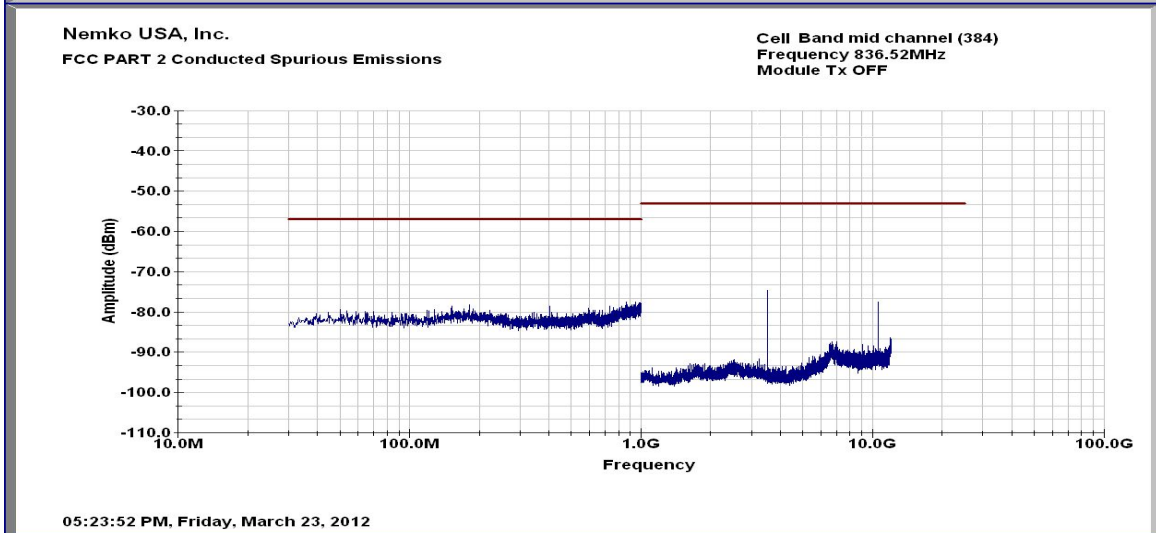
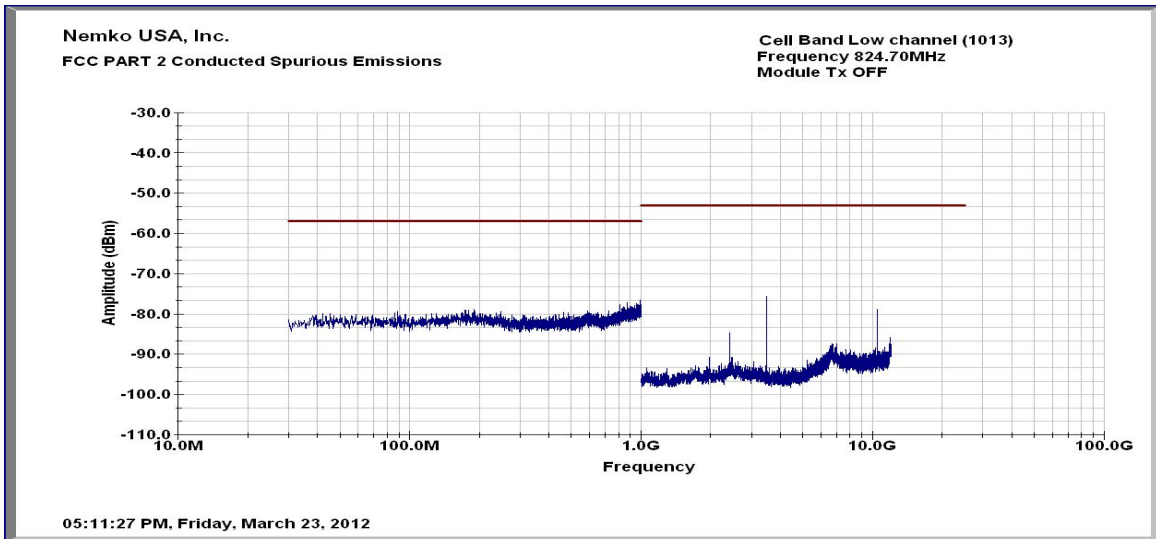
No emissions evident within 20 dB of the conducted Limits.

RBW 5 kHz, VBW 20 kHz, max hold peak.

Limit

2 nanowatts = -57dBm

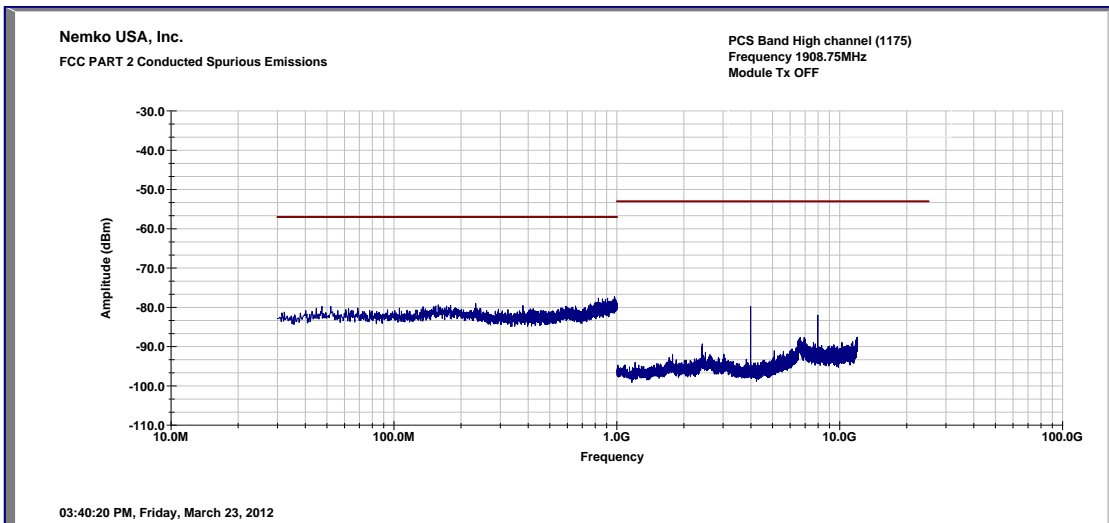
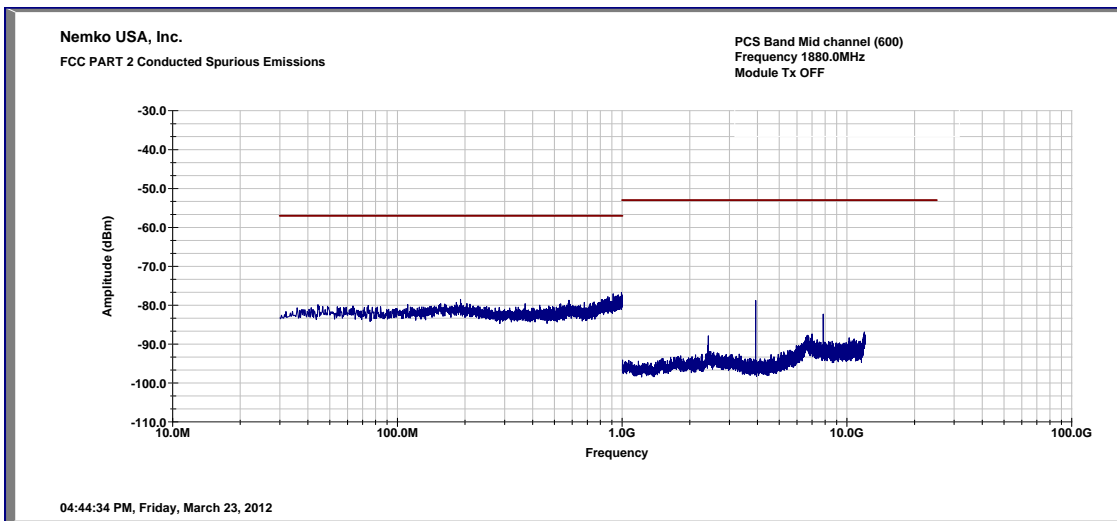
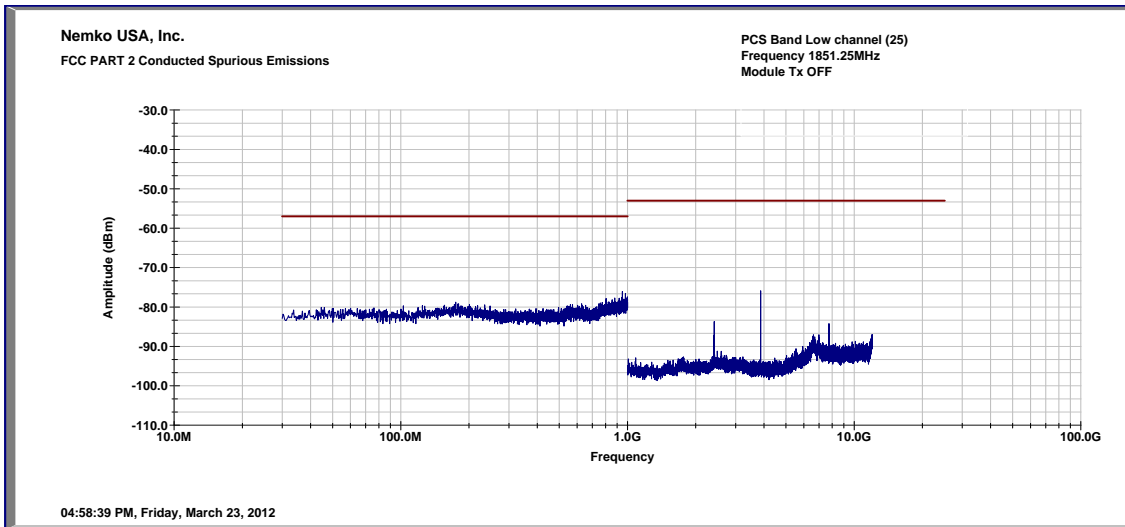
5 nanowatts = -53 dBm



Cellular Band: Low, Mid and High channels



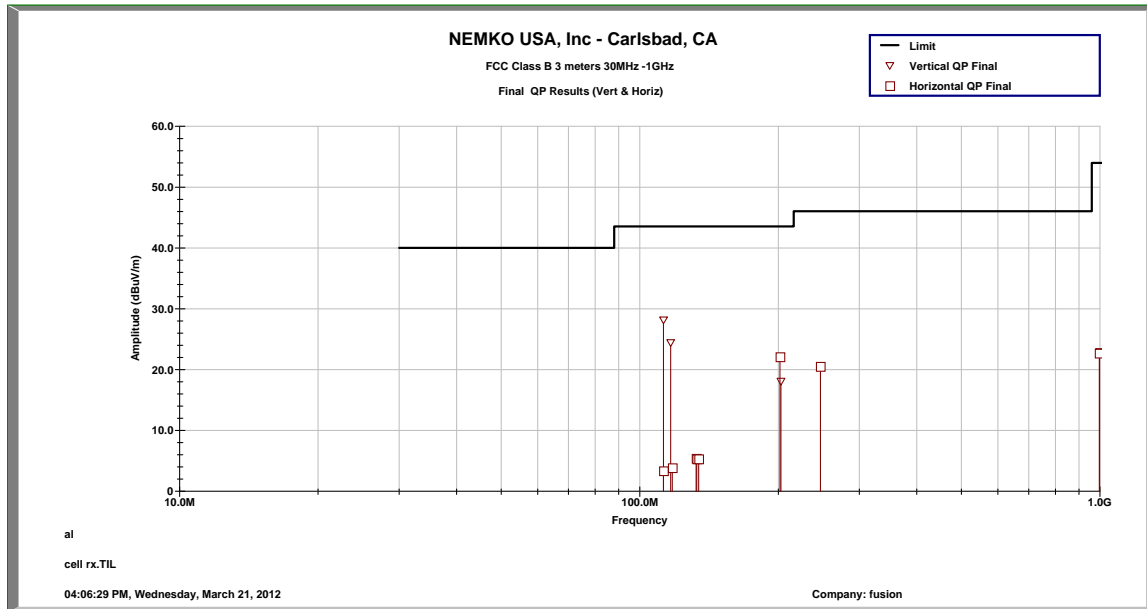
www.nemko.com



PCS Band: Low, Mid and High channels



RX CDMA Cell band 30-1000 MHz spurious emissions:



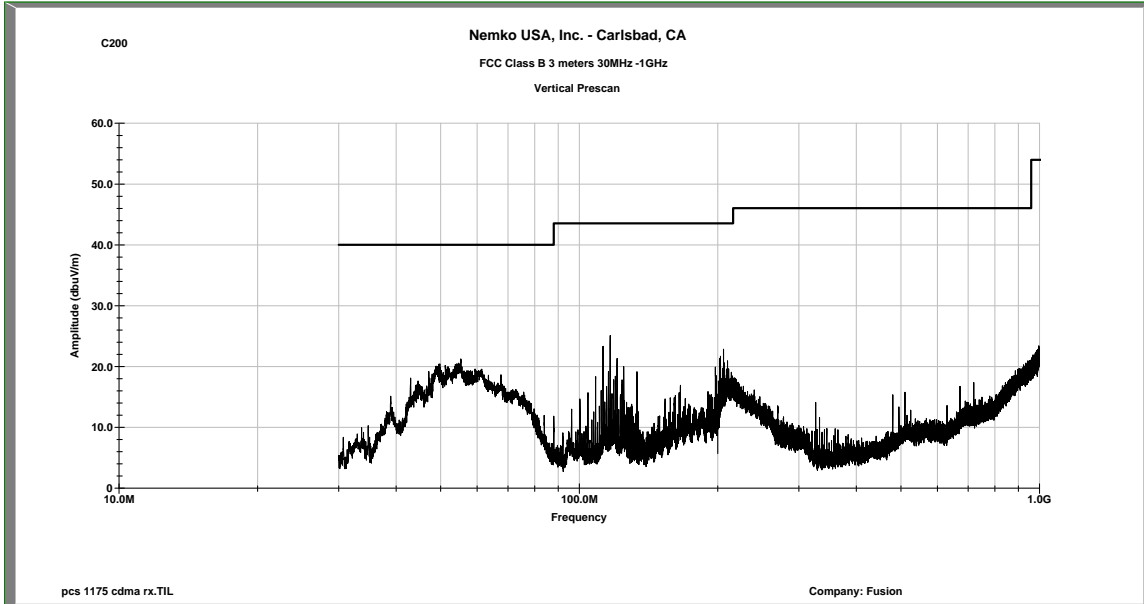
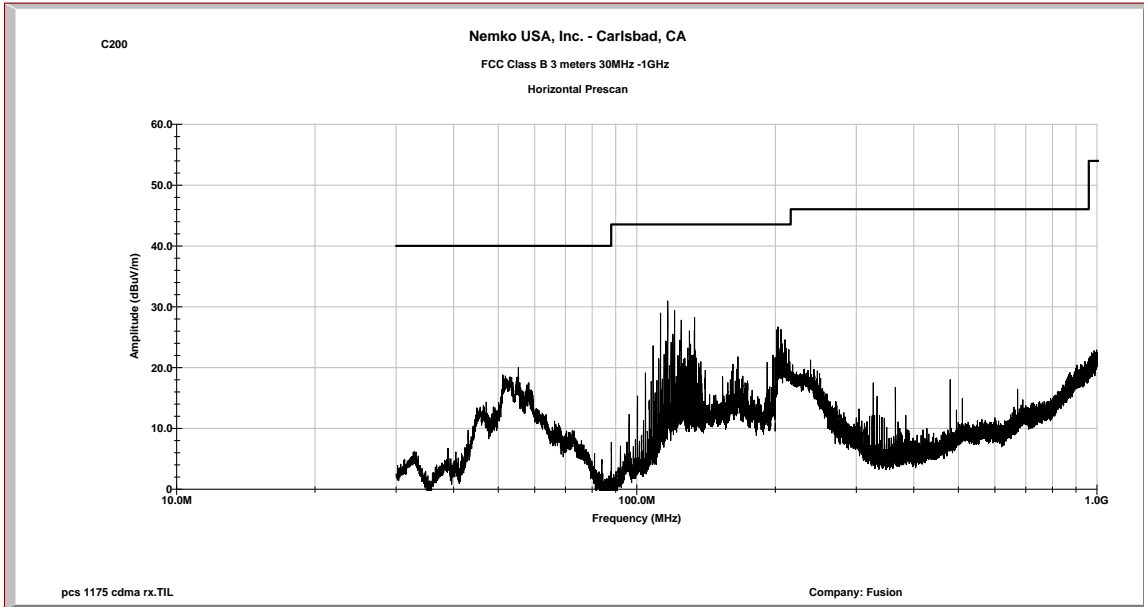
Horizontal:

| Frequency MHz | QP Measured dBuV | Adjustments dB/m | Final Result dBuV/m | Limit dBuV/m | QP Margin dB | Ant. Ht. cm | EUT Rotation degrees |
|---------------|------------------|------------------|---------------------|--------------|--------------|-------------|----------------------|
| 112.642 | 24.2 | -20.9 | 3.3 | 43.5 | -40.2 | 111 | 4 |
| 117.684 | 24.0 | -20.2 | 3.8 | 43.5 | -39.7 | 111 | 0 |
| 132.53 | 23.8 | -18.4 | 5.4 | 43.5 | -38.1 | 112 | 0 |
| 133.012 | 23.7 | -18.4 | 5.3 | 43.5 | -38.2 | 110 | -1 |
| 134.359 | 23.6 | -18.3 | 5.3 | 43.5 | -38.2 | 111 | -1 |
| 201.711 | 41.8 | -19.8 | 22.1 | 43.5 | -21.4 | 111 | 358 |
| 246.787 | 40.1 | -19.6 | 20.5 | 46.0 | -25.5 | 111 | 361 |
| 996.221 | 21.8 | 0.9 | 22.7 | 54.0 | -31.3 | 111 | 360 |

Vertical:

| Frequency MHz | QP Measured dBuV | Adjustments dB/m | Final Result dBuV/m | Limit dBuV/m | QP Margin dB | Ant. Ht. cm | EUT Rotation degrees |
|---------------|------------------|------------------|---------------------|--------------|--------------|-------------|----------------------|
| 112.634 | 49.1 | -20.9 | 28.2 | 43.5 | -15.3 | 113 | 178 |
| 116.746 | 44.7 | -20.3 | 24.4 | 43.5 | -19.1 | 111 | 11 |
| 202.729 | 37.8 | -19.8 | 18.1 | 43.5 | -25.4 | 213 | 274 |
| 998.181 | 22.0 | 0.9 | 23.0 | 54.0 | -31.0 | 111 | 350 |

RX CDMA PCS band 30-1000 MHz spurious emissions (peak detector prescan):



No emissions could be measured in RX for Cell or PCS band from 1-10 GHz.