# TEST REPORT

**Report Number: 3047393-43-01-1**
**Project Number: 3047393**
**December 16, 2003**

**Evaluation of the**
**SX5P CDMA Desk Phone**
**Model Number: 1D02A035**
**FCC ID: MTF050398**
**to**

**FCC Part 15**
**FCC Part 22 Subpart H**
**FCC Part 24 Subpart E**

| Test Performed by: | Test Authorized by: |
|---|---|
| Intertek | Telular Corporation |
| 1950 Evergreen Blvd. Suite 100 | 580 Old Willets Path |
| Duluth, GA 30096 | Hauppauge, NY 11788 |

Prepared by: _____ Date: 12/17/2003
Matthew Van Steen, Project Engineer - EMC

Reviewed by: _____ Date: 12/17/2003
David J. Schramm, Team Leader - EMC

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# Executive Summary

Testing performed for: Telular Corporation

Equipment Under Test: 1D02A035, SX5P CDMA Desk Phone

| FCC RULE | IC RULE | DESCRIPTION OF TEST | RESULT | PAGE |
|---|---|---|---|---|
| §2.1046 | RSS-129 §9<br>RSS-133 §6.2 | RF Power Output | Passed | 10 |
| §22.913,<br>§24.232 | RSS-129 §9<br>RSS-133 §6.2 | ERP, EIRP | Passed | 12 |
| §2.1049<br>§22.917(b)(d) | RSS-129 §9 | Emission Limitation, Occupied Bandwidth | Passed | 13 |
| §2.1051<br>§22.917(e)<br>§22.917(f)<br>§24.238(a) | RSS-129 §8<br>RSS-133 §6.3 | Out of Band Emissions at Antenna Terminals<br>Mobile Emissions In Base Frequency Range | Passed | 17 |
| §2.1053 | RSS-129 §8<br>RSS-133 §6.3 | Field Strength of Spurious Radiation | Passed | 23 |
| §15.107, §15.207 | IC ES-003 | Power Line Conducted Emissions | Passed | 34 |
| §2.1055, §22.355,<br>§24.235 | RSS-129 §7, § 9<br>RSS-133 §7 | Frequency Stability | Passed | 36 |
| §2.1091, §2.1093 | RSS-129 §11,<br>RSS-133 §8 | RF Exposure | -- | See Note [1] |
| §15.109 | IC ES-003<br>RSS-129 §10,<br>RSS-133 §9 | Receiver Spurious Emission | Passed | 33 |

[1] The MPE is addressed in a separate document.

# 1 JOB DESCRIPTION

## 1.1 Client information

The SX5P CDMA Desk Phone has been tested at the request of

| | |
|---|---|
| Company: | Telular Corporation<br>580 Old Willets Path<br>Hauppauge, NY 11788 |
| Name of contact: | Matthew McKiernan |
| Telephone: | (631) 232-6070 |
| Fax: | (631) 232 6082 |

## 1.2 Test plan reference:

Tests were performed to the following standards:

- FCC Part 15
- FCC Part 22 Subpart H rules for an intentional radiator
- FCC Part 24 Subpart E rules for an intentional radiator

The test procedures described in this test report and ANSI C63.4: 1992 were employed.

### 1.3 Equipment Under Test (EUT)

| | | |
|---|---|---|
| Product | SX5P CDMA Desk Phone | |
| EUT Model Number | 1D02A035 | |
| EUT Serial Number | XA4LRS1383R | |
| Whether quantity (>1) production is planned | Quantity production is planned. | |
| Cellular Phone standards | CDMA 800 and CDMA 1900 | |
| Type(s) of Emission | 1M25F9W | |
| RF Output Power | See Section 3.3 | |
| Frequency Range | 824 – 849 | CDMA 800 |
| | 1850 – 1910 | CDMA 1900 |
| Antenna | Removable antenna with TNC type connector | |
| Detachable Antenna? | Yes | |

EUT receive date: November 25, 2003

EUT receive condition: The EUT was received in good condition with no apparent damage.

Test start date: November 25, 2003

Test completion date: December 16, 2003

The test results in this report pertain only to the item tested.

*Table 1: Details of Equipment Under Test*

| Description | Model Number | Serial Number |
|---|---|---|
| Dual Band CDMA Cellular Phone | 1D02A035D | XA4LRS1383R |
| AC/DC Power Supply | TMG-0716 | 0716018370 |

The EUT is a wireless CDMA desk phone that operates in the CDMA 800 and CDMA 1900 bands.

### 1.3.1 System Support Equipment

There was no support equipment required to operate the EUT other than the base station simulator, which is listed as test equipment.

### 1.3.2 Cables associated with EUT

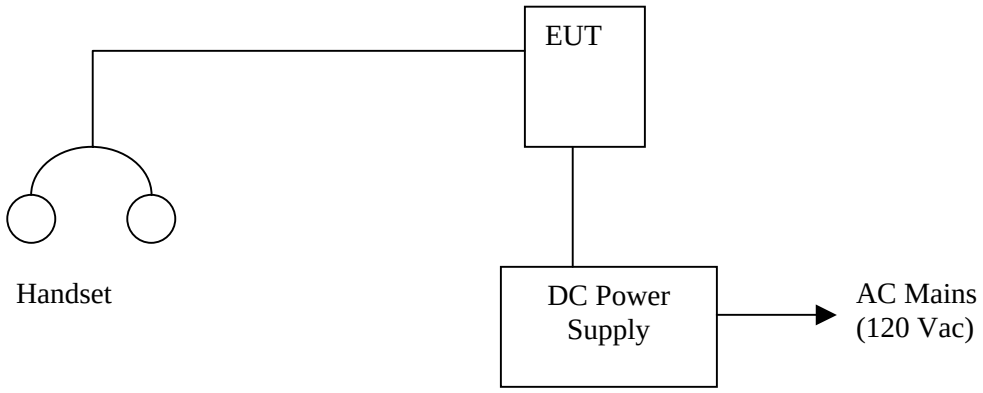
Table 1-2 contains the details of the cables associated with the EUT.

*Table 1-2: Interconnecting cables between modules of EUT*

| Cables | | | | | |
|---|---|---|---|---|---|
| **Description** | **Length** | **Shielding** | **Ferrites** | **Connection** | |
| | | | | **From** | **To** |
| AC Power Supply Cable | 2 m | No | No | AC Mains | EUT |

### 1.3.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during FCC Part 15 testing. For specific layout, refer to the test configuration photograph in the relevant section of this report.



### 1.3.4 Justification

The EUT was operated in the stand-alone configuration.

### 1.3.5 Mode(s) of operation

The EUT was powered from 120V AC, supplied by the AC mains of the test facility, for all testing. Battery power is for back-up purposes only. The EUT was set to the CDMA 800 or CDMA 1900 mode during testing.

## 1.4 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

## 1.5 Related Submittal(s) Grants

None

## 2 TEST FACILITY

The Intertek test site is located at 1950 Evergreen Blvd, Suite 100, Duluth, GA 30093. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of C63.4: 2001. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

## 3 CONDUCTED RF POWER

FCC §2.1046

### 3.1 Test Procedure

The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels that can be setup on the transmitters.

### 3.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Base Station Simulator | Rhode & Schwarz | CMU 200 | 837198/089 |
| Temperature Chamber | Thermotron | SM-8C | 32692 |
| PMA | Solar Light Co. | PMA 2100 | 5462 |
| Temperature Probe | Solar Light Co. | PMA 2170 | 6613 |

### 3.3 Test Results

*Table 3-1 Conducted RF Power*

| EUT Mode | Frequency MHz | Channel | Measured Power dBm | | |
|---|---|---|---|---|---|
| | | | +60°C | +20°C | -30°C |
| CDMA 800 | 824.70 | 1013 | 25.3 | 25.5 | 25.9 |
| | 836.52 | 384 | 25.7 | 26.2 | 26.0 |
| | 848.30 | 777 | 25.3 | 25.5 | 26.1 |
| CDMA 1900 | 1851.25 | 25 | 25.5 | 25.6 | 25.4 |
| | 1880.00 | 600 | 24.7 | 24.7 | 24.9 |
| | 1908.75 | 1175 | 23.4 | 24.0 | 24.2 |

## 4 RADIATED RF POWER

FCC §22.913: The effective radiated power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC §24.232: The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

### 4.1 Test Procedure

The EUT was placed on a non-conductive turntable with the earpiece attached. The earpiece was extended vertically above the EUT using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3m with a test antenna and EMI receiver.

During the measurement of the EUT, the receiver resolution bandwidth was set to 3 MHz and the average bandwidth was set to 10 kHz. These settings matched the power readings of a power meter with a thermocouple power sensor. The highest emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The receiver reading was recorded and the field strength (E in dBμV/m) was calculated.

ERP in frequency band 824-849 MHz, and EIRP in frequency band 1851.25-1910 MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849 MHz) or horn antenna (1851.25-1910 MHz) connected to a signal generator, which was set to approximately -10 dBm. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

$$ERP = E_1 - E_2 + V_g$$
$$EIRP = E_1 - E_2 + V_g + G$$

where,

$E_1$ is the receiver reading in dBμV/m when measuring the field strength of the EUT
$E_2$ is the receiver reading in dBμV/m when measured field strength from the generator
$V_g$ is the generator output in dBm
G is the gain of the transmitting antenna in dBi.

### 4.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Signal Generator | Fluke | 6061 | 6061014 |
| Dipole Antenna | CDI | A100 | 423 |
| Horn Antenna | EMCO | 3115 | 9208-3919 |
| Receive Antenna | Chase | CBL6112B | 2622 |
| EMI Receiver | HP | 8546A | 3410A00173 |
| EMI Receiver, Preselector section | HP | 85460A | 3348A00203 |

### 4.3 Test Results

*Table 4-1 Radiated RF Power*

| Antenna Polarity (V/H) | Frequency MHz | Channel | EUT Reading dBm **S1** | Reading from Subs Antenna **S2** | Sig Gen Output dBm **SG** | Path Loss dB **SG-S2** | Antenna Gain dBi | Radiated Power dBm ERP |
|---|---|---|---|---|---|---|---|---|
| CDMA 800 | | | | | | | | |
| V | 824.700 | 1013 | -10.7 | -34.6 | -0.7 | 33.9 | NA | 23.2 |
| H | 824.700 | 1013 | -19.5 | -31.9 | -0.7 | 31.2 | NA | 11.7 |
| V | 836.520 | 384 | -9.9 | -34.7 | -0.7 | 34.1 | NA | 24.2 |
| H | 836.520 | 384 | -17.8 | -31.8 | -0.7 | 31.1 | NA | 13.3 |
| V | 848.300 | 777 | -9.4 | -33.9 | -0.7 | 33.1 | NA | 23.7 |
| H | 848.300 | 777 | -17.3 | -31.8 | -0.7 | 31.1 | NA | 13.8 |

| Antenna Polarity (V/H) | Frequency MHz | Channel | EUT Reading dBm **S1** | Reading from Subs Antenna **S2** | Sig Gen Level dBm **SG** | Path Loss dB **SG-S2** | Antenna Gain dBi Horn only | Radiated Power dBm EIRP |
|---|---|---|---|---|---|---|---|---|
| CDMA 1900 | | | | | | | | |
| V | 1851.250 | 25 | -17.3 | -36.6 | -2.1 | 34.5 | 7.2 | 24.4 |
| H | 1851.250 | 25 | -26.0 | -35.1 | -2.1 | 32.9 | 7.1 | 14.0 |
| V | 1880.000 | 600 | -16.2 | -37.7 | -2.2 | 35.5 | 7.3 | 26.6 |
| H | 1880.000 | 600 | -22.5 | -35.9 | -2.2 | 33.7 | 7.1 | 18.3 |
| V | 1908.750 | 1175 | -17.7 | -38.2 | -2.3 | 36.0 | 7.3 | 25.6 |
| H | 1908.750 | 1175 | -23.4 | -36.7 | -2.3 | 34.5 | 7.2 | 18.2 |

# 5 EMISSION LIMITATIONS, OCCUPIED BANDWIDTH

CFR 47 §2.1049

## 5.1 Test Procedure

The 99% Bandwidth function of the spectrum analyzer was used to measure the bandwidth.

## 5.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Attenuator | Weinschel | 2 | BK7890 |
| Attenuator | Weinschel | 2 | BK2313 |
| Spectrum Analyzer | HP | 8595E | 3249A00243 |

## 5.3 Test Results

*Table 5-1: Occupied bandwidth measurements*

| Mode | Channel | Resolution Bandwidth | Video Bandwidth | Sweep time | Measured Bandwidth MHz |
|---|---|---|---|---|---|
| CDMA 800 | 1013 | 30 kHz | 300 Hz | 1.25 s | 1.275 |
| CDMA 800 | 384 | 30 kHz | 300 Hz | 1.25 s | 1.275 |
| CDMA 800 | 777 | 30 kHz | 300 Hz | 1.25 s | 1.284 |
| CDMA 1900 | 25 | 30 kHz | 300 Hz | 1.25 s | 1.266 |
| CDMA 1900 | 600 | 30 kHz | 300 Hz | 1.25 s | 1.275 |
| CDMA 1900 | 1175 | 30 kHz | 300 Hz | 1.25 s | 1.266 |

*Figure 5-1: Occupied Bandwidth – CDMA 800 Channel 1013*

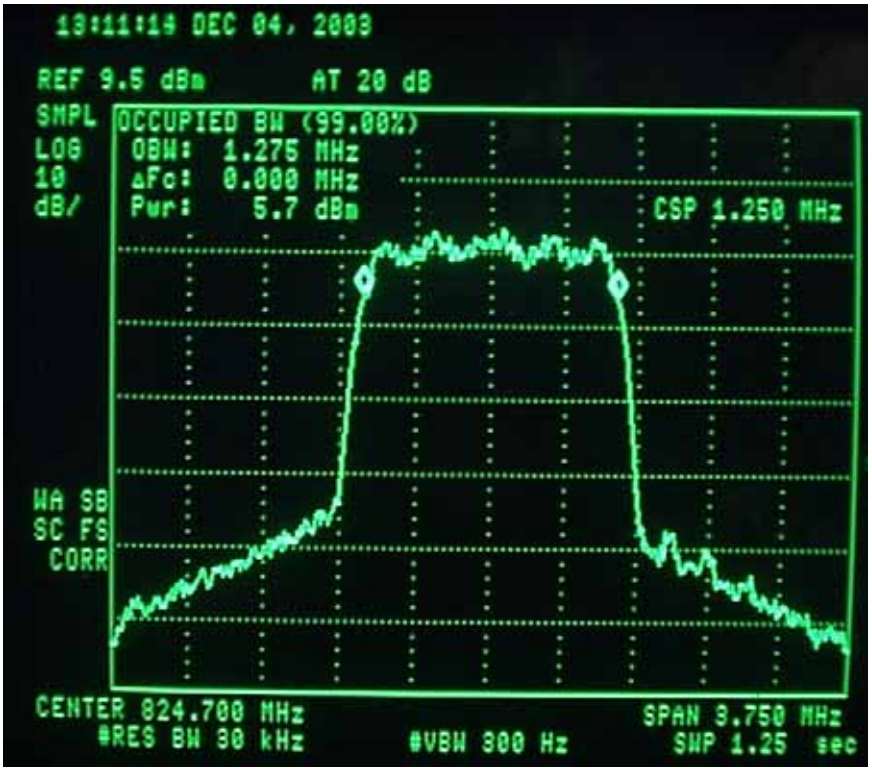



*Figure 5-2: Occupied Bandwidth – CDMA 800 Channel 384*

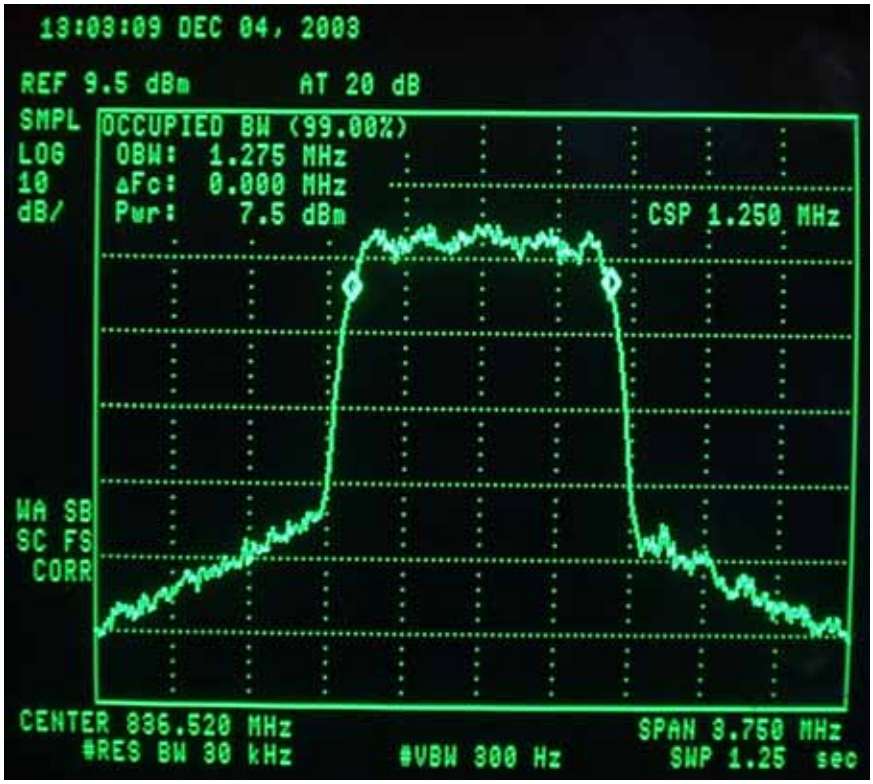


*Figure 5-3: Occupied Bandwidth – CDMA 800 Channel 777*

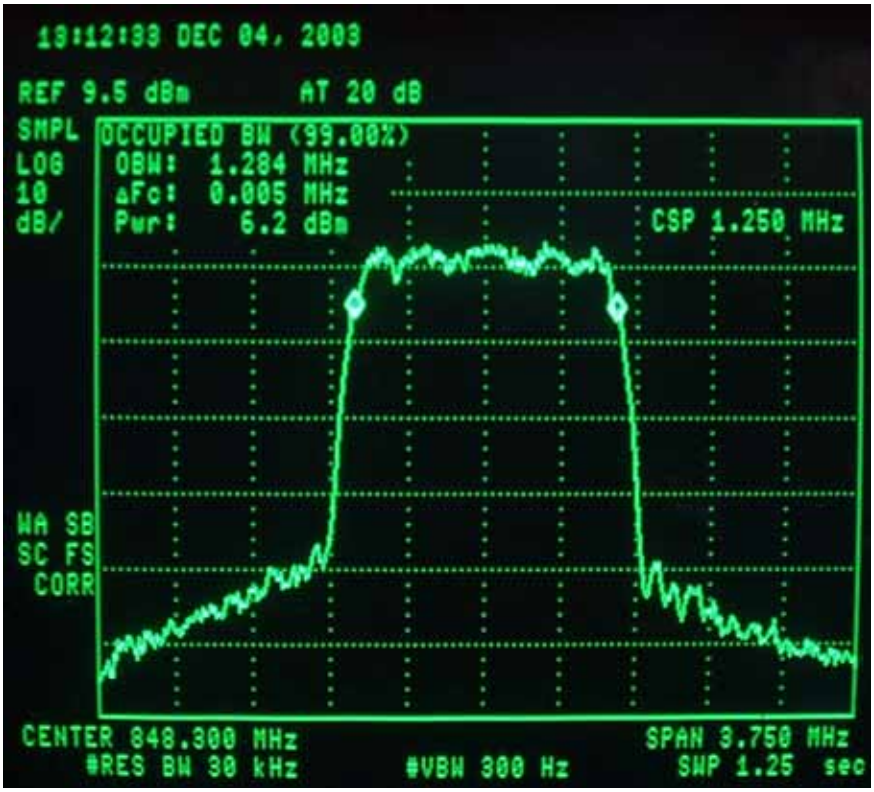



*Figure 5-4: Occupied Bandwidth – CDMA 1900 Channel 25*

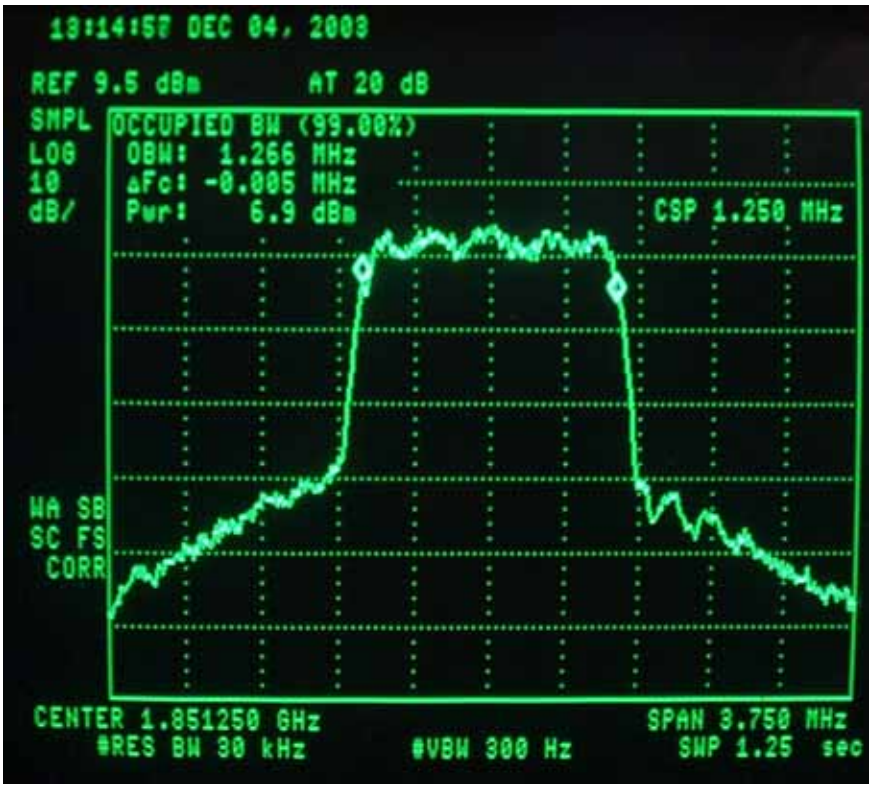


*Figure 5-5: Occupied Bandwidth – CDMA 1900 Channel 600*

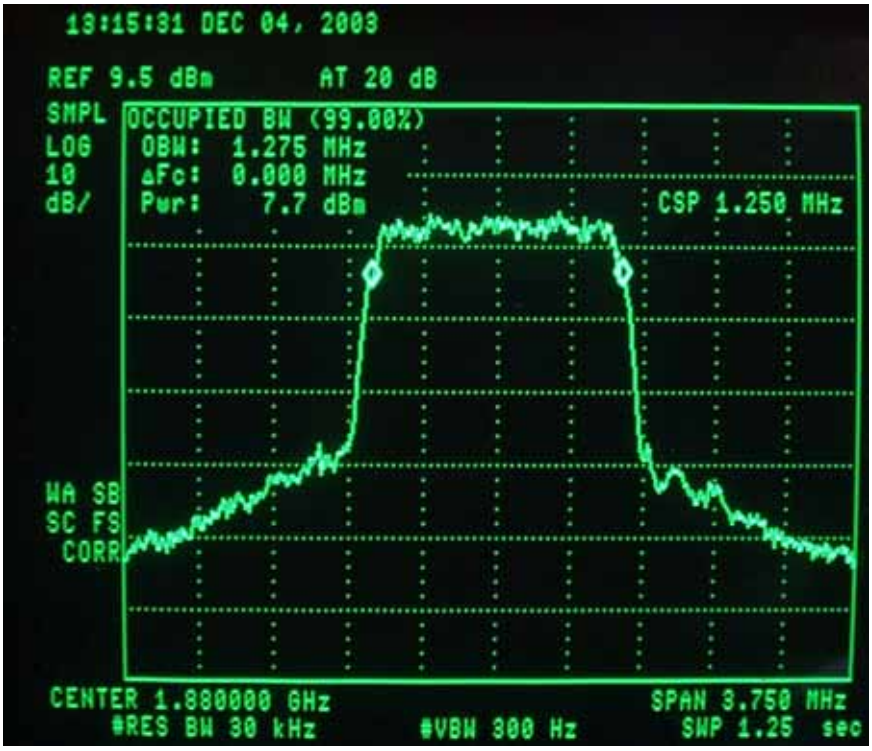
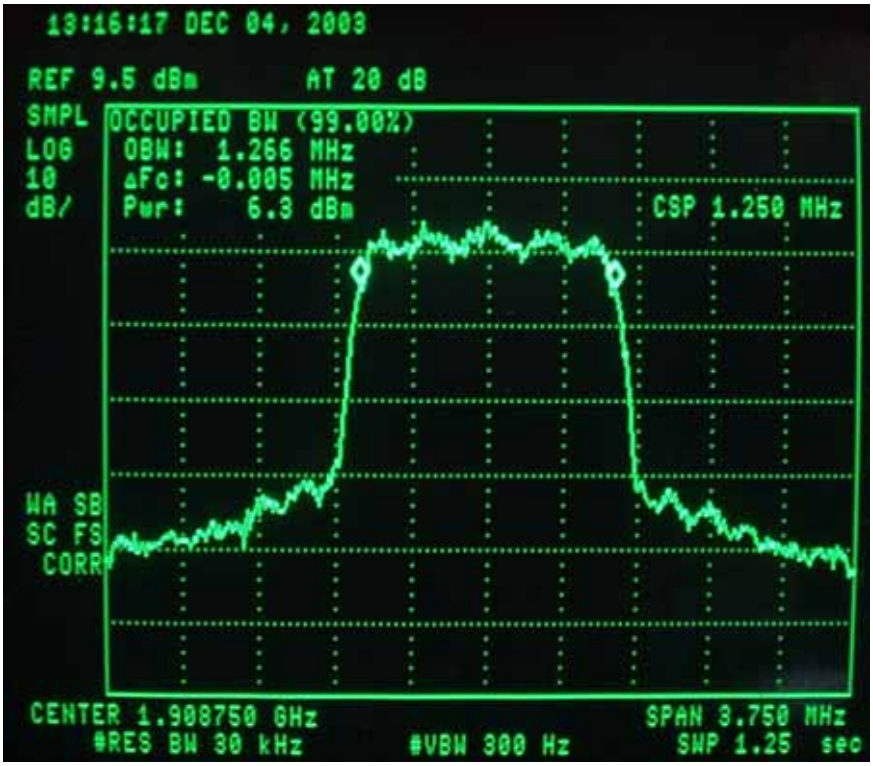



*Figure 5-6: Occupied Bandwidth – CDMA 1900 Channel 1175*



# 6 OUT OF BAND EMISSION AT ANTENNA TERMINALS

FCC §2.1047, FCC §22.905, FCC §22.917, FCC §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.

## 6.1 Test Procedure

Measurement instrumentation was set to a resolution bandwidth of 1 MHz 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.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The transceiver was set to its maximum power level. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

## 6.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Spectrum Analyzer | HP | 8566B | 2134A01032 |
| Attenuator | Weinschel | 2 | BK7890 |
| Attenuator | Weinschel | 2 | BK2313 |

## 6.3 Test Results

*Table 6-1: Summary of test result locations*

| Location | Mode (Band) | Channel | Description |
|---|---|---|---|
| Figure 6-1 | CDMA 800 | 1013 | Conducted spurious emissions, 30MHz to 10 GHz |
| Figure 6-2 | CDMA 800 | 384 | Conducted spurious emissions, 30MHz to 10 GHz |
| Figure 6-3 | CDMA 800 | 777 | Conducted spurious emissions, 30MHz to 10 GHz |
| Figure 6-4 | CDMA 1900 | 25 | Conducted spurious emissions, 30MHz to 20 GHz |
| Figure 6-5 | CDMA 1900 | 600 | Conducted spurious emissions, 30MHz to 20 GHz |
| Figure 6-6 | CDMA 1900 | 1175 | Conducted spurious emissions, 30MHz to 20 GHz |
| Figure 6-7 | CDMA 800 | 1013 | Emissions within 1 MHz of band edge |
| Figure 6-8 | CDMA 800 | 777 | Emissions within 1 MHz of band edge |
| Figure 6-9 | CDMA 1900 | 25 | Emissions within 1 MHz of band edge |
| Figure 6-10 | CDMA 1900 | 1175 | Emissions within 1 MHz of band edge |

*Figure 6-1: Out of band emissions at antenna terminals – CDMA 800 Channel 1013*

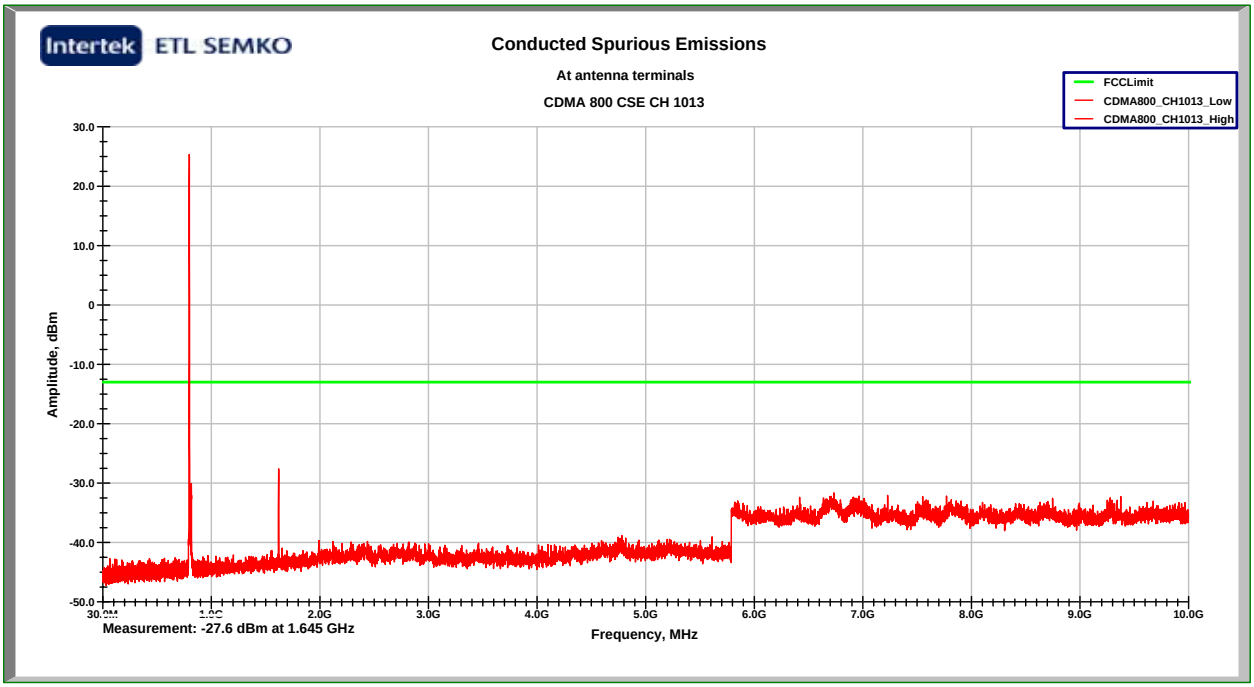



*Figure 6-2: Out of band emissions at antenna terminals – CDMA 800 Channel 384*

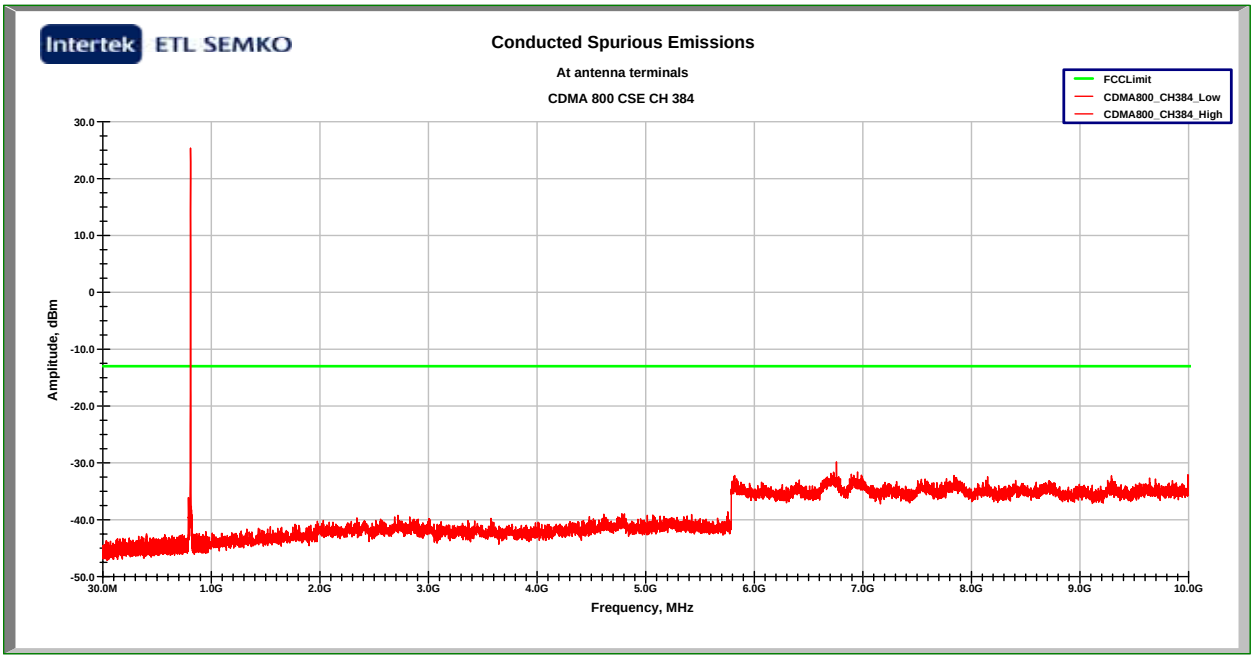


*Figure 6-3: Out of band emissions at antenna terminals – CDMA 800 Channel 777*

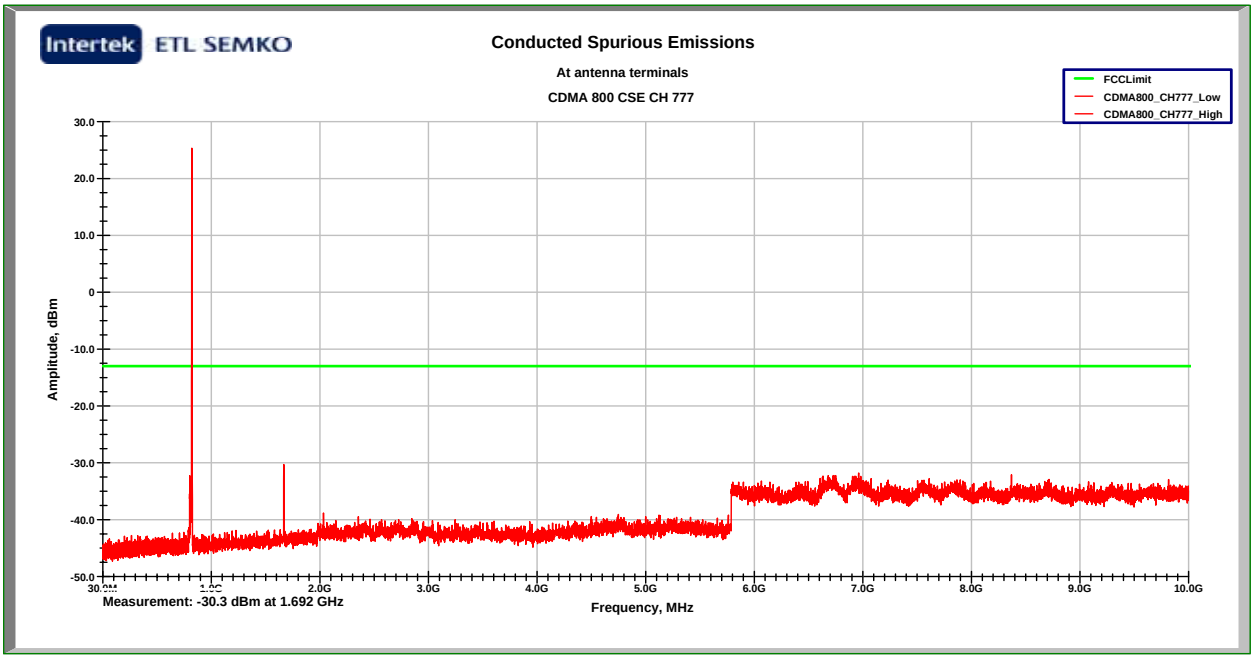



*Figure 6-4: Out of band emissions at antenna terminals – CDMA 1900 Channel 25*

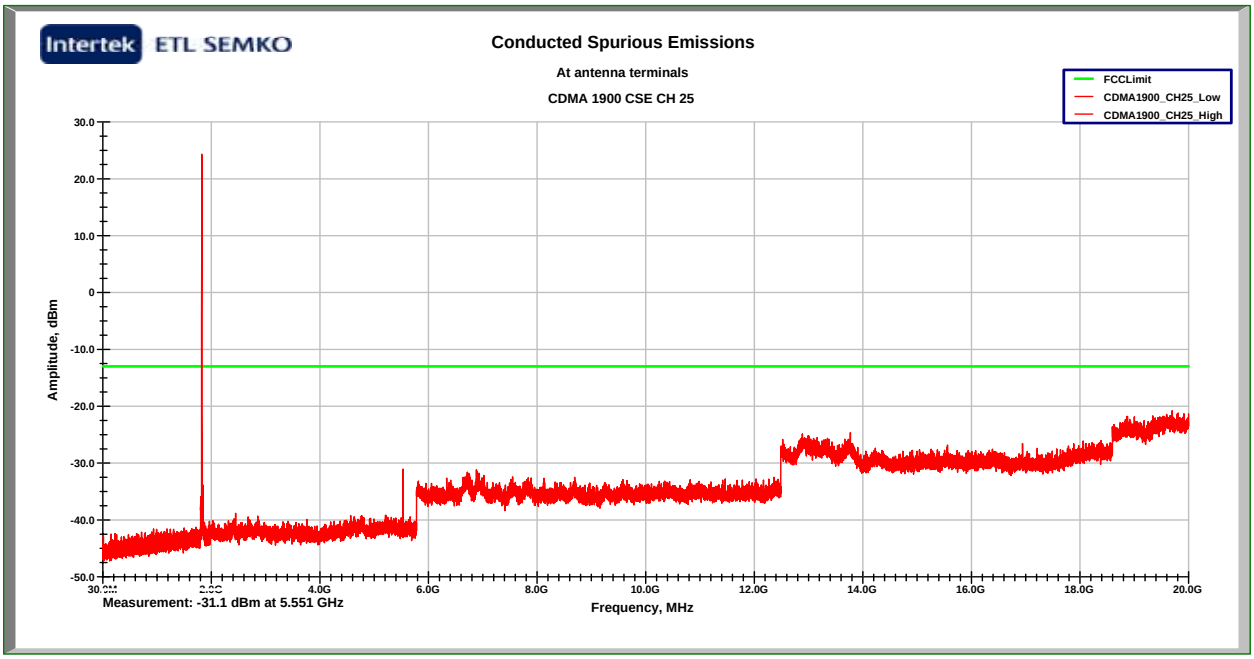


*Figure 6-5: Out of band emissions at antenna terminals – CDMA 1900 Channel 600*

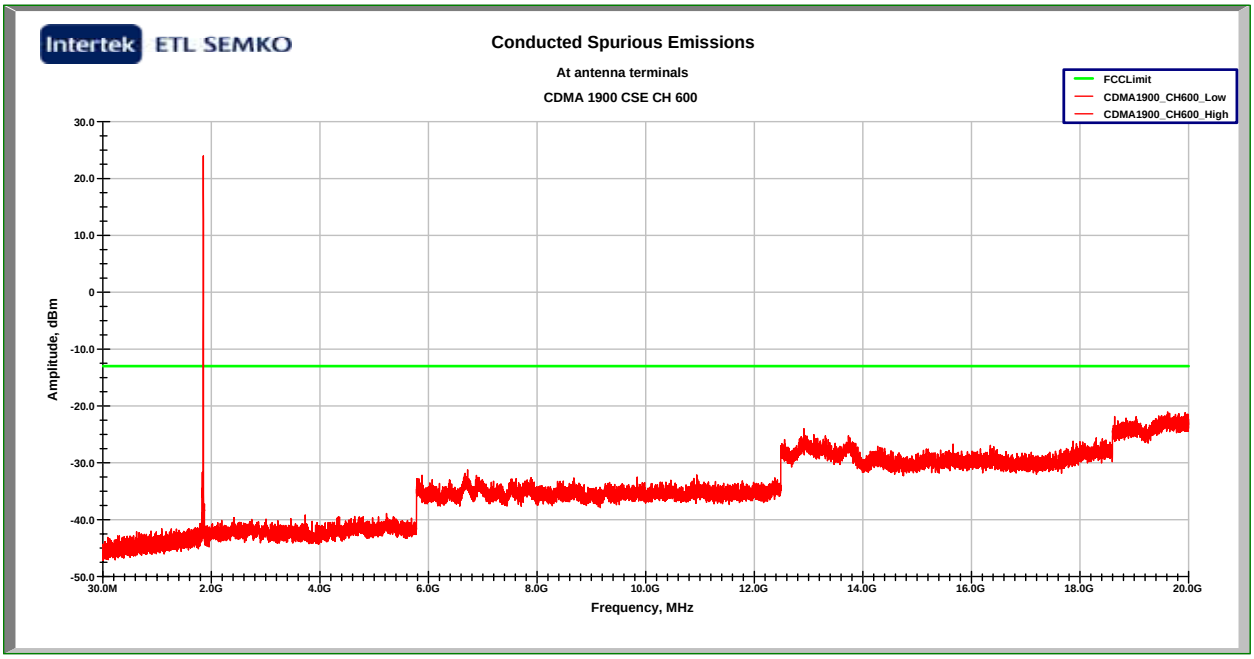



*Figure 6-6: Out of band emissions at antenna terminals – CDMA 1900 Channel 1175*

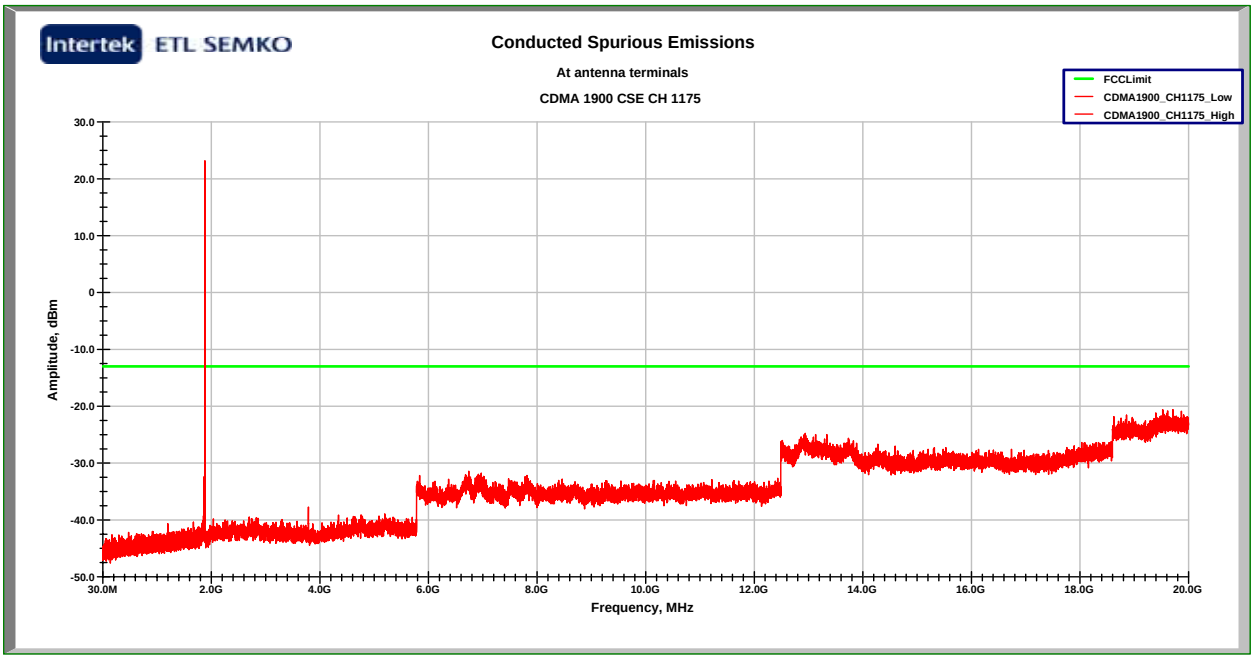


*Figure 6-7: Emissions within 1 MHz of band edge, CDMA 800 Channel 1013*

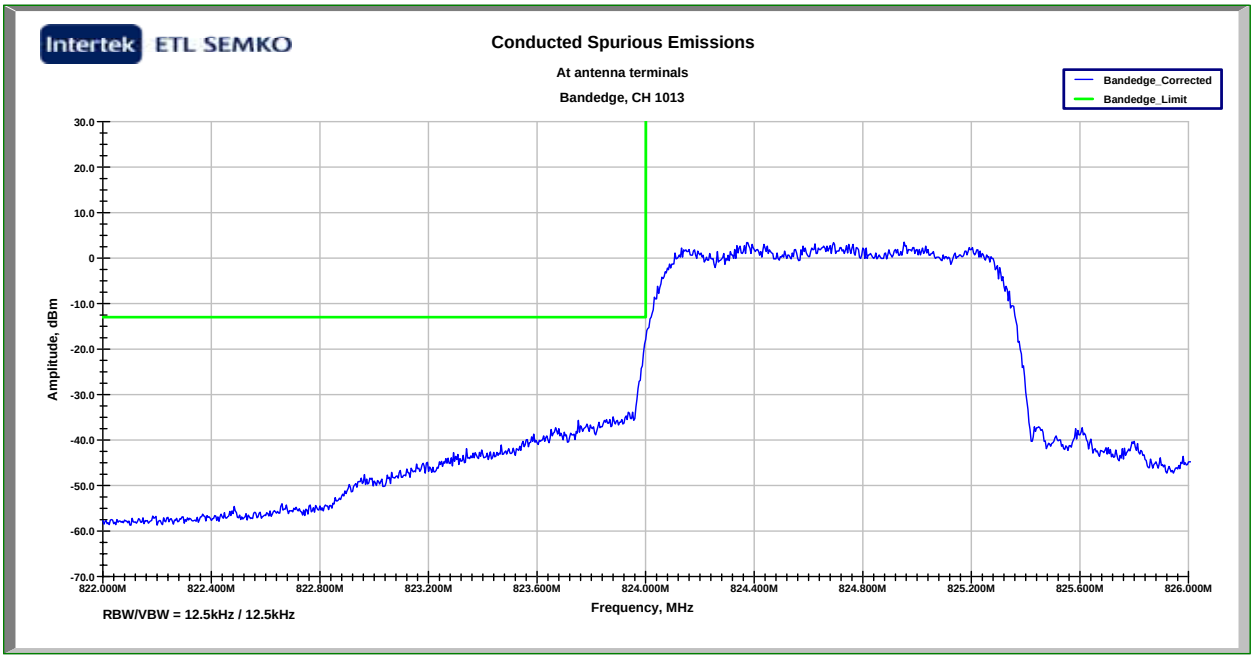



*Figure 6-8: Emissions within 1 MHz of band edge, CDMA 800 Channel 777*

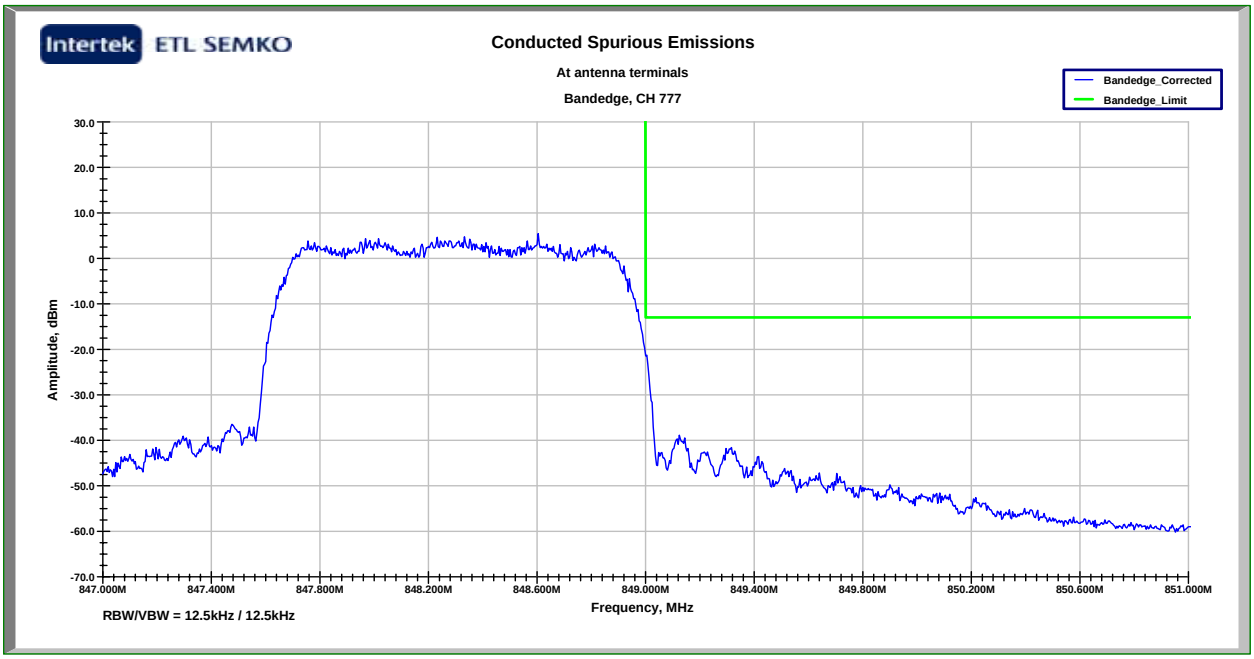


*Figure 6-9: Emissions within 1 MHz of band edge, CDMA 1900 Channel 25*

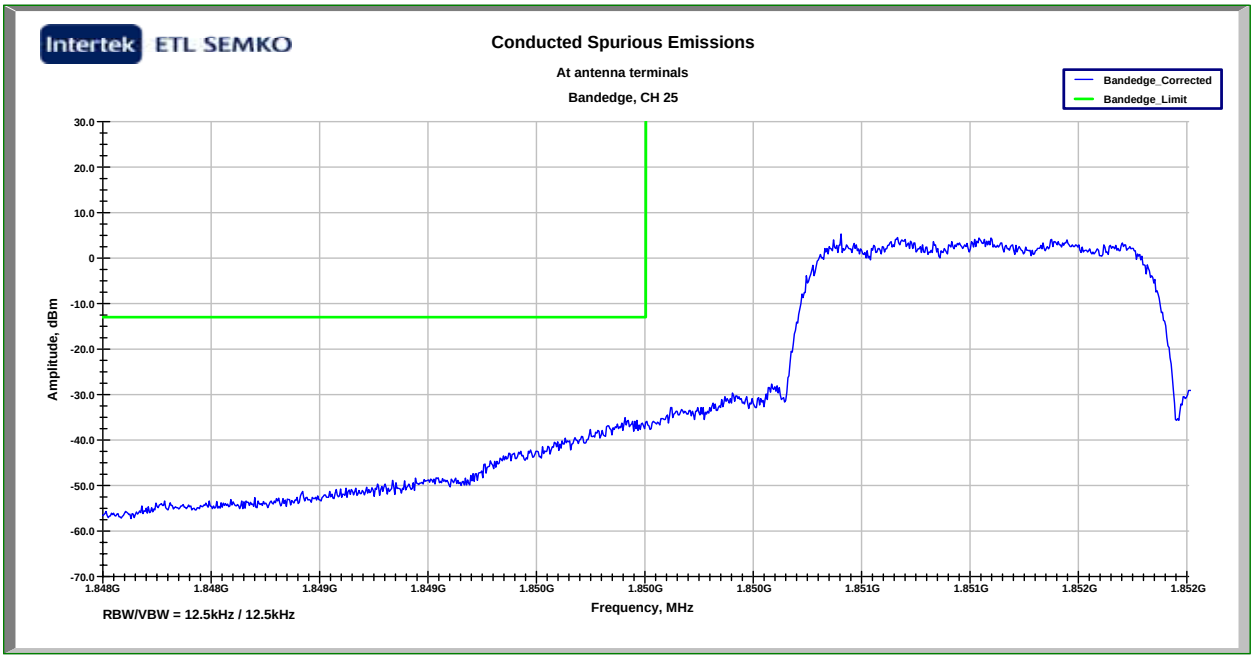
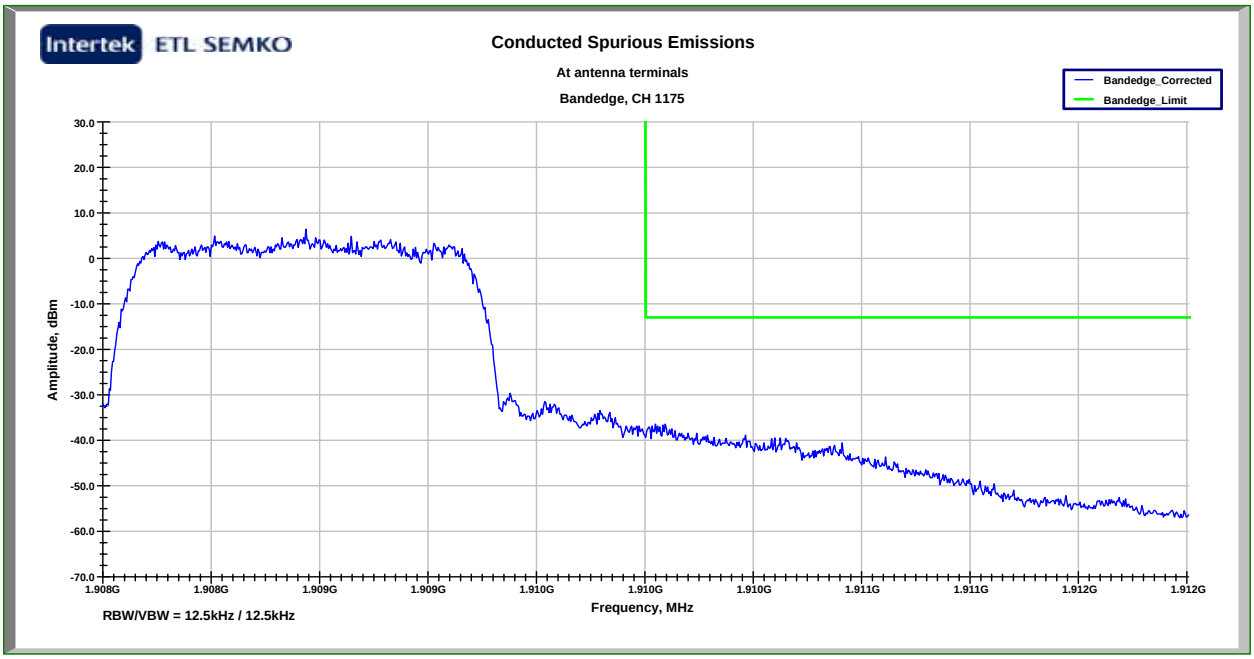



*Figure 6-10: Emissions within 1 MHz of band edge, CDMA 1900 Channel 1175*



# 7 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

## 7.1 Test Procedure

The EUT was placed on a non-conductive turntable with the earpiece attached. The earpiece was extended vertically above the EUT using a non-conductive support. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels). Once spurious emissions were identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

## 7.2 Test Equipment

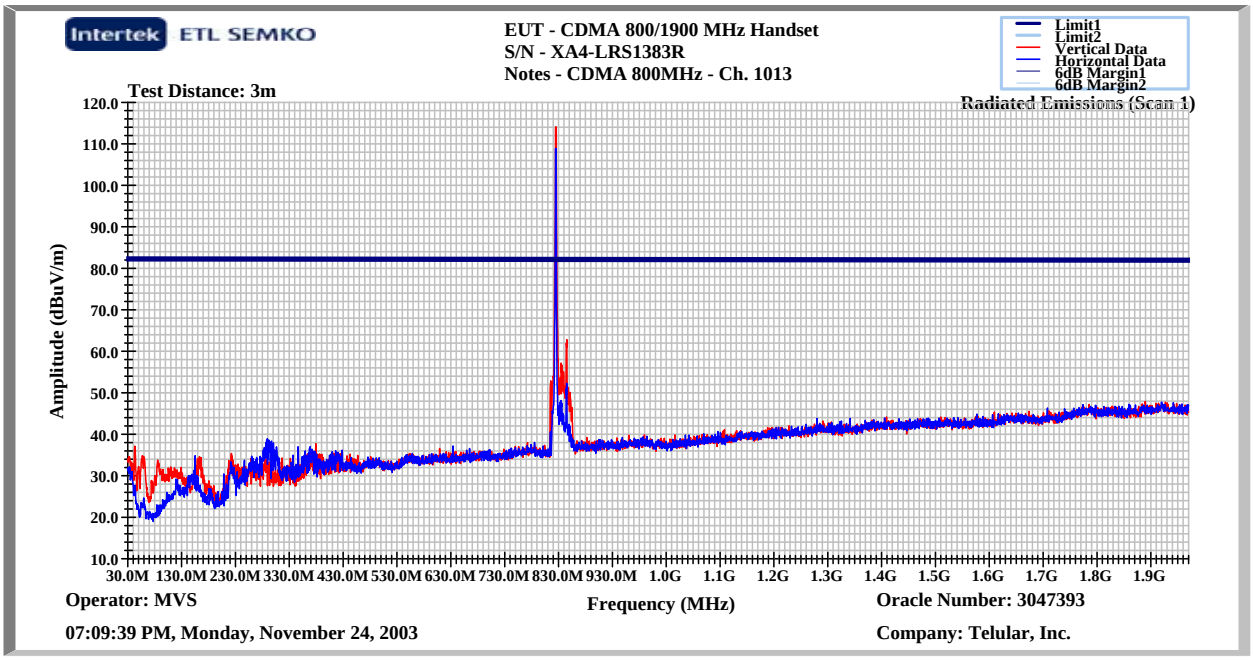
| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Signal Generator | HP | 83620B | 3722A00537 |
| Horn Antenna | EMCO | 3115 | 9208-3919 |
| Receive Antenna | Chase | CBL6112B | 2622 |
| Receive Antenna | AH Systems | SAS-200/571 | 246 |
| EMI Receiver | HP | 8546A | 3410A00173 |
| EMI Receiver, Preselector section | HP | 85460A | 3348A00203 |
| Spectrum Analyzer | HP | 8566B | 2134A01032 |

## 7.3 Test Results

*Table 7-1: Tabular Test Results for Field Strength of Spurious Radiation*

| Ant. Pol. (V/H) | Frequency MHz | Channel | EUT Reading dBm **S1** | Reading from Subs Antenna **S2** | Sig Gen Level dBm **SG** | Path Loss dB **SG-S2** | Antenna Gain dBi Horn only | Radiated Power dBm EIRP | Limit dBm EIRP | Margin dBm |
|---|---|---|---|---|---|---|---|---|---|---|
| CDMA 1900 | | | | | | | | | | |
| V | 3701.940 | 25 | -47.4 | -14.8 | -3.4 | 11.4 | 9.6 | -26.4 | -13.0 | -13.4 |
| H | 3701.940 | 25 | -50.2 | -15.2 | -3.4 | 11.8 | 9.8 | -28.6 | -13.0 | -15.6 |
| V | 5552.420 | 25 | -62.0 | -21.5 | -5.1 | 16.4 | 10.4 | -35.2 | -13.0 | -22.2 |
| H | 5552.420 | 25 | -59.4 | -23.0 | -5.1 | 17.9 | 10.4 | -31.1 | -13.0 | -18.1 |
| V | 3760.200 | 600 | -46.6 | -14.8 | -3.4 | 11.4 | 9.6 | -25.6 | -13.0 | -12.6 |
| H | 3760.200 | 600 | -48.4 | -15.2 | -3.4 | 11.8 | 9.8 | -26.8 | -13.0 | -13.8 |
| V | 5639.540 | 600 | -61.7 | -21.5 | -5.1 | 16.4 | 10.4 | -34.9 | -13.0 | -21.9 |
| H | 5639.540 | 600 | -59.7 | -23.0 | -5.1 | 17.9 | 10.4 | -31.4 | -13.0 | -18.4 |
| V | 3817.860 | 1175 | -39.5 | -14.8 | -3.4 | 11.4 | 9.6 | -18.5 | -13.0 | -5.5 |
| H | 3817.860 | 1175 | -45.2 | -15.2 | -3.4 | 11.8 | 9.8 | -23.6 | -13.0 | -10.6 |
| V | 5726.100 | 1175 | -53.7 | -21.5 | -5.1 | 16.4 | 10.4 | -26.9 | -13.0 | -13.9 |
| H | 5726.100 | 1175 | -59.8 | -23.0 | -5.1 | 17.9 | 10.4 | -31.5 | -13.0 | -18.5 |

*Figure 7-1: Measured Field Strength of Spurious Radiation CDMA 800, Channel 1013*



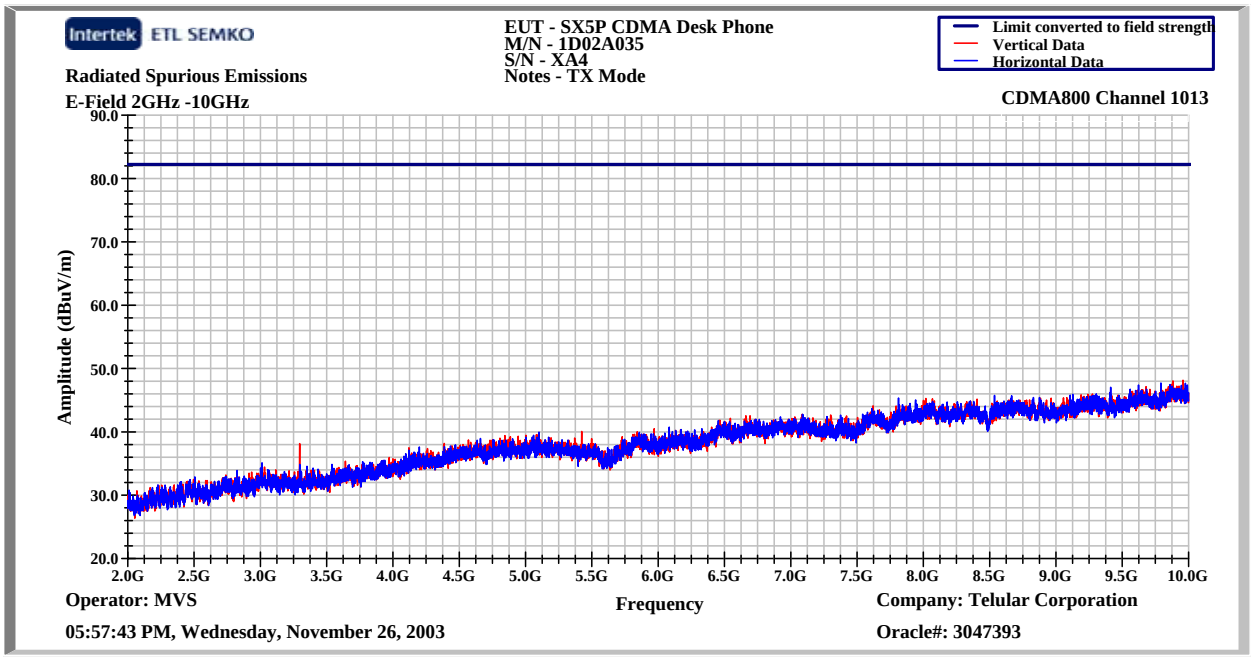
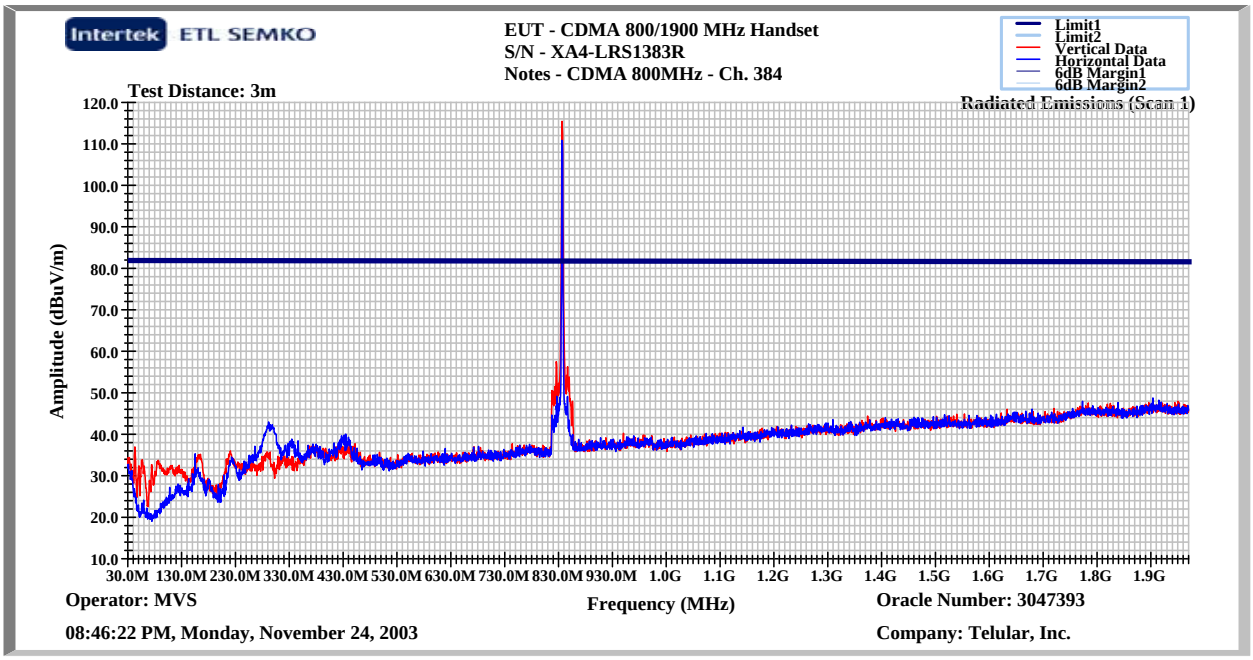



*Figure 7-2: Measured Field Strength of Spurious Radiation CDMA 800, Channel 384*



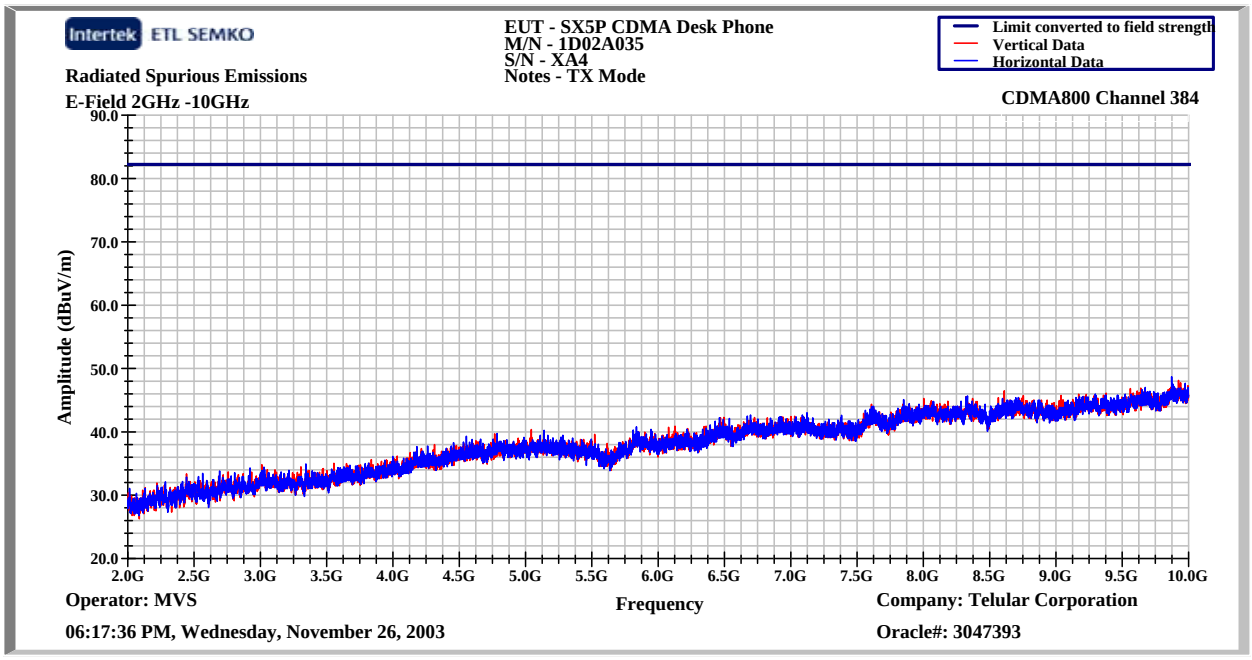
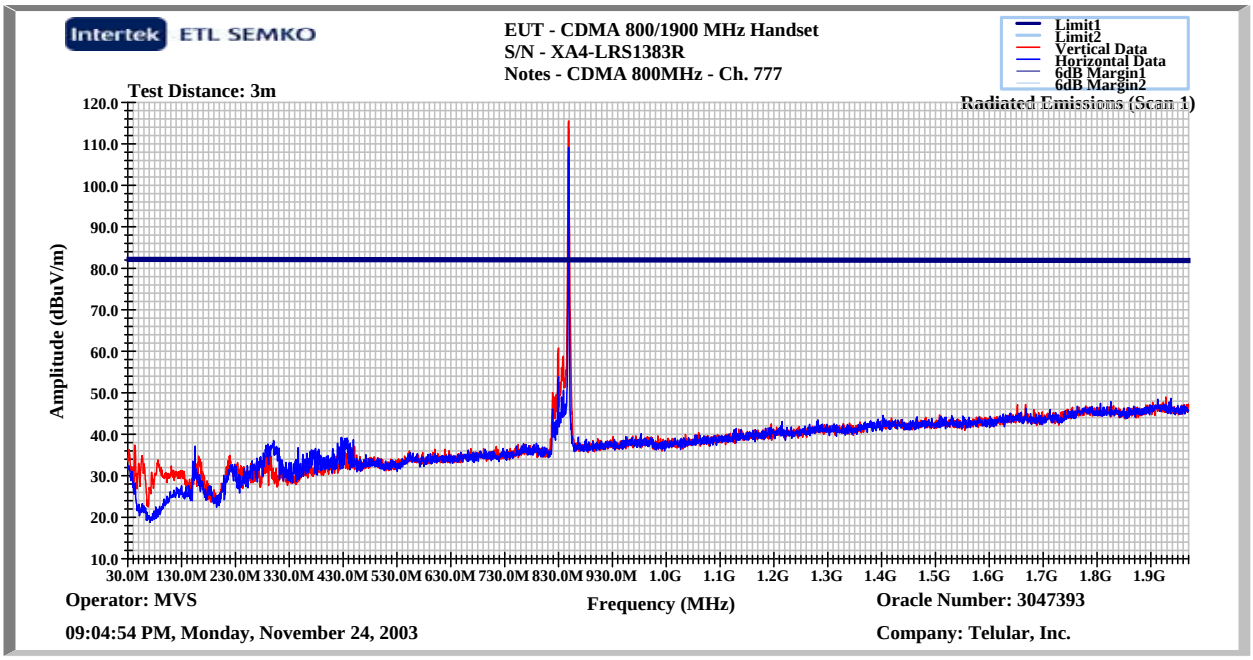



*Figure 7-3: Measured Field Strength of Spurious Radiation CDMA 800, Channel 777*



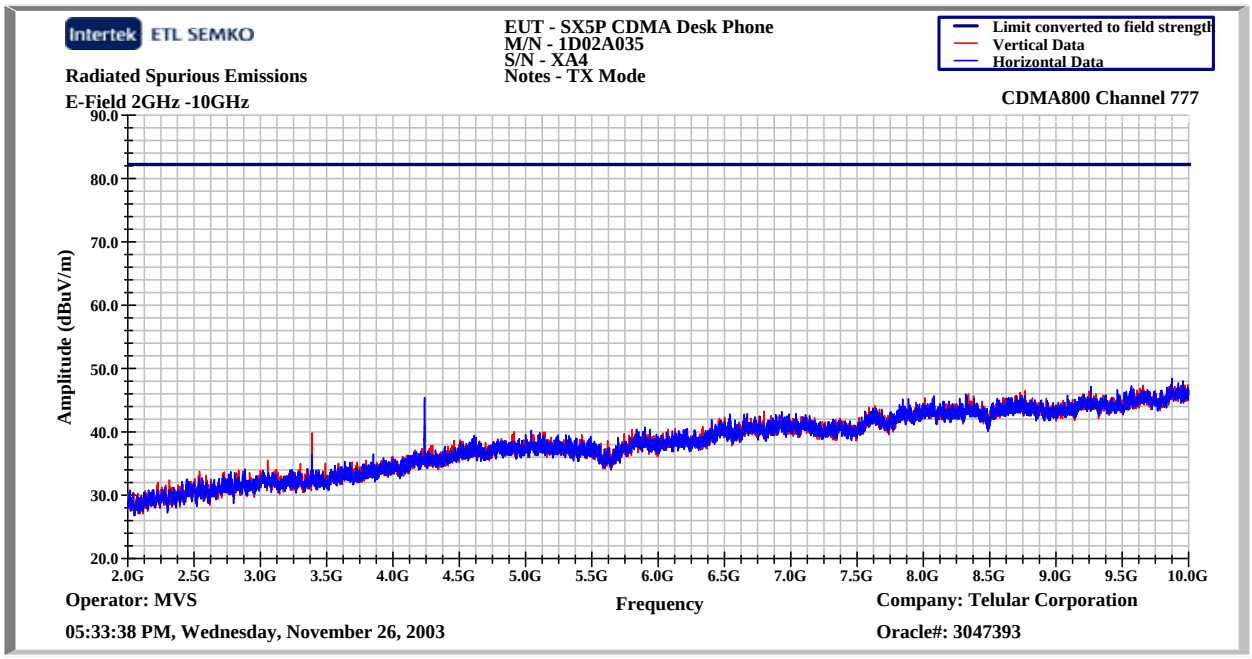
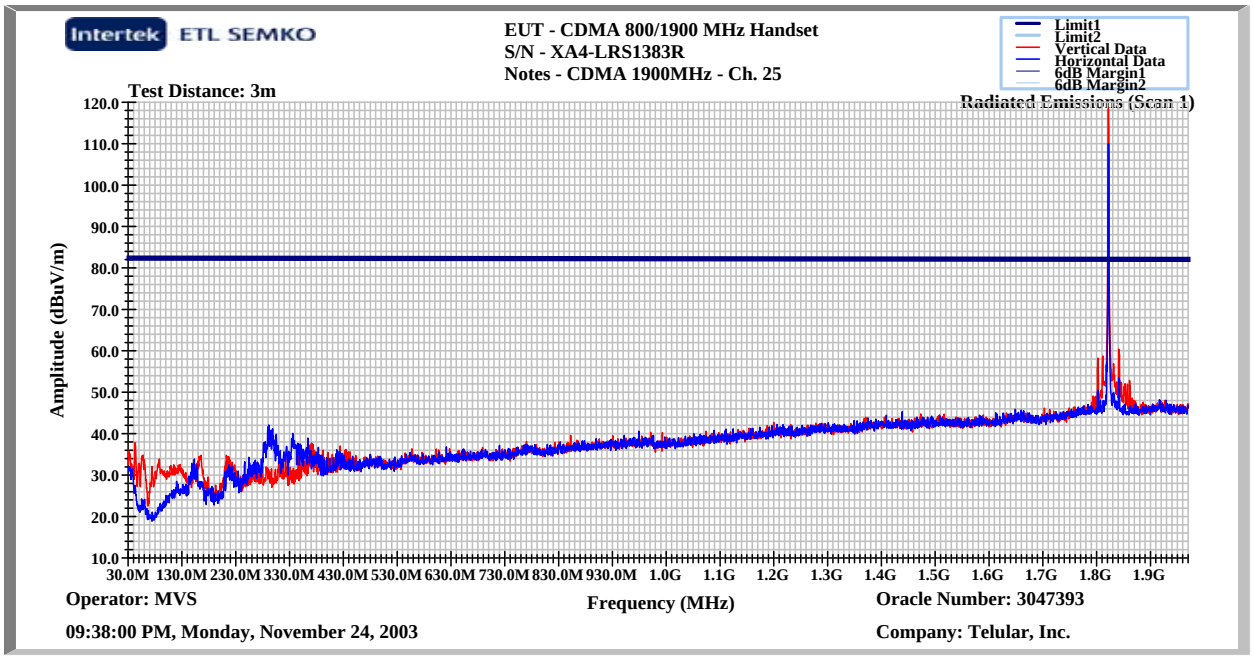



*Figure 7-4: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 25*



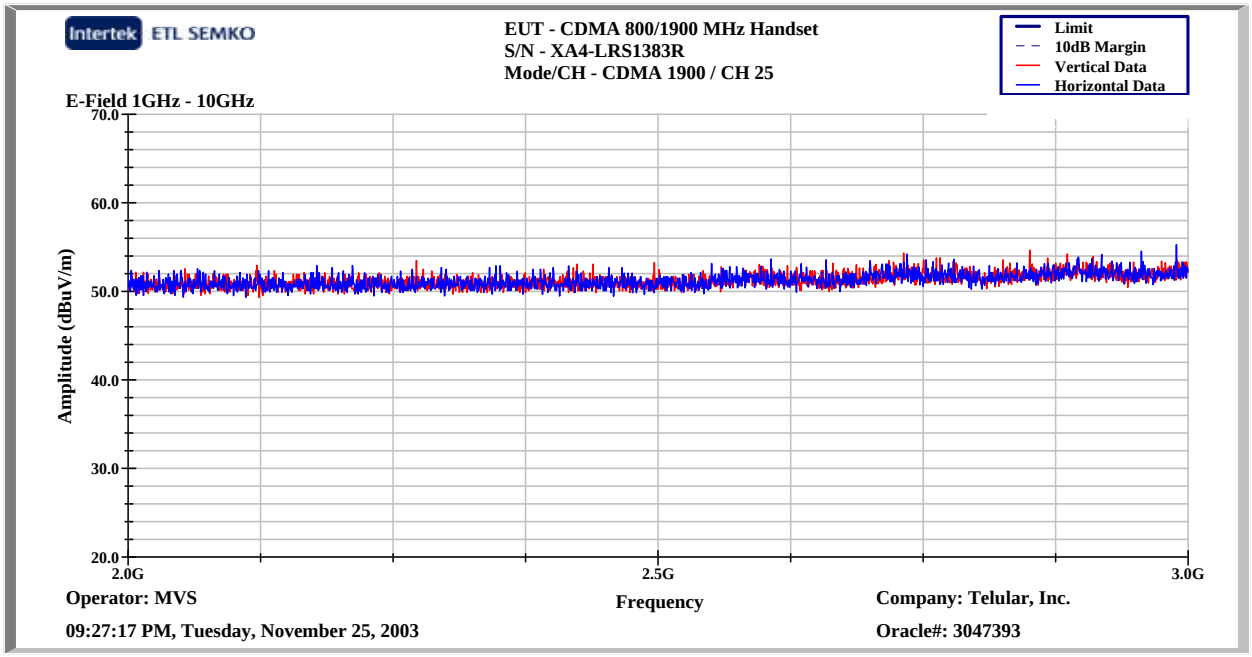



*Figure 7-5: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 25*

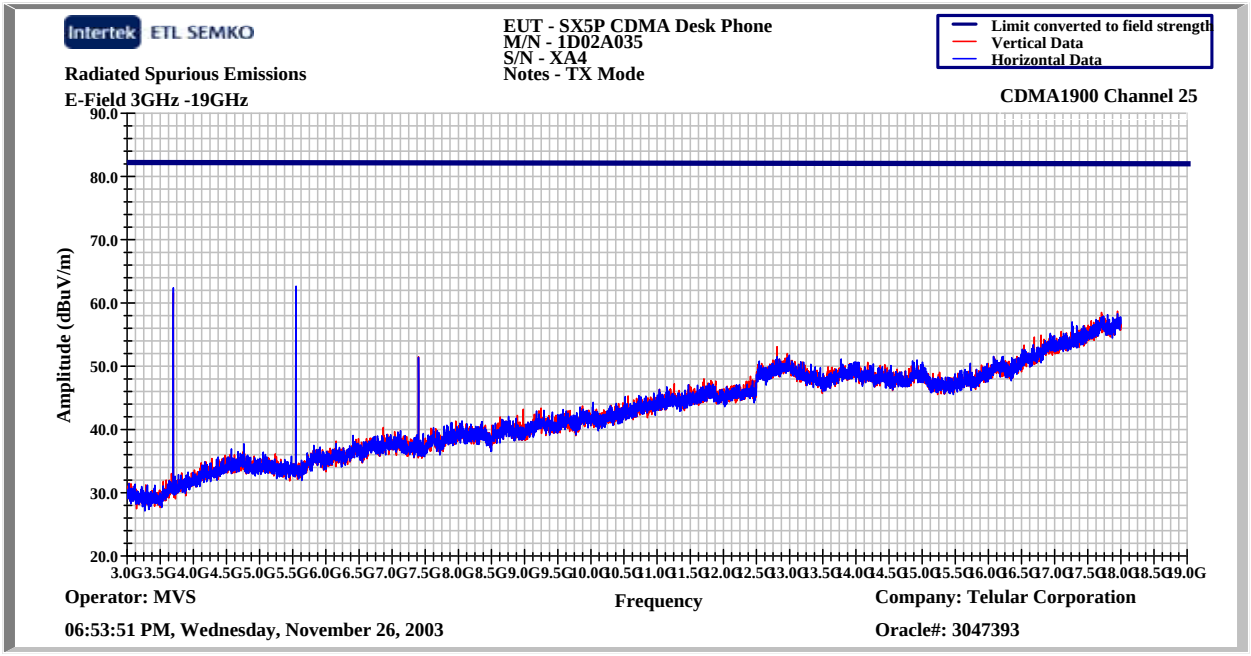
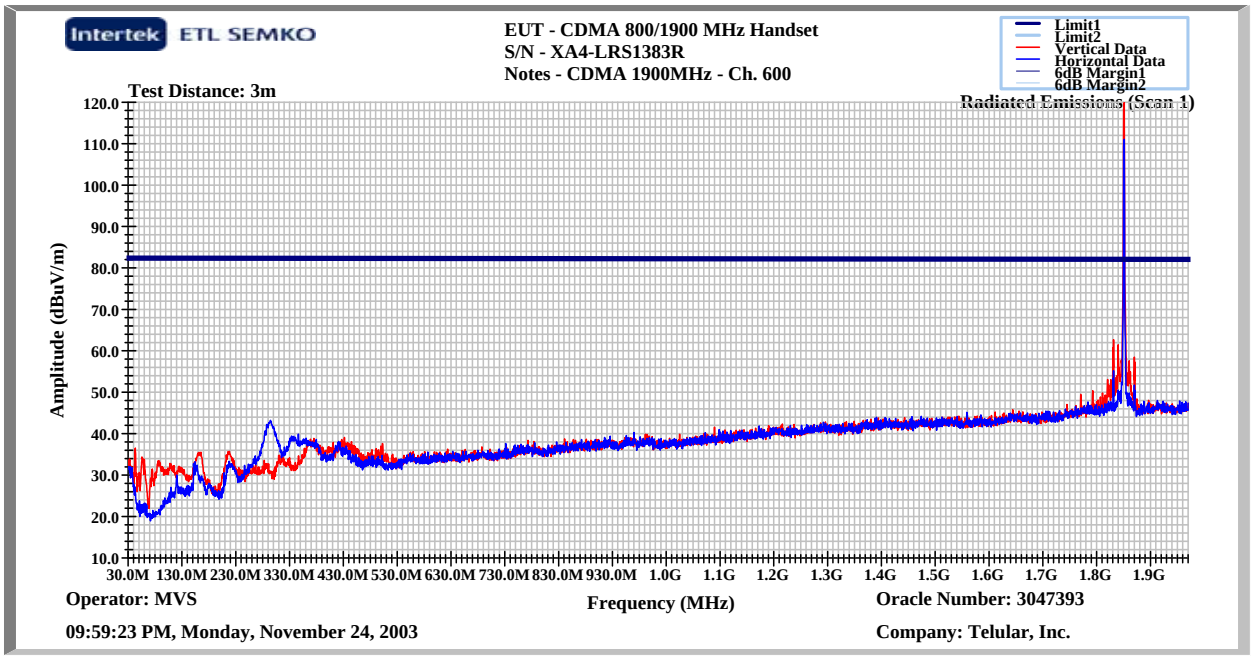


*Figure 7-6: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 600*



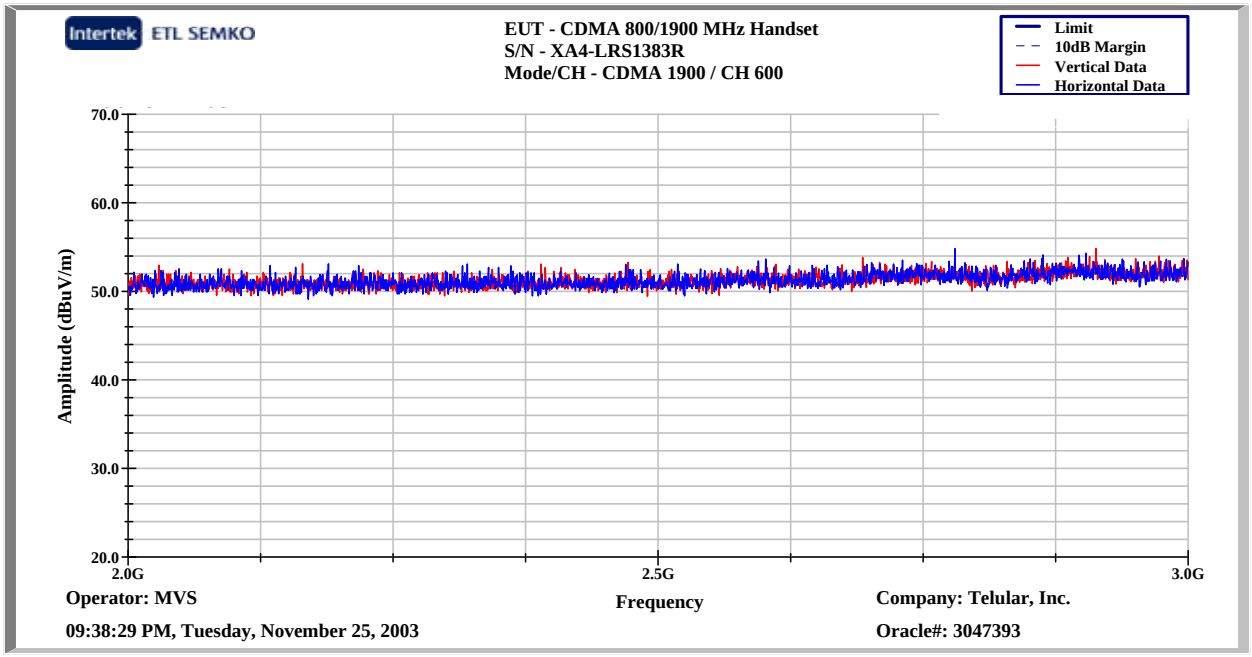



*Figure 7-7: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 600*

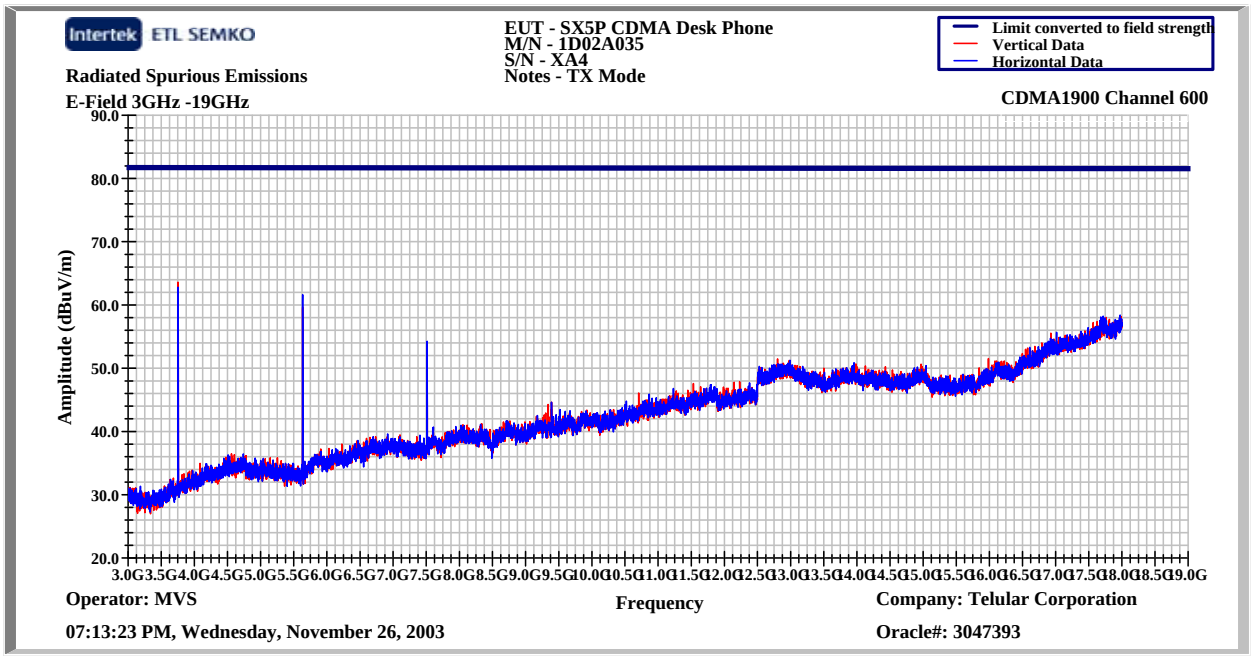
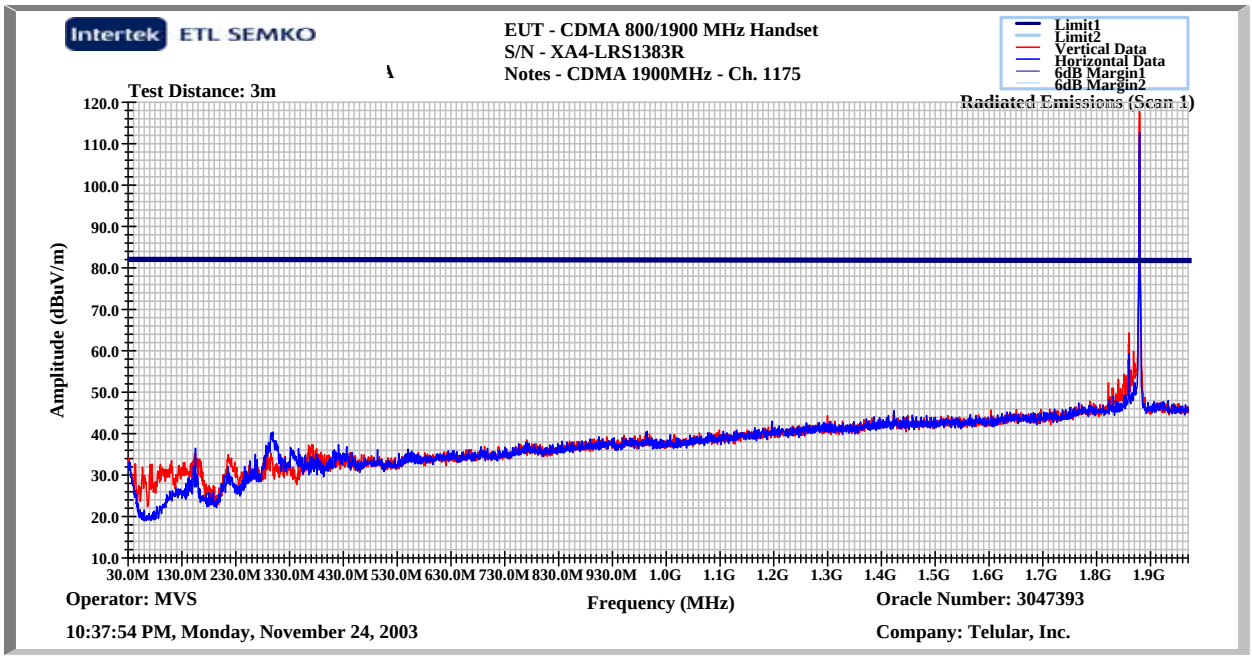


*Figure 7-8: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 1175*



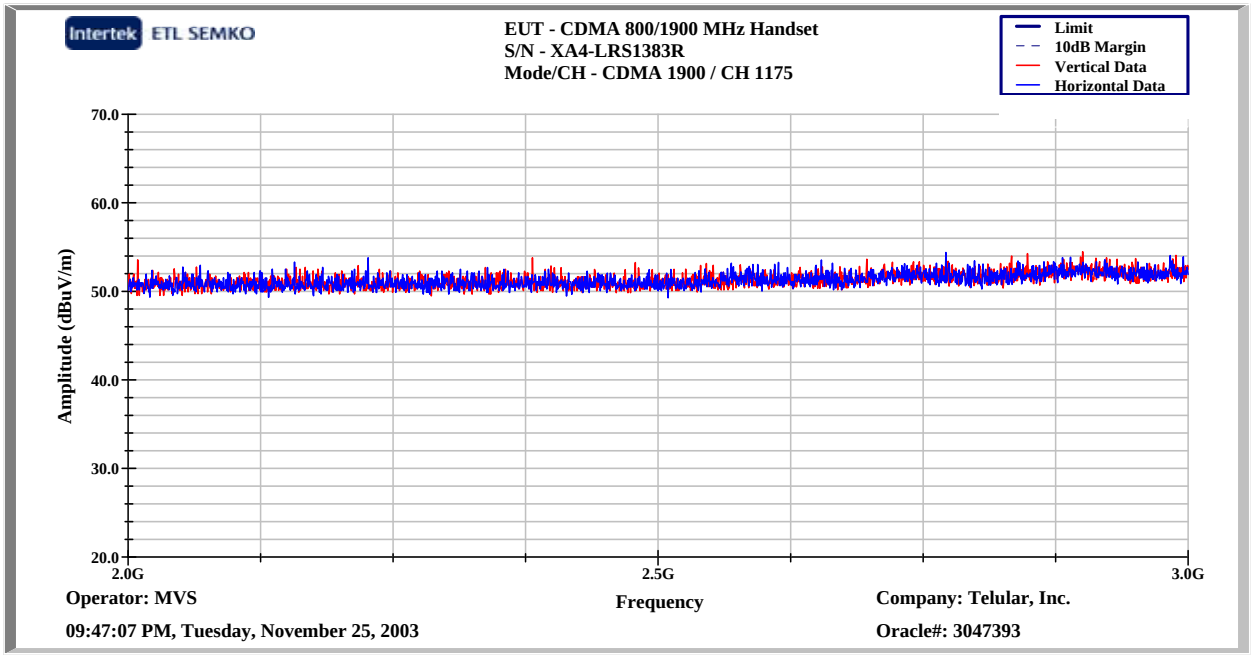
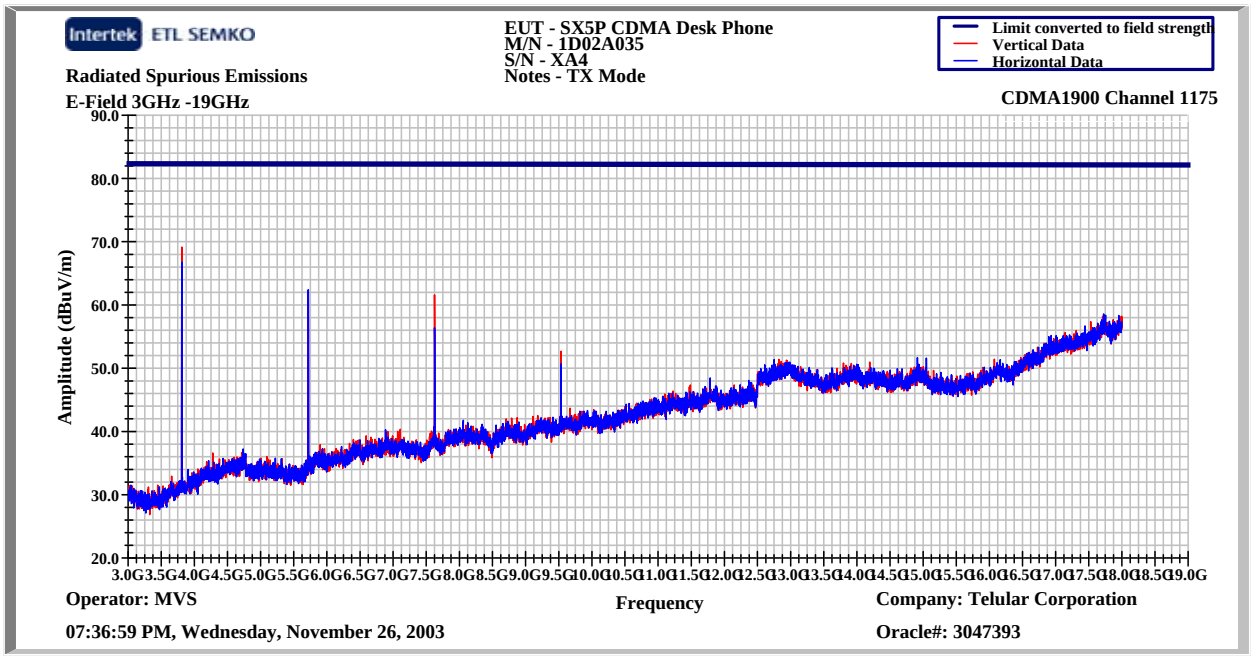



*Figure 7-9: Measured Field Strength of Spurious Radiation CDMA 1900, Channel 1175*



## 8 POWER LINE CONDUCTED EMISSIONS

FCC §15.107, FCC §15.207

### 8.1 Test Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 1992.

### 8.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| EMI Receiver | HP | 8546A | 3410A00173 |
| LISN | FCC | FCC-LISN-50-50-2M | 2019 |

## 8.3 Test Results

*Figure 8-1: FCC §15.107 and §15.207 power line conducted emissions (peak)*

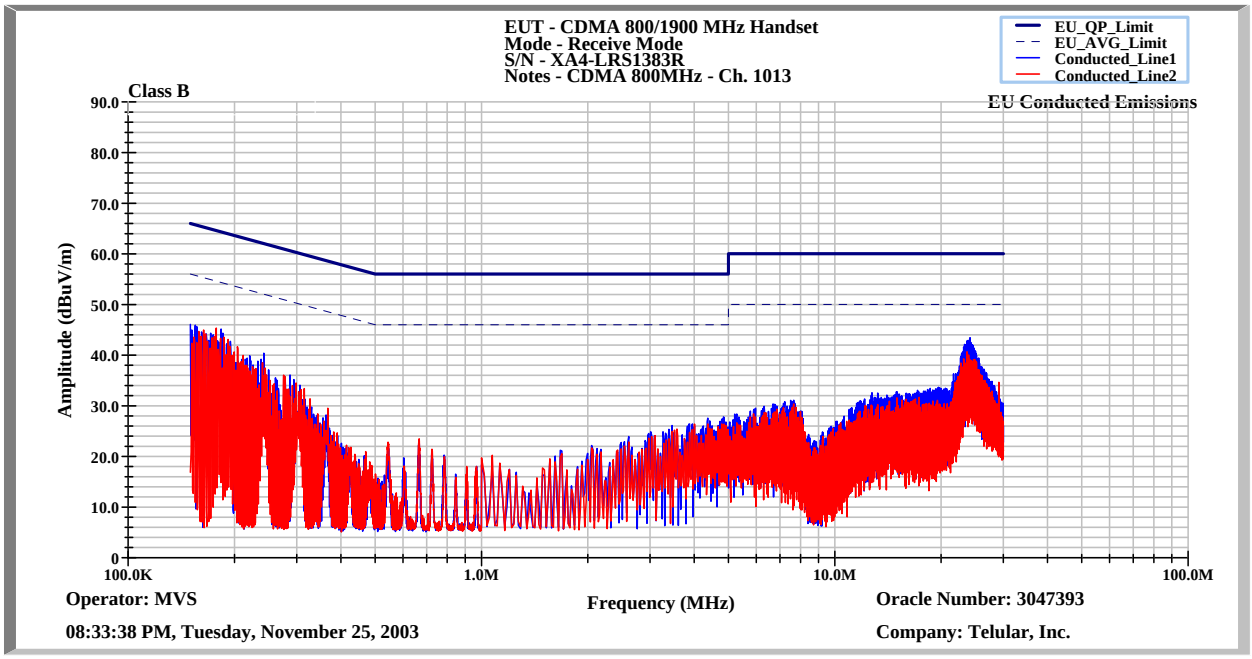
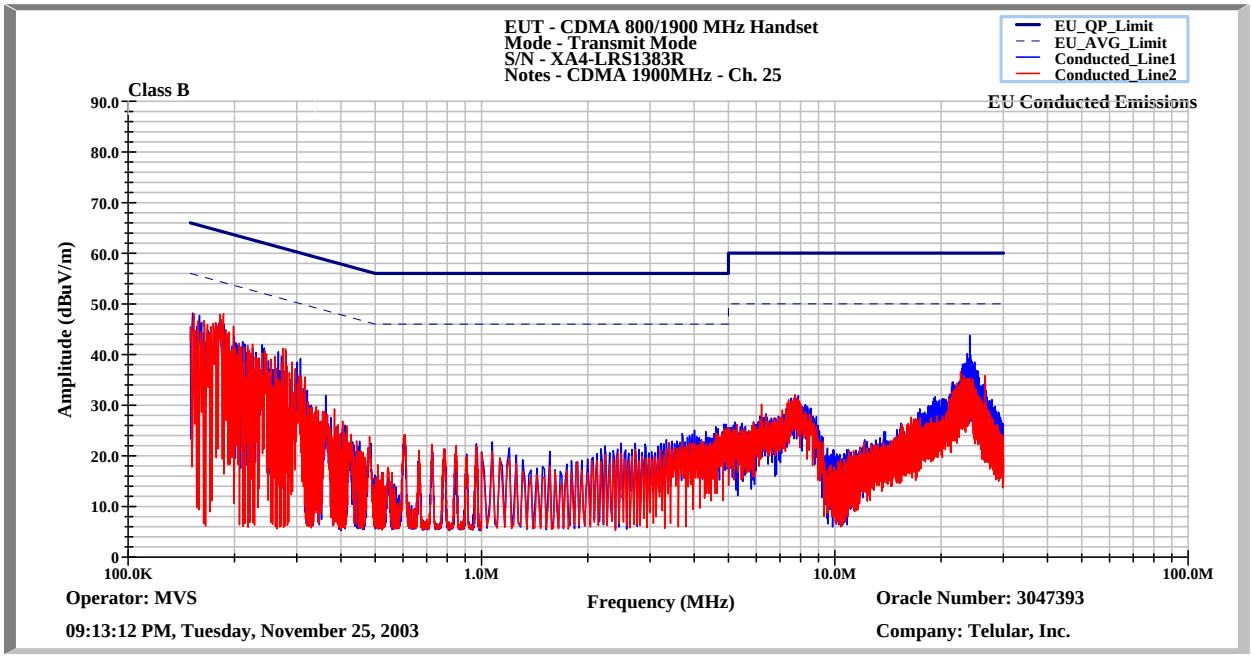



*Figure 8-2: FCC §15.107 and §15.207 power line conducted emissions (peak)*



## 9 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

Frequency tolerance: 2.5ppm

### 9.1 Test Procedure

Frequency Stability vs. Temperature

The equipment under test was connected to an external power supply and the RF output was connected to a base station simulator. The EUT was placed inside the temperature chamber. The power lead and RF output cable, and control cable (if applicable) exited the chamber through an opening.

After the temperature stabilized for approximately 30 minutes, the transmitter was activated, and the frequency error was recorded. The procedure was repeated every 10 degrees from –30 to +60 degrees Celsius.

Frequency Stability vs. Input Voltage

For mains powered equipment, the frequency error was recorded with the input voltage set to 115%, 100% and 85% of the nominal value. For DC powered equipment, the frequency error was recorded with the input voltage set to nominal, at the battery endpoint and at least 3 point between.

### 9.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Base Station Simulator | Rhode & Schwarz | CMU-200 | 837198/089 |
| Temperature Chamber | Thermotron | SM-8C | 32692 |
| PMA | Solar Light Co. | PMA 2100 | 5462 |
| Temperature Probe | Solar Light Co. | PMA 2170 | 6613 |
| Variable Transformer | Power Stat | 3PN126 | 289290 |
| Multi-meter | Fluke | 23 | 43530108 |
| Power Supply | Keithley | 2304 | Asset #2288 |

### 9.3 Test Results

*Table 4-1: CDMA 800 Channel 384, Frequency stability vs. Temperature*

| Frequency Error (Hz) vs. Temp. | | | | | | |
|---|---|---|---|---|---|---|
| | CDMA 800 | | | CDMA 1900 | | |
| Temp (C) | 384 | 777 | 1013 | 25 | 600 | 1175 |
| 60 | -1 | -1 | 0 | -2 | -4 | -2 |
| 50 | -1 | -1 | -1 | -2 | -2 | -1 |
| 40 | -1 | -2 | -3 | -2 | -3 | -2 |
| 30 | -1 | -3 | -3 | -1 | 0 | -3 |
| 20 | -1 | -1 | -1 | -4 | -1 | -3 |
| 10 | -2 | -1 | -1 | -2 | -5 | -2 |
| 0 | -1 | -1 | 0 | -2 | -2 | -3 |
| -10 | 0 | 0 | 0 | -1 | -1 | -3 |
| -20 | -1 | 0 | -1 | -1 | -1 | -4 |
| -30 | 0 | 0 | -1 | -3 | -3 | -2 |

| Frequency Error (Hz) vs. Input voltage | | | | | | |
|---|---|---|---|---|---|---|
| Voltage | CDMA 800 | | | CDMA 1900 | | |
| | 384 | 777 | 1013 | 25 | 600 | 1175 |
| 138 Vac | -1 | -1 | -1 | -4 | -3 | -2 |
| 120 Vac | -1 | 0 | 0 | -3 | -2 | -3 |
| 102 Vac | -1 | -1 | -1 | -3 | -1 | -3 |
| 6.0 Vdc | -1 | -1 | -1 | -1 | -3 | -2 |
| 5.5 Vdc | 0 | 0 | -1 | -3 | -3 | -3 |
| 5.0 Vdc | -1 | 0 | 0 | -3 | -2 | -2 |
| 4.5 Vdc | 0 | 0 | 1 | 0 | 0 | 0 |
| 4.0 Vdc | 34 | 35 | 19 | -19 | -121 | -130 |
| 3.9 Vdc | 46 | 49 | 26 | 53 | -105 | -240 |

## 10 RECEIVER SPURIOUS EMISSIONS

### 10.1 Test Limits

*Table 10-1 Radiated Emission Limit for FCC §15.109*

| Radiated Emission Limits at 3 meters | |
|---|---|
| Frequency (MHz) | Quasi-Peak limits, dB (μV/m) |
| 30 to 88 | 40.0 |
| 88 to 216 | 43.5 |
| 216 to 960 | 46.0 |
| 960 and up | 54.0 |

### 10.2 Test Equipment

| Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|
| Horn Antenna | EMCO | 3115 | 9208-3919 |
| BiConLog Antenna | Chase | CBL6112B | 2622 |
| EMI Receiver | HP | 8546A | 3410A00173 |
| EMI Receiver, Preselector section | HP | 85460A | 3348A00203 |

### 10.3 Test Procedure

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

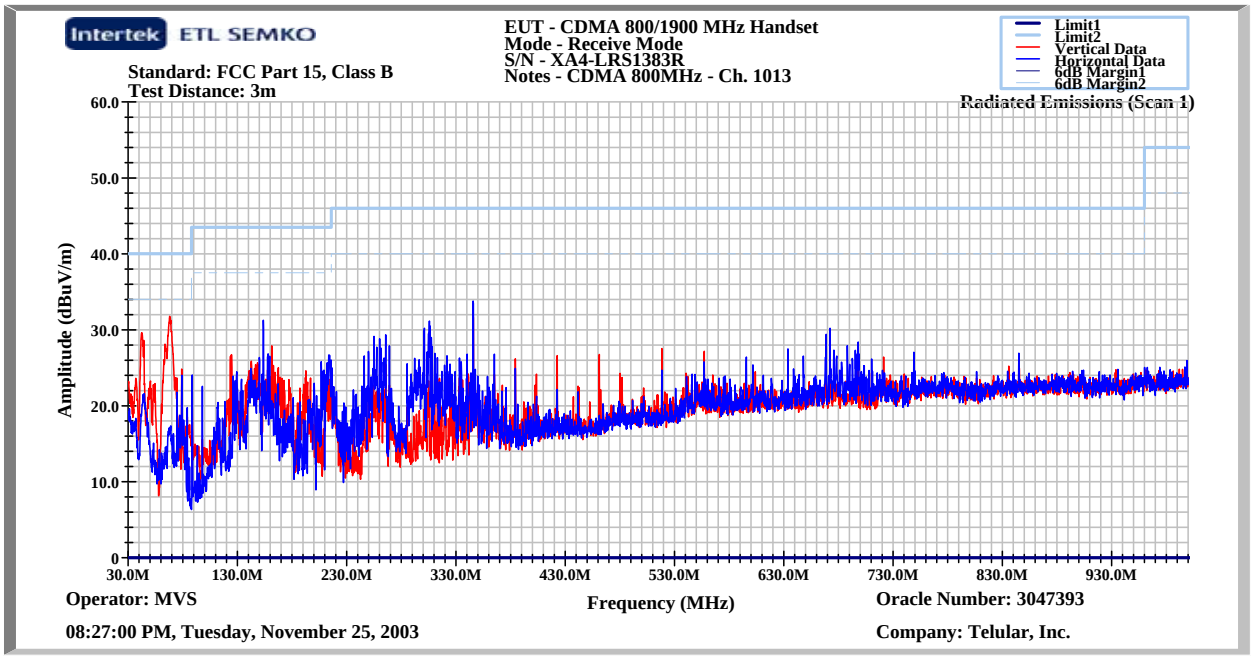
The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4: 1992.

## 10.4 Test Results

*Figure 10-1 FCC §15.109 Receiver Spurious Emissions*



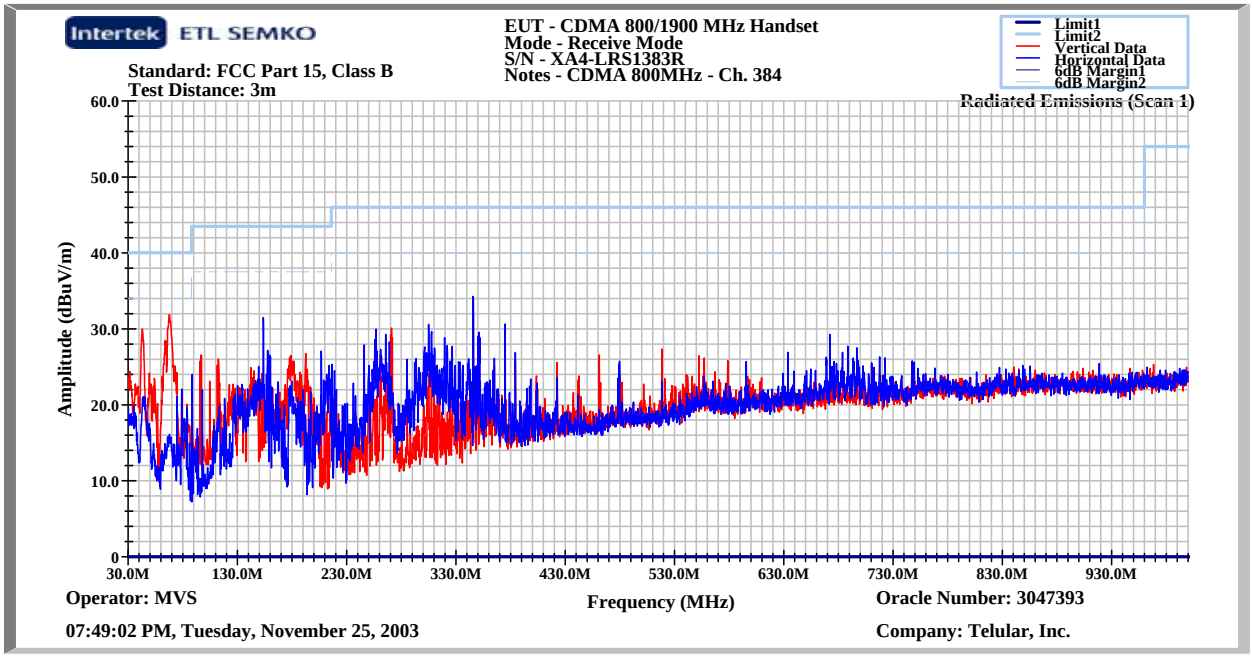



*Figure 10-2 FCC §15.109 Receiver Spurious Emissions*