

# FCC PART 24 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

For

## Advanced RF Technologies, Inc.

5440 Trabuco Road  
Irvine, CA 92620

**FCC ID: S2OADRFTECH001**

2005-03-08

|                                                                                                                                                              |                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report                                                                          | <b>Equipment Type:</b><br>PCS Repeater |
| <b>Test Engineer:</b> Ming Jing /                                        |                                        |
| <b>Report No.:</b> R0501183                                                                                                                                  |                                        |
| <b>Test Date:</b> 2005-02-25                                                                                                                                 |                                        |
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**Note:** This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *Advanced RF Technologies, Inc.*'s product, FCC ID: S2OADRFTECH001 or the "EUT" as referred to in this report is a PCS 1900 Repeater. The EUT measures approximately 485mmL x 380mmW x 235mmH.

*\* The test data gathered are from production sample, serial number: 001, provided by the manufacturer.*

### Objective

This type approval report is prepared on behalf of *Advanced RF Technologies, Inc.* in accordance with Part 2, Subpart J, and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, spurious radiated emission, frequency stability, band edge and radiated margin.

### Related Submittal(s)/Grant(s)

No Related Submittals

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 24 Subpart E - PCS

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-2003, and TIA/EIA-603A.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters, except as noted below.

### Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations is attached hereinafter and can also be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to TIA/EIA 603A.

The final qualification test was performed with the EUT operating at normal mode.

### Block Diagram

Please refer to Exhibit D.

### Equipment Modifications

No modifications were made to the EUT.

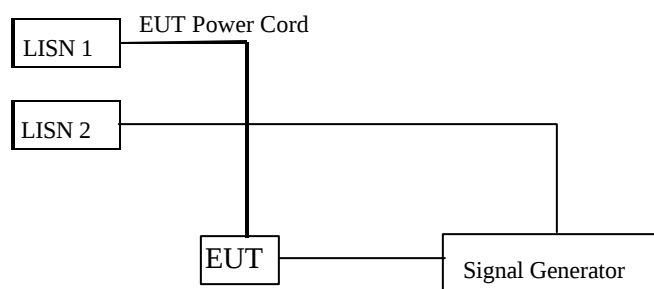
### Local Support Equipment List and Details

| Manufacturer    | Description | Model   | Serial Number | FCC ID |
|-----------------|-------------|---------|---------------|--------|
| Rohde & Schward | Generator   | SMIQ03B | DE23746       | DOC    |
| Compaq          | Notebook PC | 2/03VS  | CNF43403      | N/A    |

### External I/O Cabling List and Details

| Cable Description | Length (M) | Port/From             | To            |
|-------------------|------------|-----------------------|---------------|
| Shielded cable    | 2.0        | RF Output / Generator | RF Port / EUT |

### Test Setup Block Diagram



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## SUMMARY OF TEST RESULTS

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Results reported relate only to the product tested, serial number: 001.

| FCC RULE                | DESCRIPTION OF TEST                     | Result    |
|-------------------------|-----------------------------------------|-----------|
| §2.1046<br>§ 24.232     | RF power output                         | Compliant |
| § 2.1049<br>§ 24.238(b) | Emission Bandwidth                      | Compliant |
| 2.1051<br>§ 24.238(a)   | Spurious emissions at antenna terminals | Compliant |
| IS-138A (3.4.4)         | Two-Tone Test                           | Compliant |
| 2.1053                  | Spurious Radiated Emissions             | Compliant |
| §24.238                 | Band Edge                               | Compliant |
| § 2.1047                | Modulation Characteristics              | N/A       |
| § 2.1055<br>§ 24.235    | Frequency stability                     | Compliant |

## §2.1046 & §24.232 - RF POWER OUTPUT

### Applicable Standard

According to FCC §2.1046 and §24.232 (b), mobile stations are limited to 2 watts eirp peak power.

### Test Procedure

The antenna was removed and SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 Ohm), 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 was determined by adding the value of the attenuator to the power meter reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitter.

### Test Equipment List and Details

| Manufacturer    | Description          | Model    | Serial Number | Cal. Date  |
|-----------------|----------------------|----------|---------------|------------|
| Agilent         | Power Meter          | E4419B   | MY41291511    | 2004-04-29 |
| HP              | Plotter              | 7470A    | N/A           | N/A        |
| Rohde & Schwarz | Signal Generator     | SMIQ03   | DE23746       | 2004-07-03 |
| Rohde & Schwarz | Modulation Generator | AMIQ-K11 | DE30565       | 2004-04-06 |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 21° C     |
| Relative Humidity: | 37%       |
| ATM Pressure:      | 1032 mbar |

\* *The testing was performed by Ming Jin on 2005-02-25.*

**Test Results**

| Mode      | Signal | Channel Frequency<br>MHz | Input Power<br>dBm | Output Power<br>dBm |
|-----------|--------|--------------------------|--------------------|---------------------|
| Up-link   | CDMA   | Low: 1851.25             | -66                | 23.96               |
|           |        | Mid: 1880.00             | -66                | 24.17               |
|           |        | High: 1908.75            | -66                | 24.03               |
|           | GSM    | Low: 1850.20             | -66                | 24.25               |
|           |        | Mid: 1880.00             | -66                | 24.37               |
|           |        | High: 1909.80            | -66                | 24.14               |
|           | TDMA   | Low: 1850.04             | -66                | 23.98               |
|           |        | Mid: 1879.98             | -66                | 24.13               |
|           |        | High: 1909.92            | -66                | 24.05               |
| Down-link | CDMA   | Low: 1931.25             | -66                | 24.26               |
|           |        | Mid: 1960.00             | -66                | 24.43               |
|           |        | High: 1988.75            | -66                | 24.19               |
|           | GSM    | Low: 1930.20             | -66                | 24.33               |
|           |        | Mid: 1960.00             | -66                | 24.47               |
|           |        | High: 1989.80            | -66                | 24.28               |
|           | TDMA   | Low: 1930.04             | -66                | 24.09               |
|           |        | Mid: 1959.98             | -66                | 24.15               |
|           |        | High: 1989.92            | -66                | 24.12               |

| Mode      | Signal | Channel Frequency<br>MHz | Maximum<br>Input Power<br>dBm | Output Power<br>dBm |
|-----------|--------|--------------------------|-------------------------------|---------------------|
| Up-link   | CDMA   | Low: 1851.25             | -45                           | 24.02               |
|           |        | Mid: 1880.00             | -45                           | 24.19               |
|           |        | High: 1908.75            | -45                           | 24.11               |
|           | GSM    | Low: 1850.20             | -45                           | 24.28               |
|           |        | Mid: 1880.00             | -45                           | 24.39               |
|           |        | High: 1909.80            | -45                           | 24.25               |
|           | TDMA   | Low: 1850.04             | -45                           | 23.99               |
|           |        | Mid: 1879.98             | -45                           | 24.17               |
|           |        | High: 1909.92            | -45                           | 24.08               |
| Down-link | CDMA   | Low: 1931.25             | -45                           | 24.29               |
|           |        | Mid: 1960.00             | -45                           | 24.46               |
|           |        | High: 1988.75            | -45                           | 24.23               |
|           | GSM    | Low: 1930.20             | -45                           | 24.35               |
|           |        | Mid: 1960.00             | -45                           | 24.48               |
|           |        | High: 1989.80            | -45                           | 24.31               |
|           | TDMA   | Low: 1930.04             | -45                           | 24.12               |
|           |        | Mid: 1959.98             | -45                           | 24.23               |
|           |        | High: 1989.92            | -45                           | 24.18               |

Note : EUT operated under AGC mode

## §2.1049 & §24.238 - EMISSION BANDWIDTH

### Applicable Standards

According to FCC §2.1049 and §24.238 (b), 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 26dB below the transmitter power.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the spectrum was recorded.

### Test Equipment List and Details

| Manufacturer    | Description          | Model    | Serial Number | Cal. Date  |
|-----------------|----------------------|----------|---------------|------------|
| HP              | Spectrum Analyzer    | 8565EC   | 3946A00131    | 2004-08-08 |
| HP              | Plotter              | 7470A    | N/A           | N/A        |
| Rohde & Schwarz | Signal Generator     | SMIQ03   | DE23746       | 2004-07-03 |
| Rohde & Schwarz | Modulation Generator | AMIQ-K11 | DE30565       | 2004-04-06 |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 21° C     |
| Relative Humidity: | 37%       |
| ATM Pressure:      | 1032 mbar |

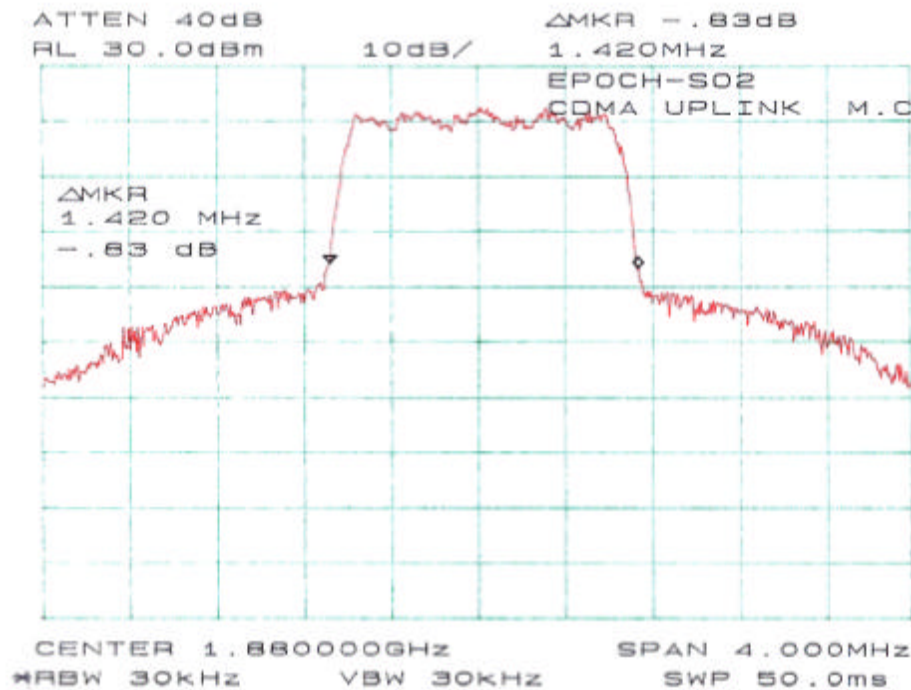
\* *The testing was performed by Ming Jin on 2005-02-25.*

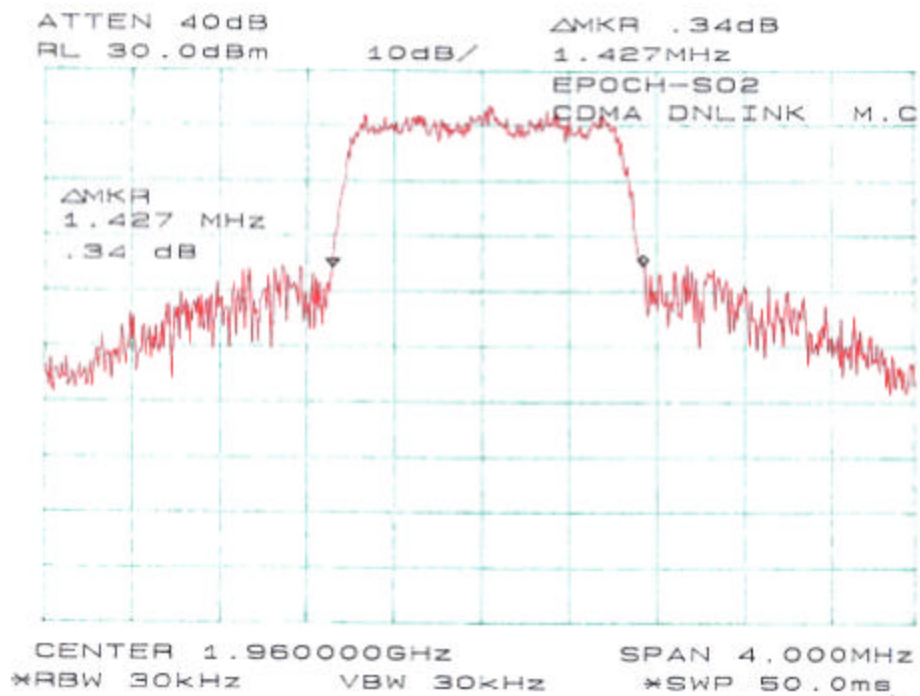
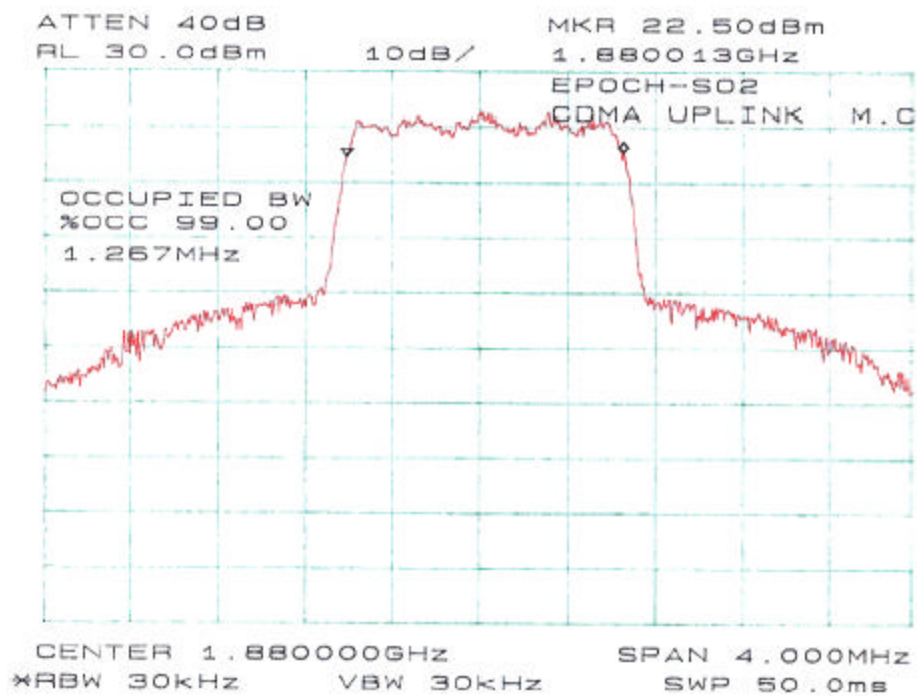
## Test Results

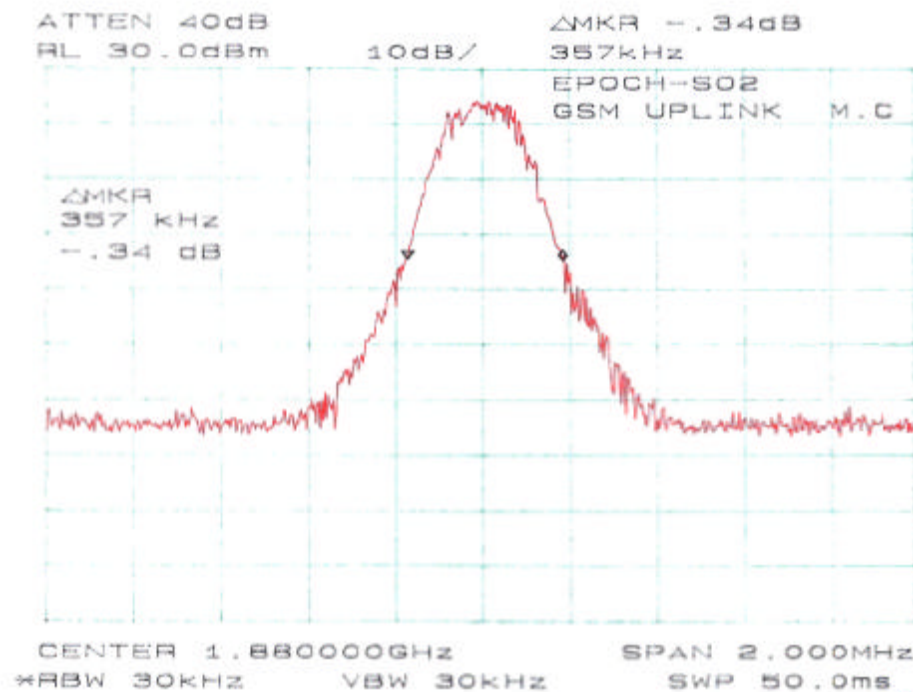
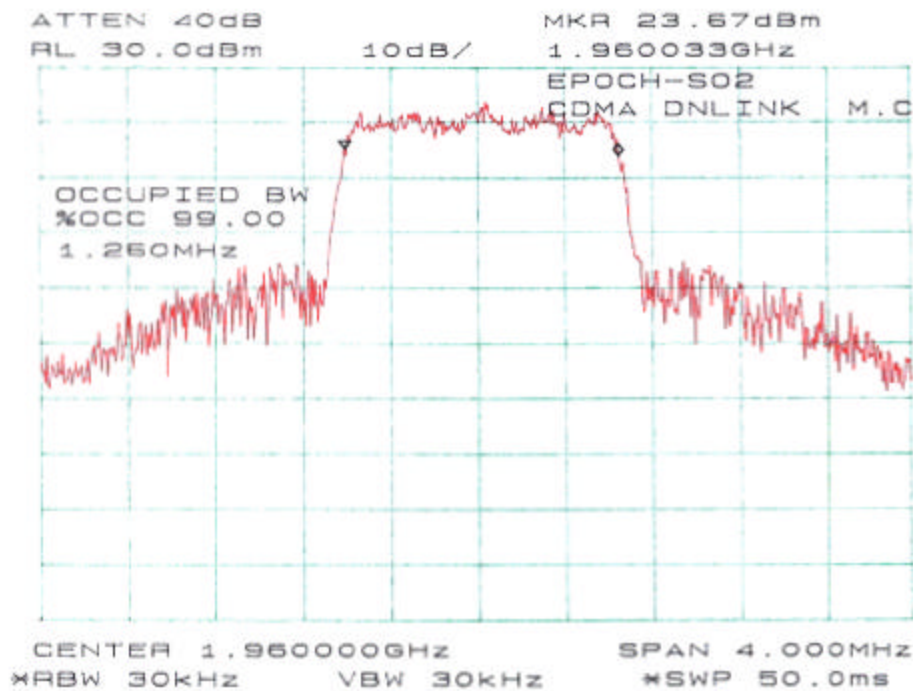
### Test Data Summary

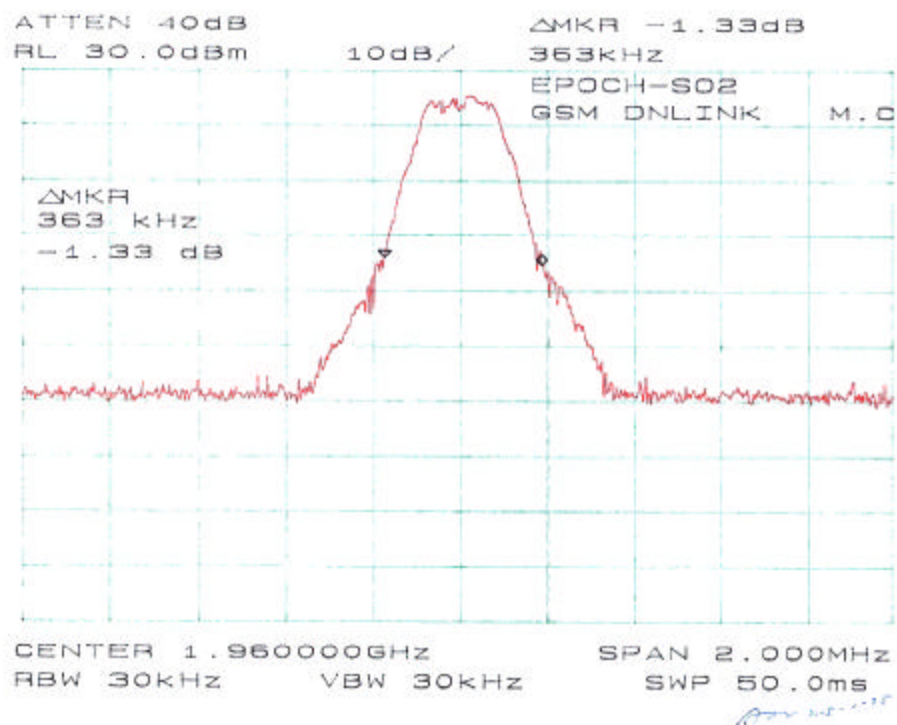
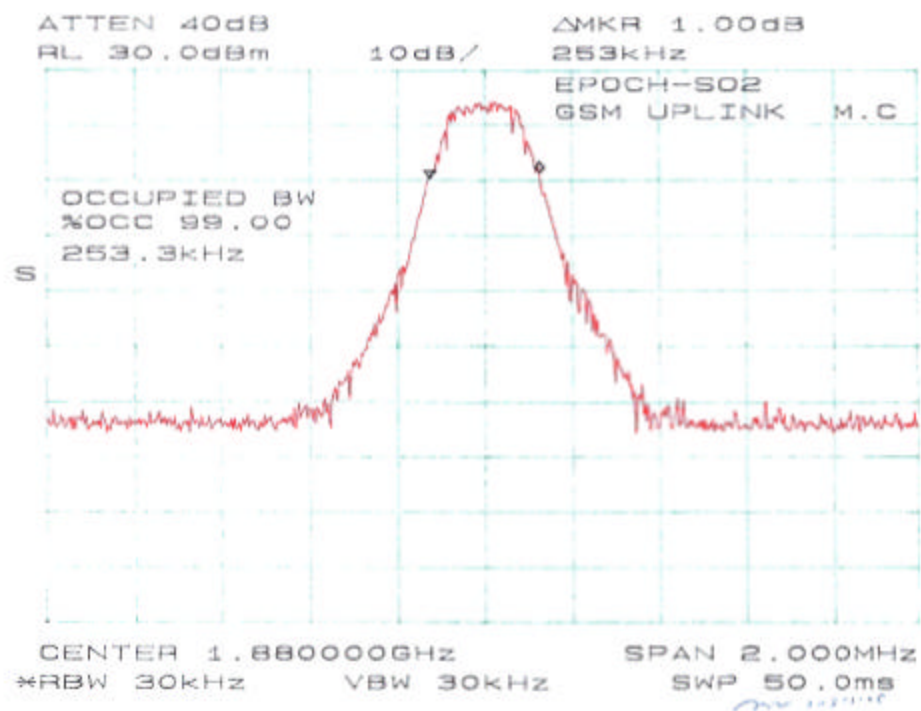
| Modulation | Mode      | Frequency (MHz) | Emission Bandwidth in kHz |
|------------|-----------|-----------------|---------------------------|
| CDMA       | Up-link   | 1880            | 1267                      |
|            | Down-link | 1960            | 1260                      |
| GSM        | Up-link   | 1880            | 253.3                     |
|            | Down-link | 1960            | 253.3                     |
| TDMA       | Up-link   | 1879.98         | 96.67                     |
|            | Down-link | 1959.98         | 95                        |

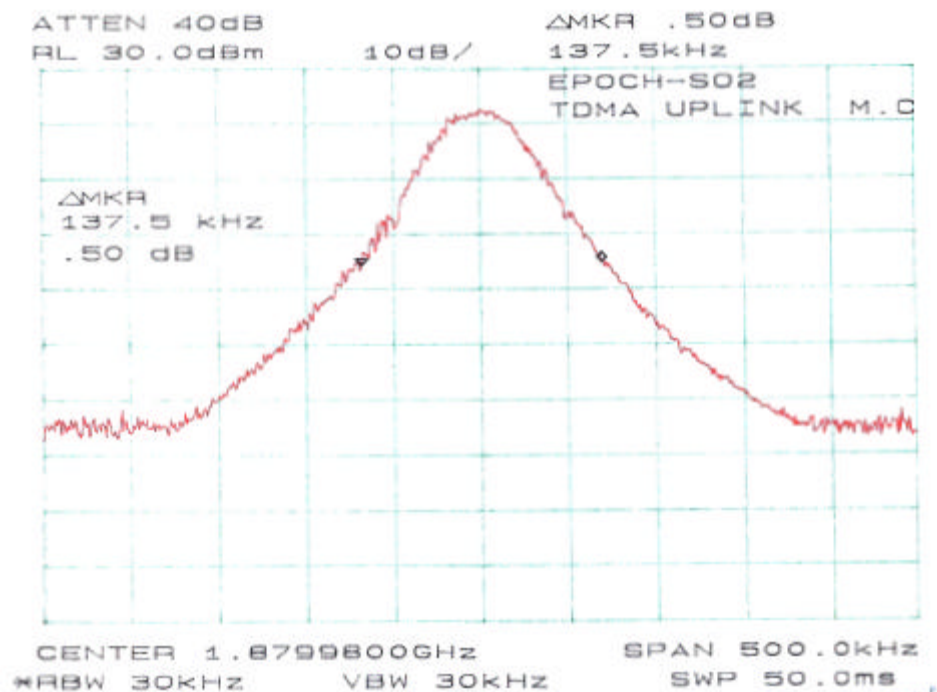
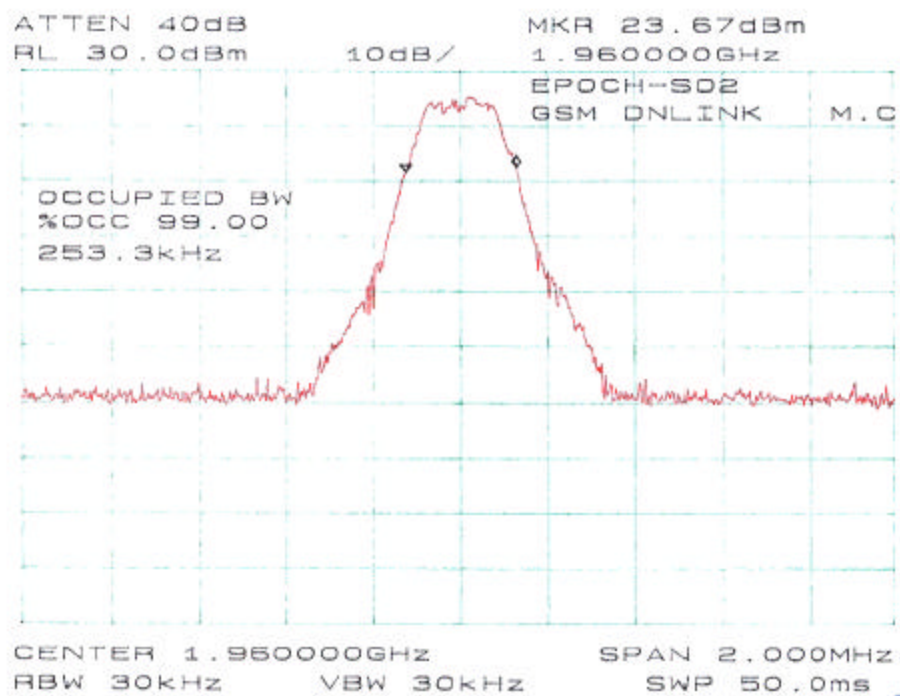
Please refer to plots hereinafter.

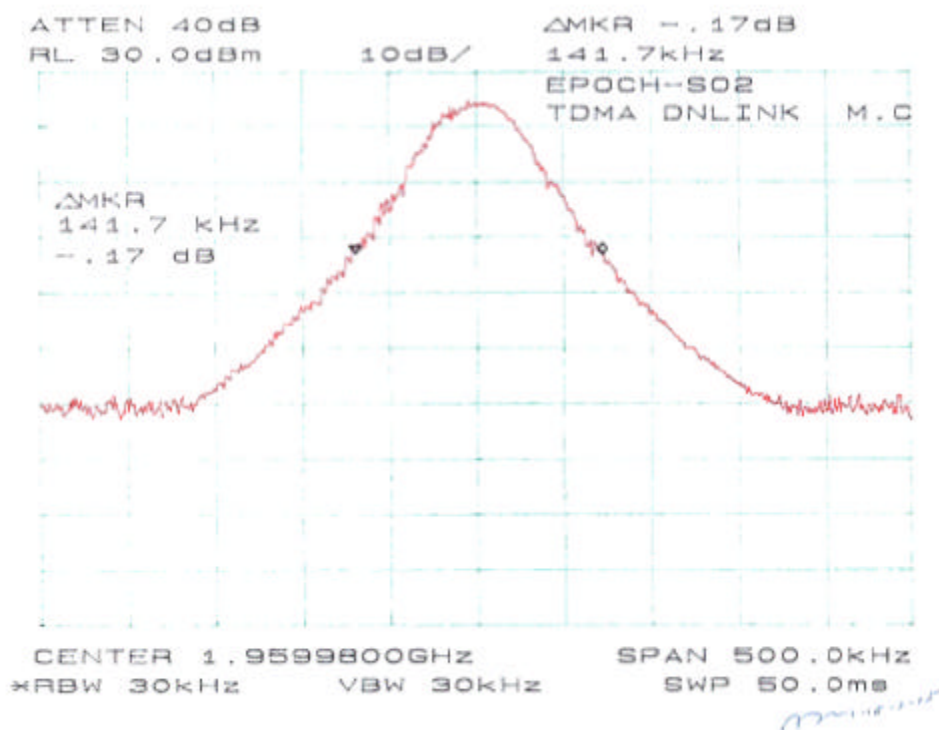
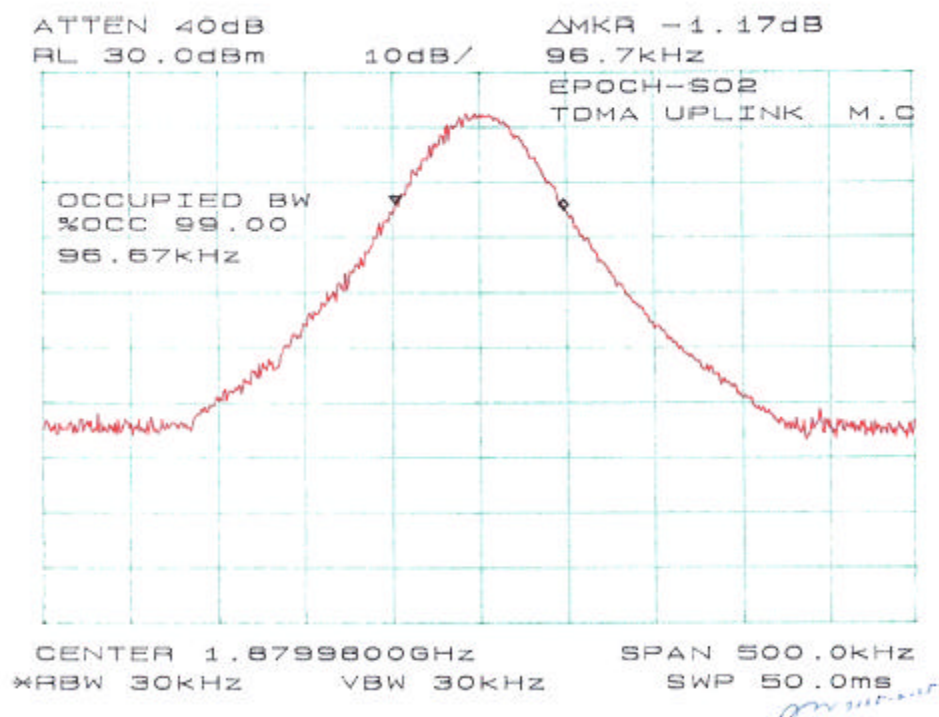


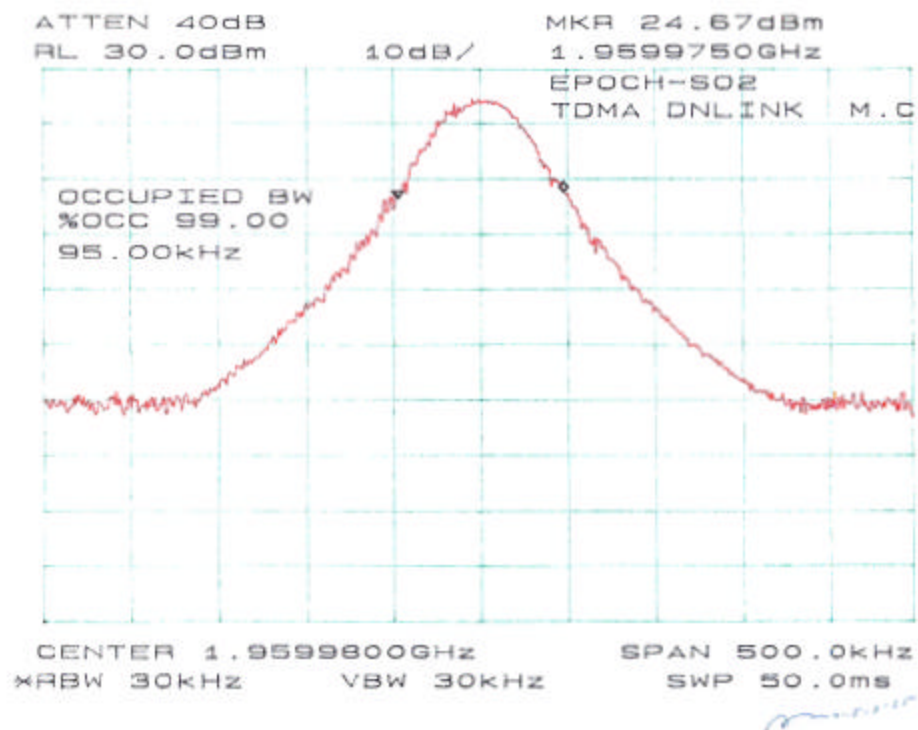




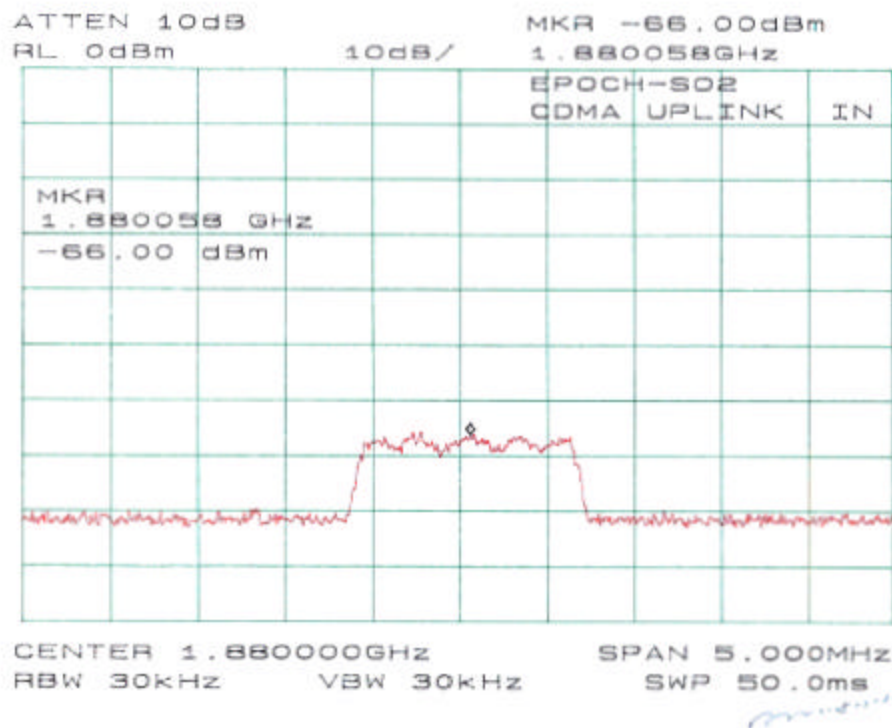


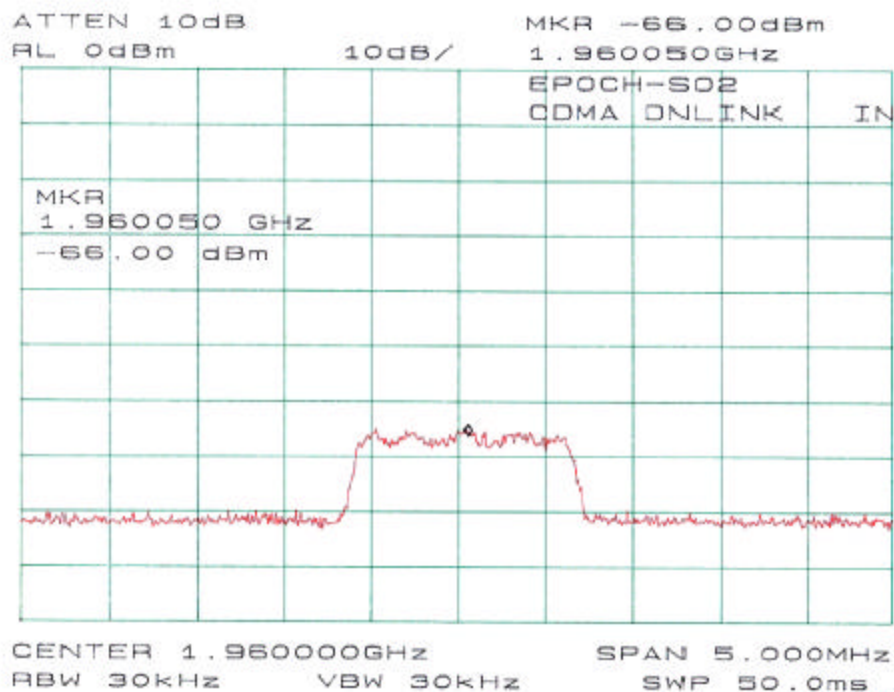




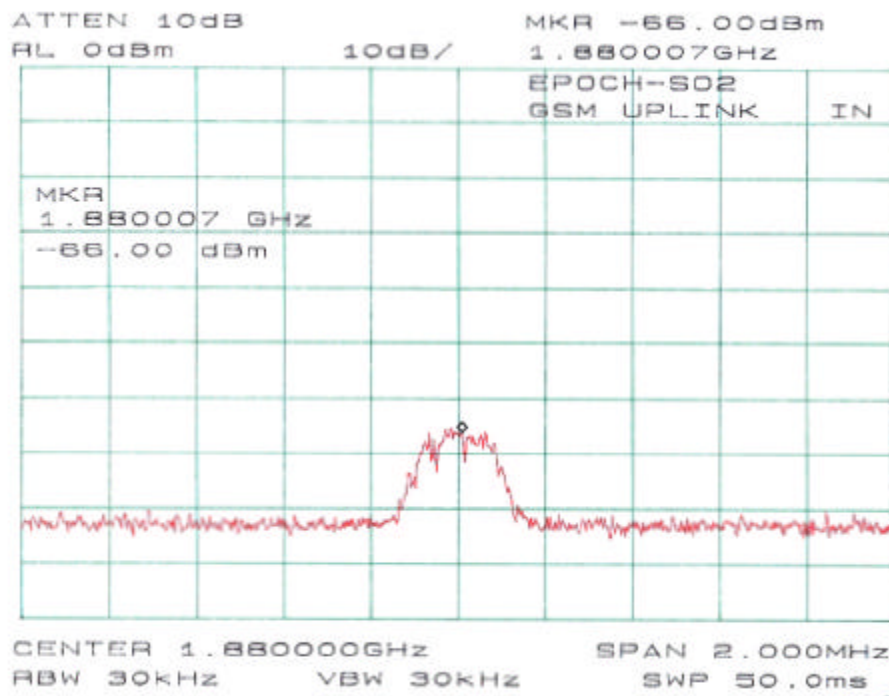


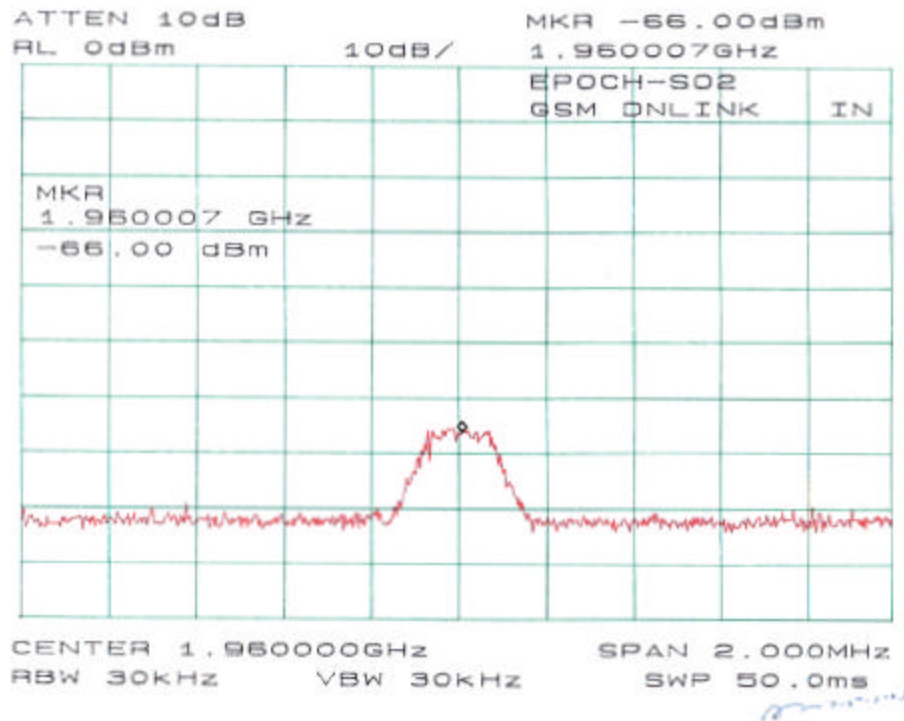
CDMA Input Signal:



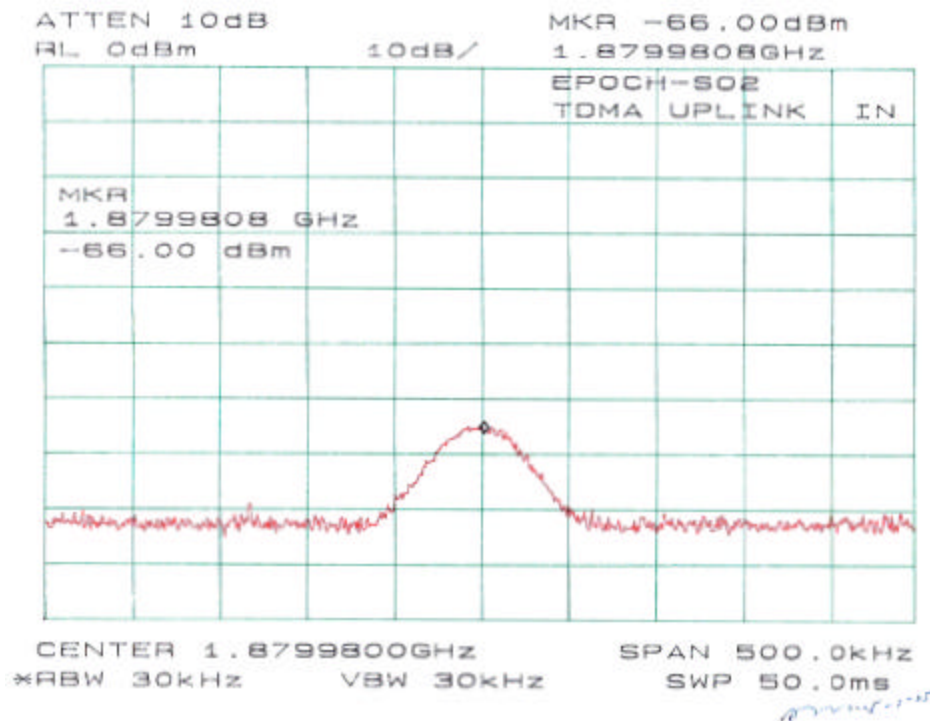


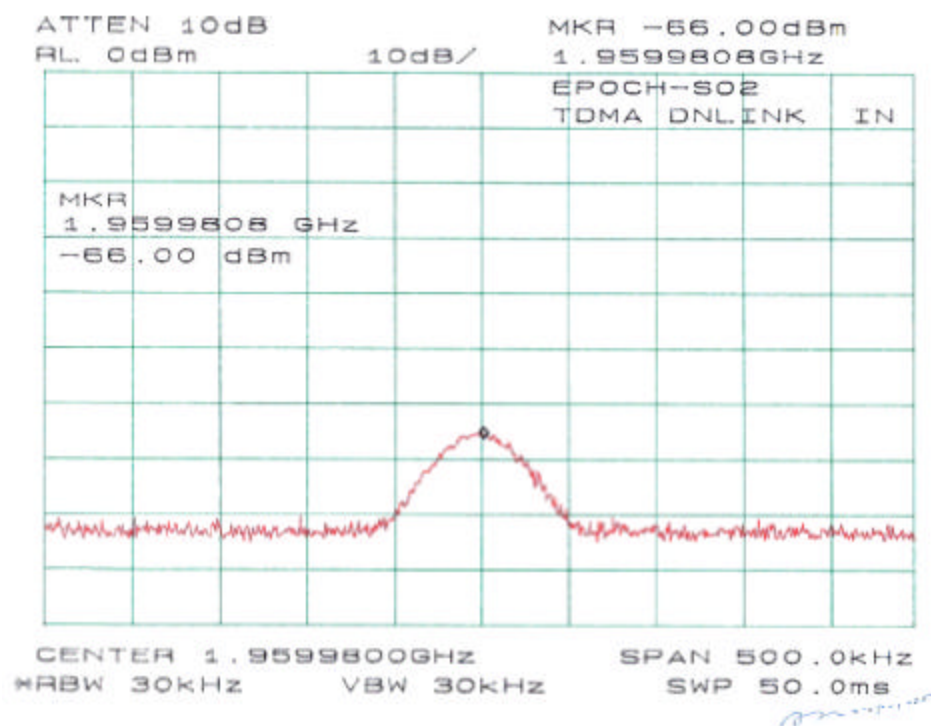
GSM Input Signal:





TDMA Input Signal:





## §2.1051 & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### Applicable Standards

According to FCC §2.1049 and §24.238, on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

### Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 KHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### Test Equipment List and Details

| Manufacturer    | Description          | Model    | Serial Number | Cal. Date  |
|-----------------|----------------------|----------|---------------|------------|
| HP              | Spectrum Analyzer    | 8565EC   | 3946A00131    | 2004-08-08 |
| HP              | Plotter              | 7470A    | N/A           | N/A        |
| Rohde & Schwarz | Signal Generator     | SMIQ03   | DE23746       | 2004-07-03 |
| Rohde & Schwarz | Modulation Generator | AMIQ-K11 | DE30565       | 2004-04-06 |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

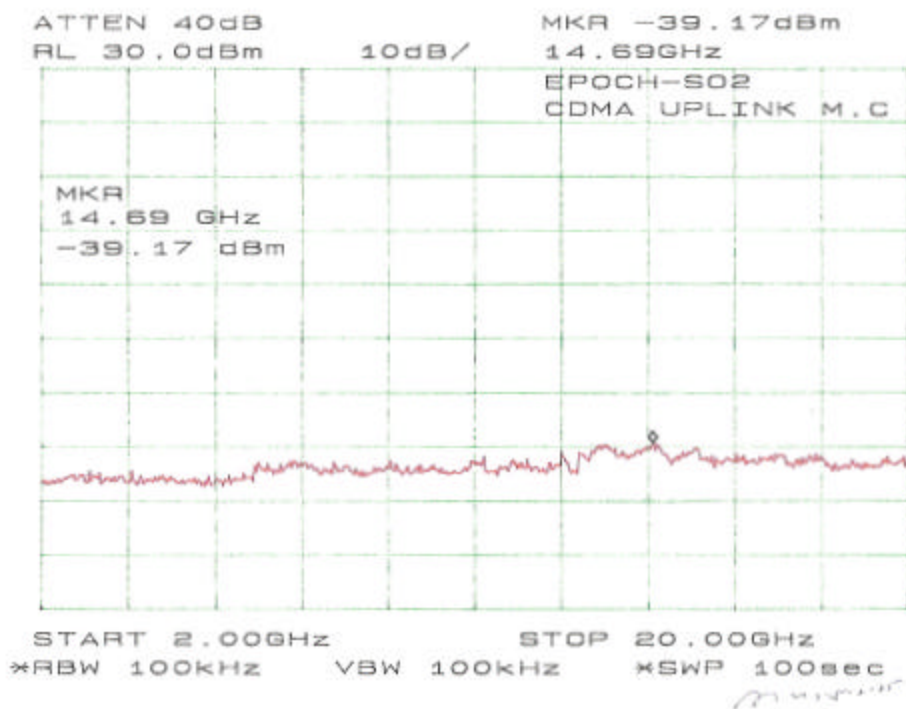
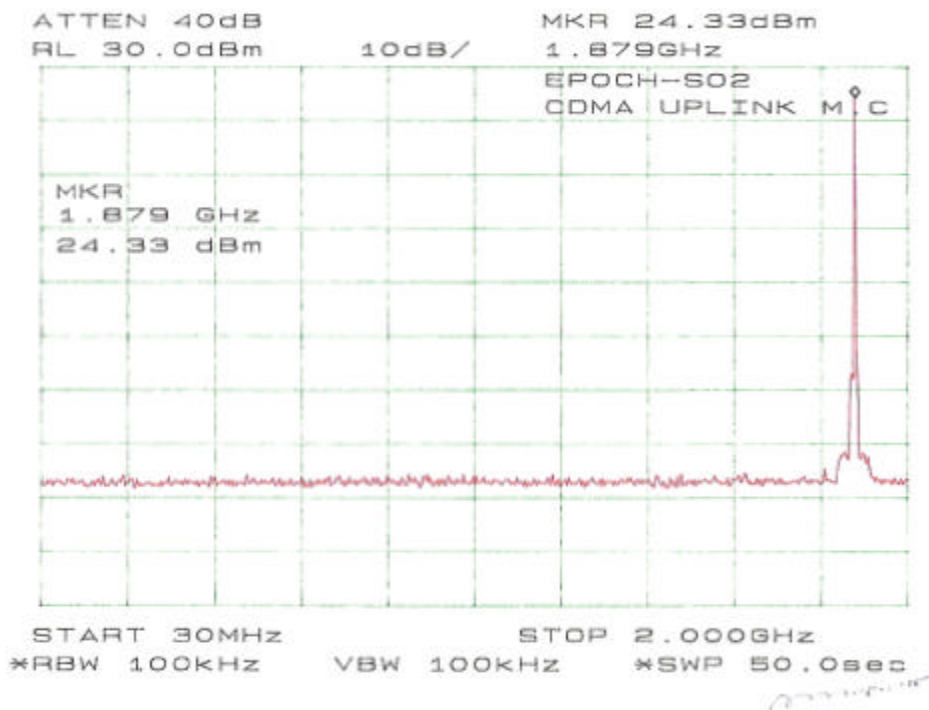
### Environmental Conditions

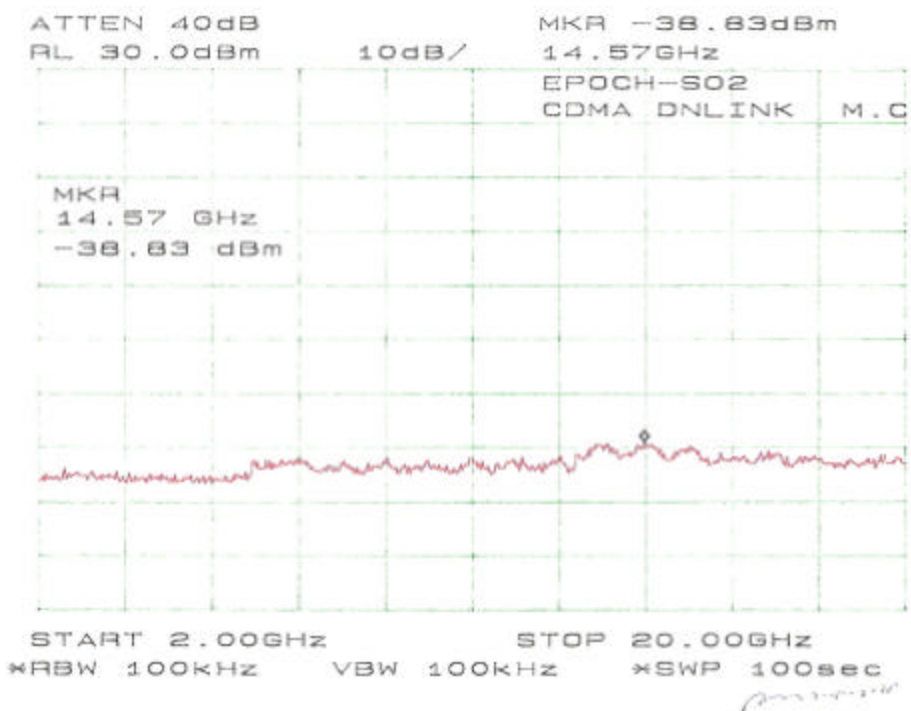
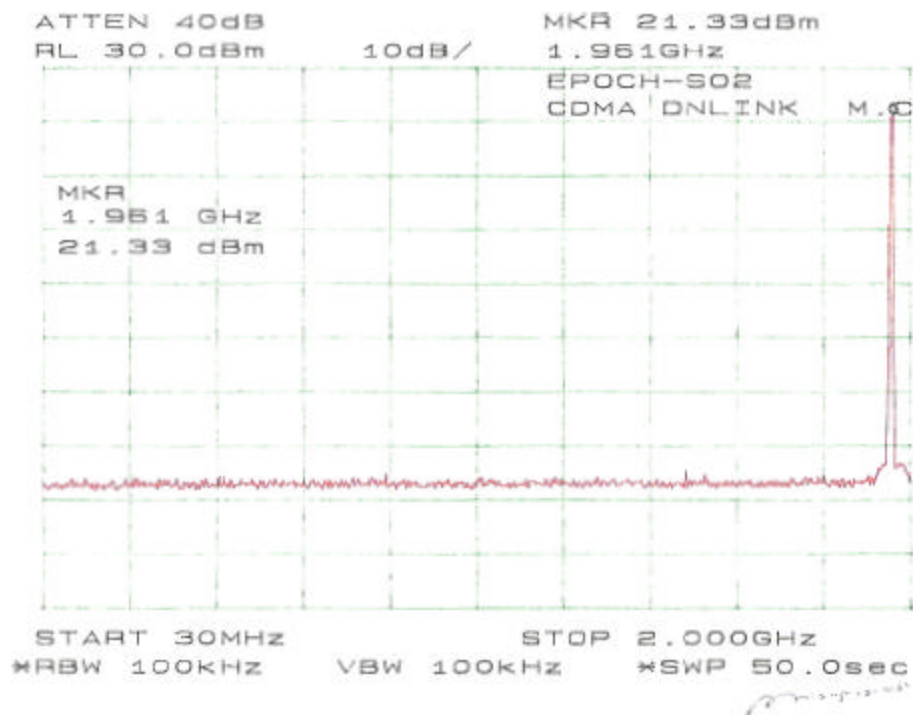
|                    |          |
|--------------------|----------|
| Temperature:       | 21° C    |
| Relative Humidity: | 37%      |
| ATM Pressure:      | 1032mbar |

\* *The testing was performed by Ming Jin on 2005-02-25.*

### Test Results

Please refer to the hereinafter plots.





## IS-138a (3.4.4) TWO-TONE TEST

### Applicable Standards

According to IS-138A (3.4.4), Intermodulation products must be attenuated below the rated power of the EUT by at least  $43 + 10\log(P)$ , equivalent to  $-13$  dBm.

### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 KHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic. Two input signals are equal in level (and can be raised equally), were send to the EUT.

### Test Equipment List and Details

| Manufacturer    | Description          | Model    | Serial Number | Cal. Date  |
|-----------------|----------------------|----------|---------------|------------|
| HP              | Spectrum Analyzer    | 8565EC   | 3946A00131    | 2004-08-08 |
| HP              | Plotter              | 7470A    | N/A           | N/A        |
| Rohde & Schwarz | Signal Generator     | SMIQ03   | DE23746       | 2004-07-03 |
| Rohde & Schwarz | Modulation Generator | AMIQ-K11 | DE30565       | 2004-04-06 |

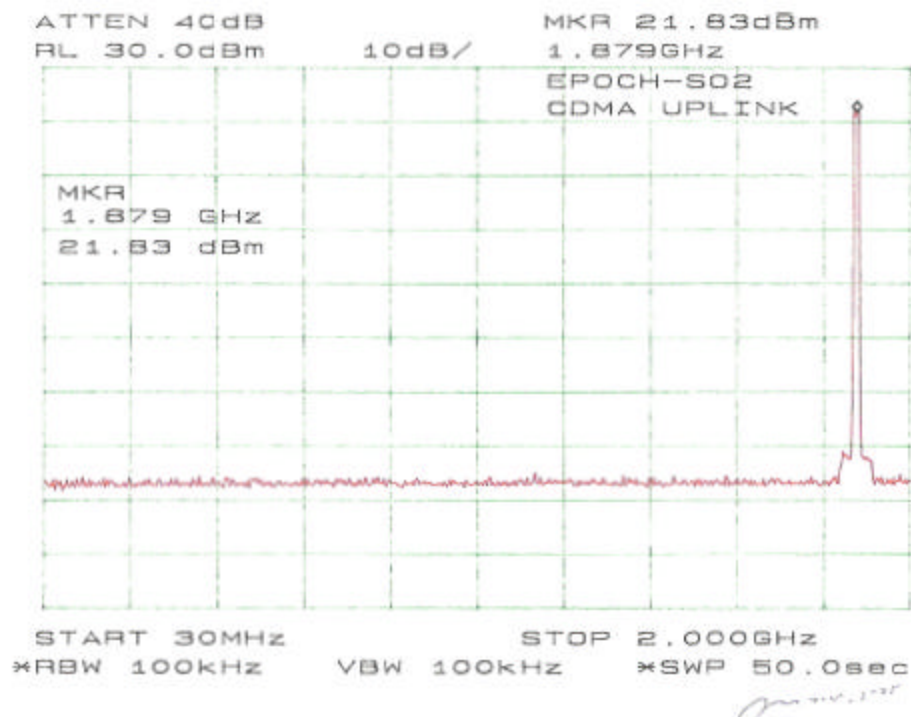
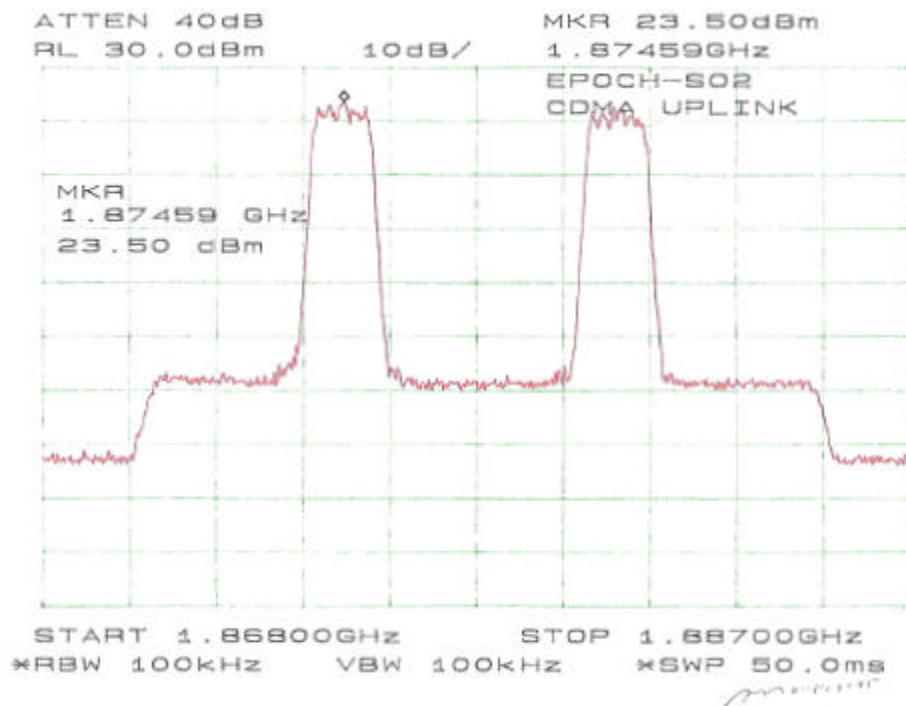
\* The testing was performed by Ming Jin on 2005-02-25.

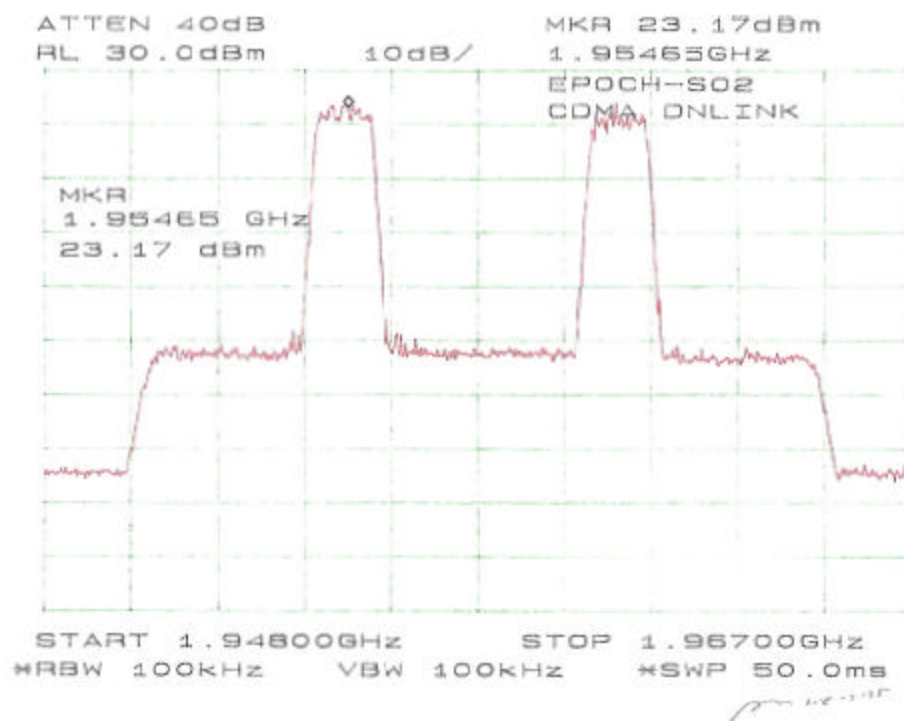
### Test Results

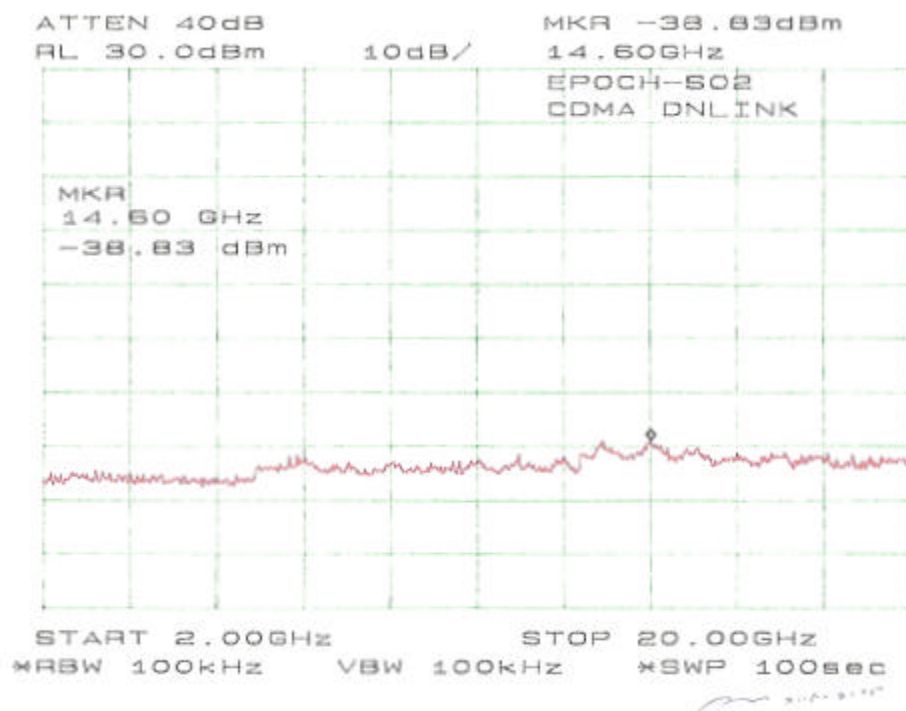
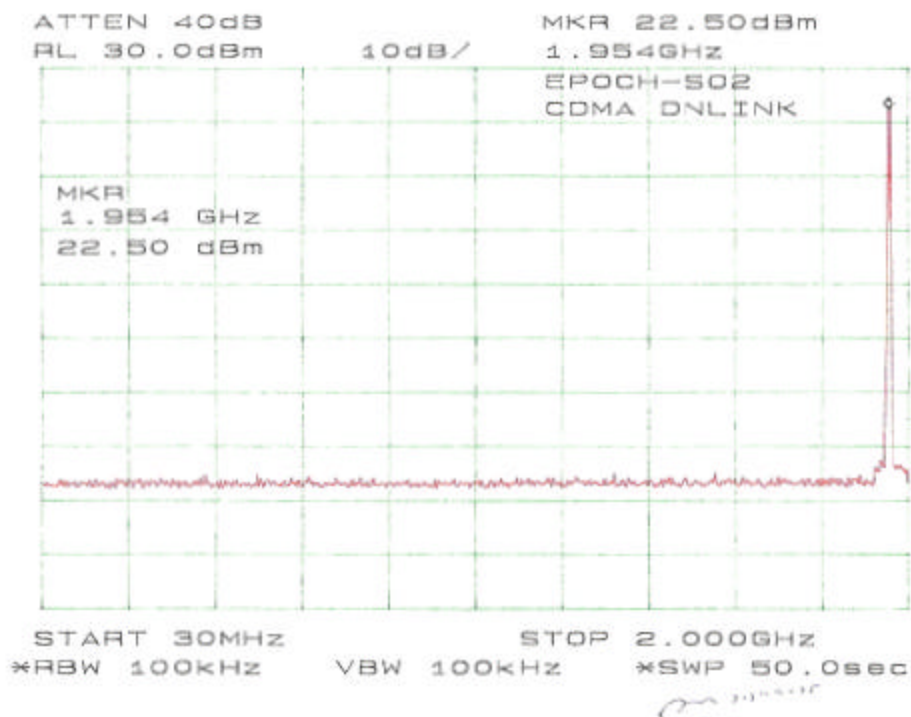
| Modulation | Mode      | Channel | Measured |
|------------|-----------|---------|----------|
| CDMA       | Up-link   | Mid     | < -13dBm |
|            | Down-link | Mid     | < -13dBm |

### Plots of Two -Tone Test Result

Please refer to plots hereinafter.







## §2.1053 - SPURIOUS RADIATED EMISSION

### Applicable Standards

Requirements: CFR 47, § 2.1053, and § 24.238 (a).

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg(\text{TXpwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \log_{10}(\text{power out in Watts})$

### Test Equipment List and Details

| Manufacturer | Description          | Model       | Serial Number | Cal. Date  |
|--------------|----------------------|-------------|---------------|------------|
| HP           | Spectrum Analyzer    | 8568B       | 2601A02165    | 2004-07-03 |
| HP           | Amplifier            | 8447E       | 2944A10187    | 2004-09-23 |
| HP           | Quasi-Peak Adapter   | 85650A      | 3019A05393    | 2004-06-13 |
| EMCO         | Biconical Antenna    | 3110B       | 9309-1165     | 2004-10-11 |
| EMCO         | Log Periodic Antenna | 3146        | 2101          | 2004-10-11 |
| AH System    | Horn Antenna         | SAS-200/511 | 261           | 2004-08-02 |
| HP           | Spectrum Analyzer    | HP8564E     | 3943A01781    | 2004-08-01 |

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 21° C    |
| Relative Humidity: | 37%      |
| ATM Pressure:      | 1032mbar |

\* The testing was performed by Ming Jin on 2005-02-25.

**Test Result**

CDMA Up-link: -11.5 dB at 3760MHz

CDMA Down-link: -27.2 dB at 3920MHz

GSM Up-link: -10.9 dB at 3760MHz

GSM Down-link: -12.5 dB at 3920MHz

TDMA Up-link: -12.2 dB at 3759.96MHz

TDMA Down-link: -13.2 dB at 3919.96MHz

CDMA Uplink, Primary Scan Primary Scan 1GHz-20GHz (Fundamental 1880 MHz)

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3760             | 36.4            | 45              | 1.6             | v            | 3760             | -32.7        | 10.3              | 2.1        | -24.5        | -13          | -11.5        |
| 3760             | 35.2            | 90              | 1.8             | h            | 3760             | -33.9        | 10.3              | 2.1        | -25.7        | -13          | -12.7        |
| 5640             | 34.5            | 0               | 1.5             | v            | 5640             | -34.6        | 10.6              | 2.5        | -26.5        | -13          | -13.5        |
| 5640             | 33.6            | 180             | 1.5             | h            | 5640             | -35.8        | 10.6              | 2.5        | -27.7        | -13          | -14.7        |

CDMA Downlink, Primary Scan Primary Scan 1GHz-20GHz (Fundamental 1960 MHz)

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3920             | 34.1            | 90              | 1.5             | v            | 3920             | -34.2        | 10.3              | 2.1        | -26          | -13          | -13.0        |
| 3920             | 33.8            | 160             | 1.6             | h            | 3920             | -34.6        | 10.3              | 2.1        | -26.4        | -13          | -13.4        |
| 5880             | 32.7            | 0               | 2.1             | v            | 5880             | -36.5        | 10.6              | 2.5        | -28.4        | -13          | -15.4        |
| 5880             | 32.2            | 15              | 1.5             | h            | 5880             | -37.2        | 10.6              | 2.5        | -29.1        | -13          | -16.1        |

## GSM Uplink, Primary Scan 30MHz-20GHz

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3760             | 36.9            | 210             | 1.6             | v            | 3760             | -32.1        | 10.3              | 2.1        | -23.9        | -13          | -10.9        |
| 3760             | 35.6            | 280             | 2.2             | h            | 3760             | -33.5        | 10.3              | 2.1        | -25.3        | -13          | -12.3        |
| 5640             | 34.8            | 0               | 1.8             | v            | 5640             | -34.9        | 10.6              | 2.5        | -26.8        | -13          | -13.8        |
| 5640             | 33.9            | 90              | 1.5             | h            | 5640             | -35.4        | 10.6              | 2.5        | -27.3        | -13          | -14.3        |

## GSM Downlink, Primary Scan 30MHz-20GHz

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3920             | 34.5            | 160             | 1.5             | v            | 3920             | -33.7        | 10.3              | 2.1        | -25.5        | -13          | -12.5        |
| 3920             | 34.1            | 320             | 1.8             | h            | 3920             | -34.1        | 10.3              | 2.1        | -25.9        | -13          | -12.9        |
| 5880             | 33.2            | 0               | 2.1             | v            | 5880             | -35.9        | 10.6              | 2.5        | -27.8        | -13          | -14.8        |
| 5880             | 32.7            | 45              | 1.5             | h            | 5880             | -36.6        | 10.6              | 2.5        | -28.5        | -13          | -15.5        |

## TDMA Uplink, Primary Scan 30MHz-20GHz

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3759.96          | 36.1            | 290             | 1.6             | v            | 3759.96          | -33.4        | 10.3              | 2.1        | -25.2        | -13          | -12.2        |
| 3759.96          | 34.9            | 140             | 1.5             | h            | 3759.96          | -34.3        | 10.3              | 2.1        | -26.1        | -13          | -13.1        |
| 5639.94          | 34.2            | 0               | 1.8             | v            | 5639.94          | -35.2        | 10.6              | 2.5        | -27.1        | -13          | -14.1        |
| 5639.94          | 33.1            | 120             | 1.5             | h            | 5639.94          | -36.3        | 10.6              | 2.5        | -28.2        | -13          | -15.2        |

## TDMA Downlink, Primary Scan 30MHz-20GHz

| EUT              |                 |                 |                 |              | Generator        |              |                   |            |              | Standard     |              |
|------------------|-----------------|-----------------|-----------------|--------------|------------------|--------------|-------------------|------------|--------------|--------------|--------------|
| Indicated        |                 | Table           | Test Antenna    |              | Substitution     |              | Antenna           | Cable      | Absolute     | FCC          | FCC          |
| Frequency<br>MHz | Ampl.<br>dBuV/m | Angle<br>Degree | Height<br>Meter | Polar<br>H/V | Frequency<br>MHz | Level<br>dBm | Gain<br>Corrected | Loss<br>dB | Level<br>dBm | Limit<br>dBm | Margin<br>dB |
| 3919.96          | 33.9            | 90              | 1.5             | v            | 3919.96          | -34.4        | 10.3              | 2.1        | -26.2        | -13          | -13.2        |
| 3919.96          | 33.5            | 170             | 1.8             | h            | 3919.96          | -34.9        | 10.3              | 2.1        | -26.7        | -13          | -13.7        |
| 5879.94          | 32.4            | 60              | 2.2             | v            | 5879.94          | -36.8        | 10.6              | 2.5        | -28.7        | -13          | -15.7        |
| 5879.94          | 31.7            | 180             | 1.5             | h            | 5879.94          | -37.6        | 10.6              | 2.5        | -29.5        | -13          | -16.5        |

Note: According to FCC Part 15 at 3 meter distance the emission from an intentional radiator shall not exceed the field strength level 40 dBuV/m within 30-88MHz, 43.5 dBuV/m within 88-216MHz, 46 dBuV/m within 226-960MHz, 54 dBuV/m above 960MHz. The level of any unwanted emissions shall not exceed the level of the fundamental frequency.

The levels of unwanted emission of the EPOCH-S)2-6 repeater were below the above limits. This device was compliant with the FCC Part 15.

## §24.238 – BAND EDGE

### Applicable Standards

According to FCC §2.1049 and §24.238, when measuring the emission limits, carrier frequency shall be adjusted as close to the frequency block edges, both upper and lower.

### Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Adjust the carrier frequency as close to the frequency block edges both upper and lower. Sufficient scans were taken to show any out of band-edge emission.

### Test Equipment List and Details

| Manufacturer | Description       | Model   | Serial Number | Cal. Date    |
|--------------|-------------------|---------|---------------|--------------|
| HP           | Spectrum Analyzer | 8564E   | 3943A01781    | 2004-10-04   |
| HP           | Plotter           | HP7470A | 2541A49659    | Not Required |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

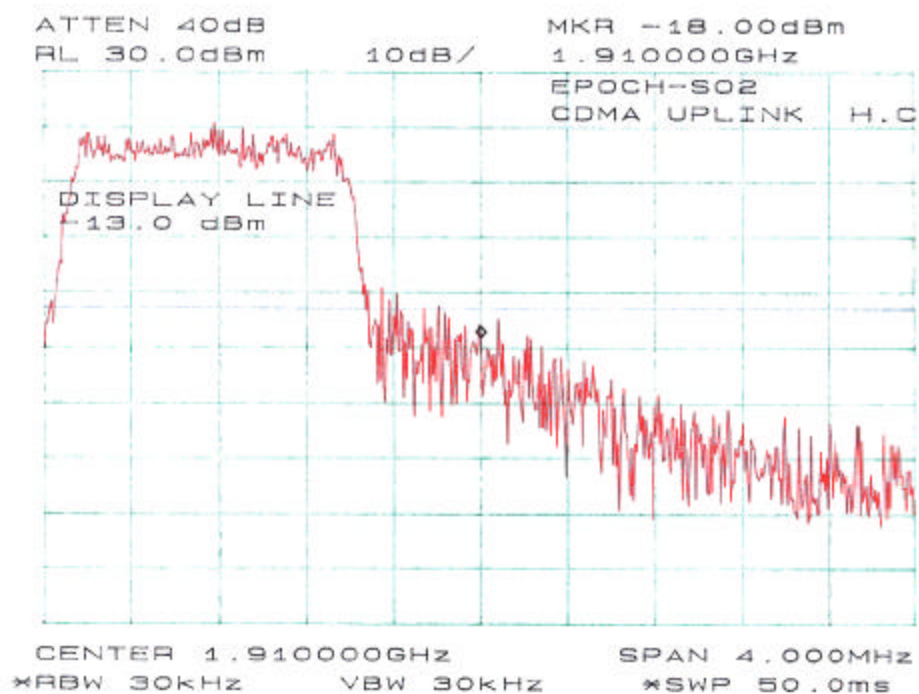
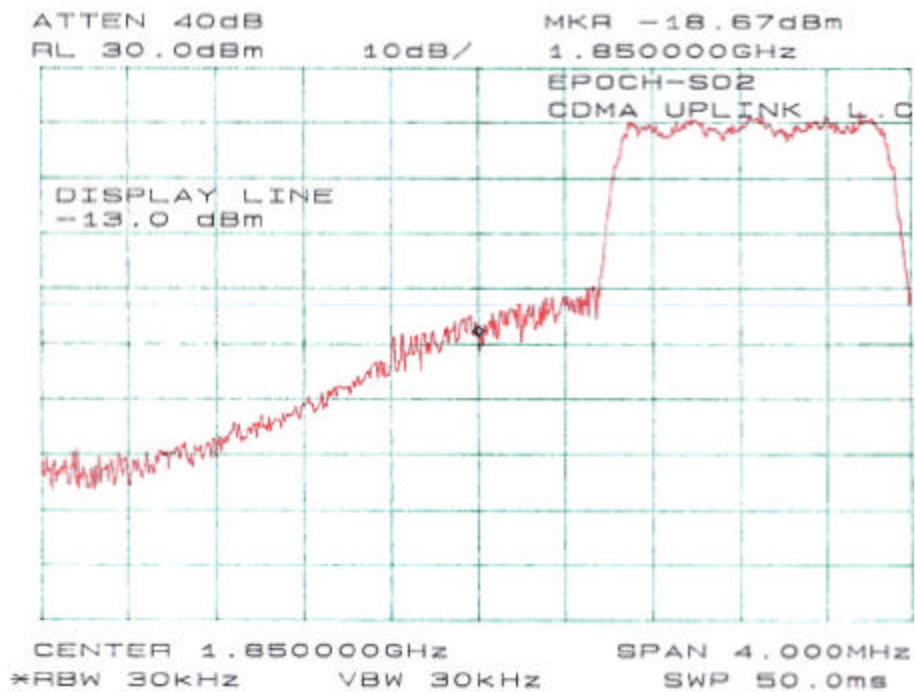
### Environmental Conditions

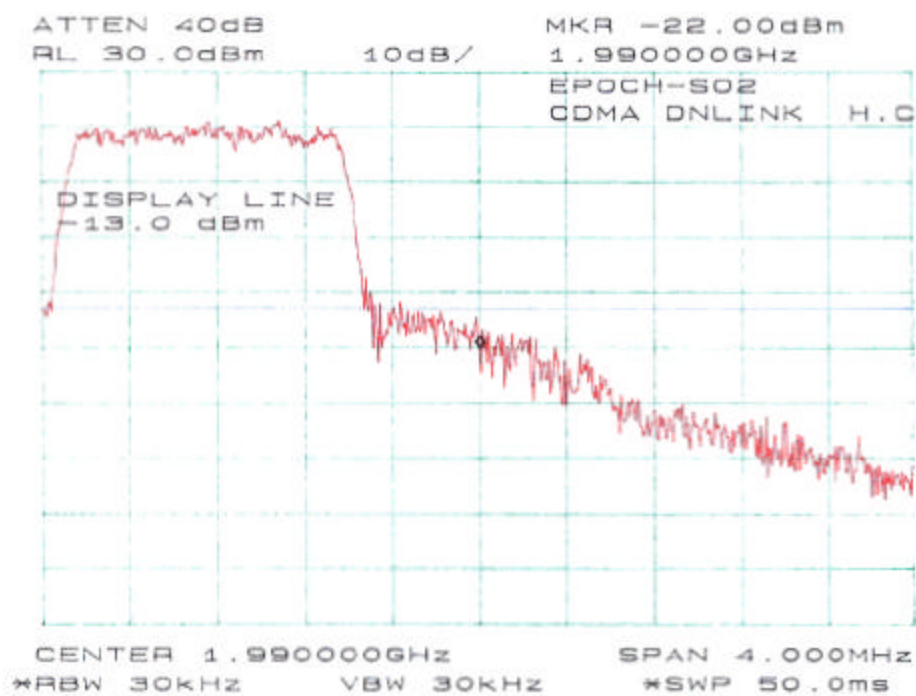
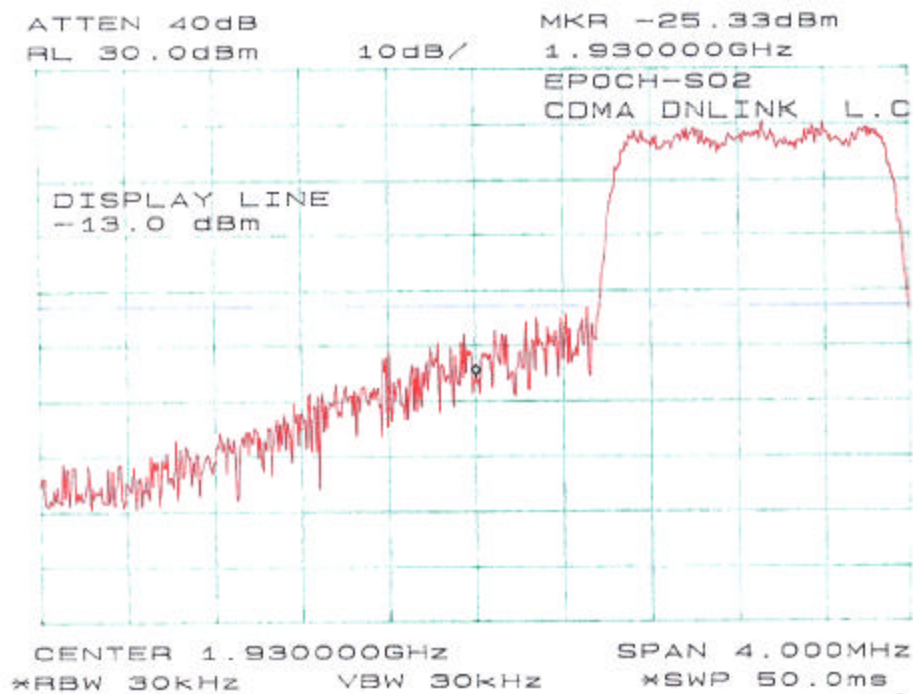
|                    |           |
|--------------------|-----------|
| Temperature:       | 21° C     |
| Relative Humidity: | 37%       |
| ATM Pressure:      | 1032 mbar |

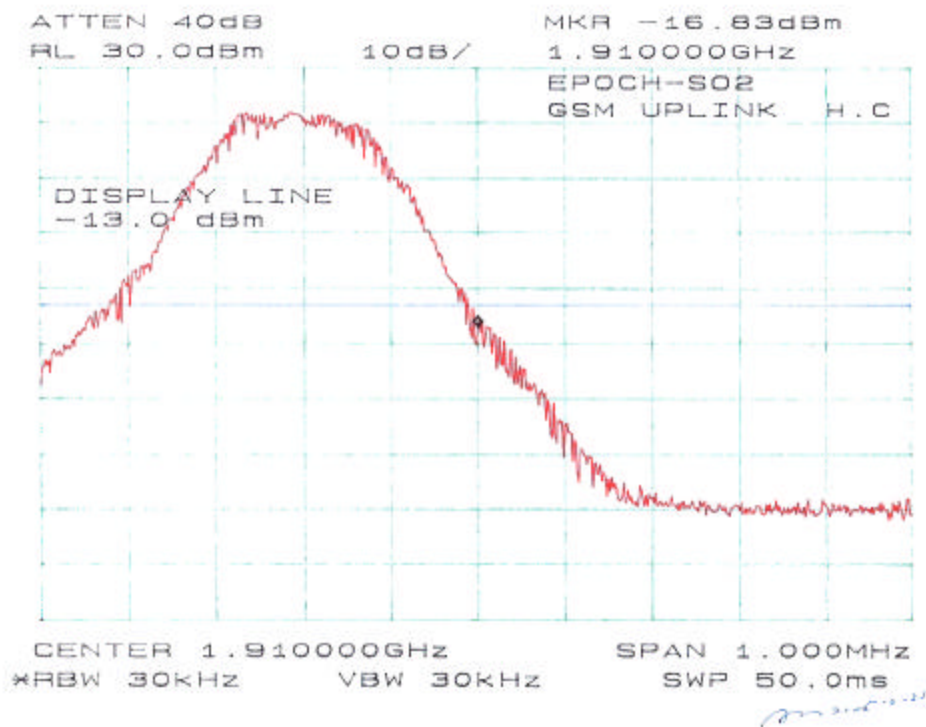
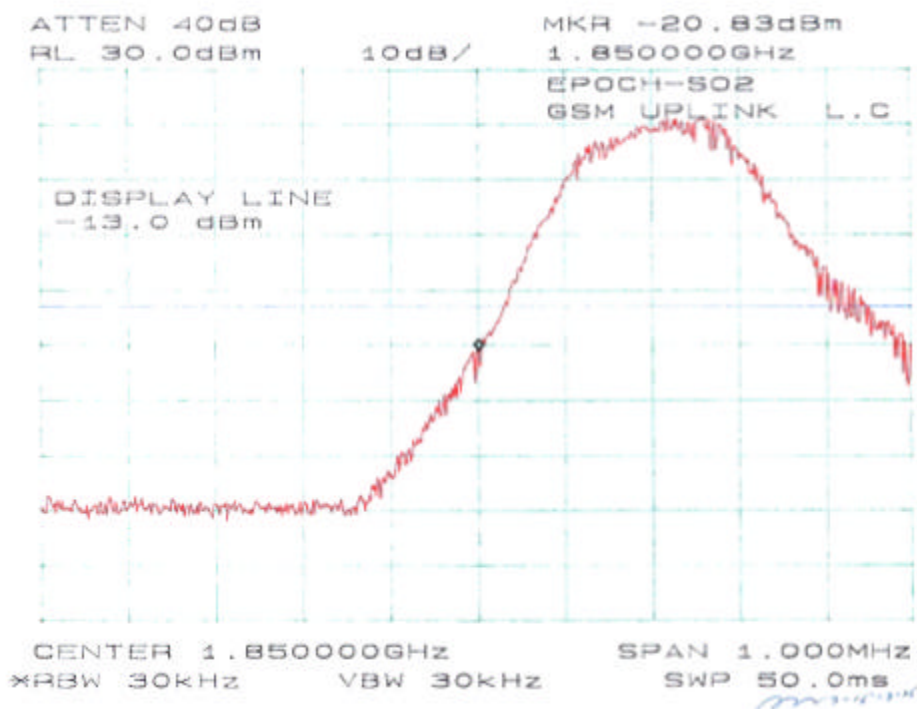
\* *The testing was performed by Ming Jin on 2005-02-25.*

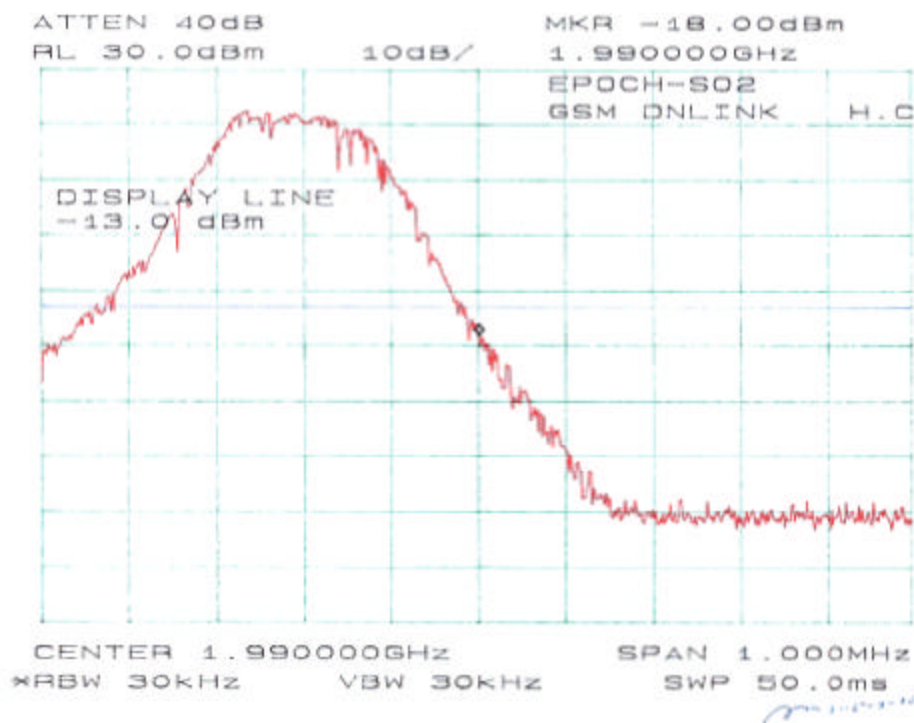
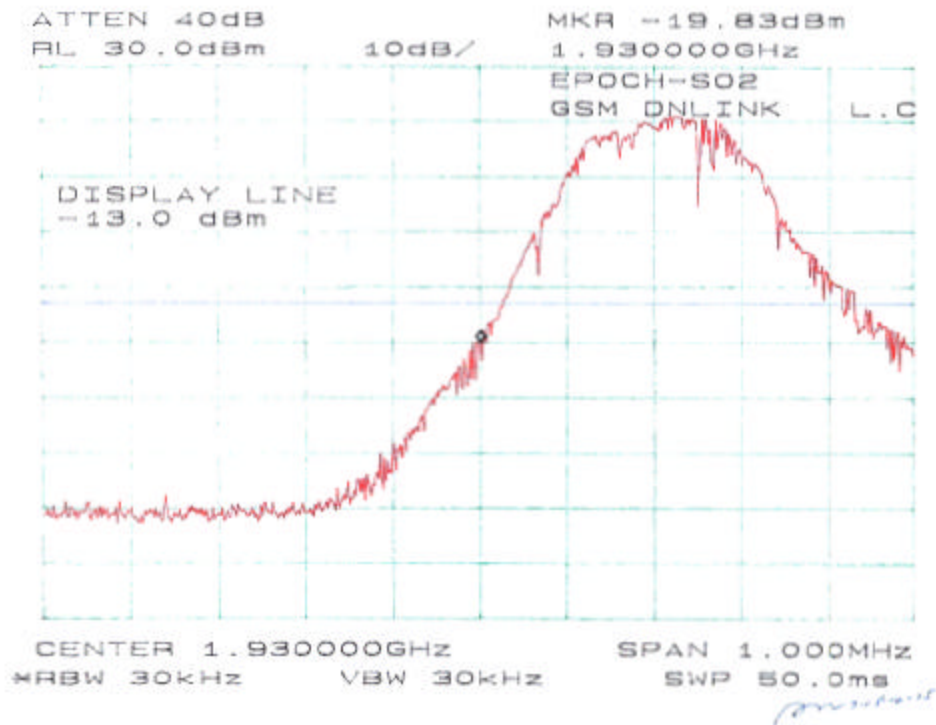
### Test Results

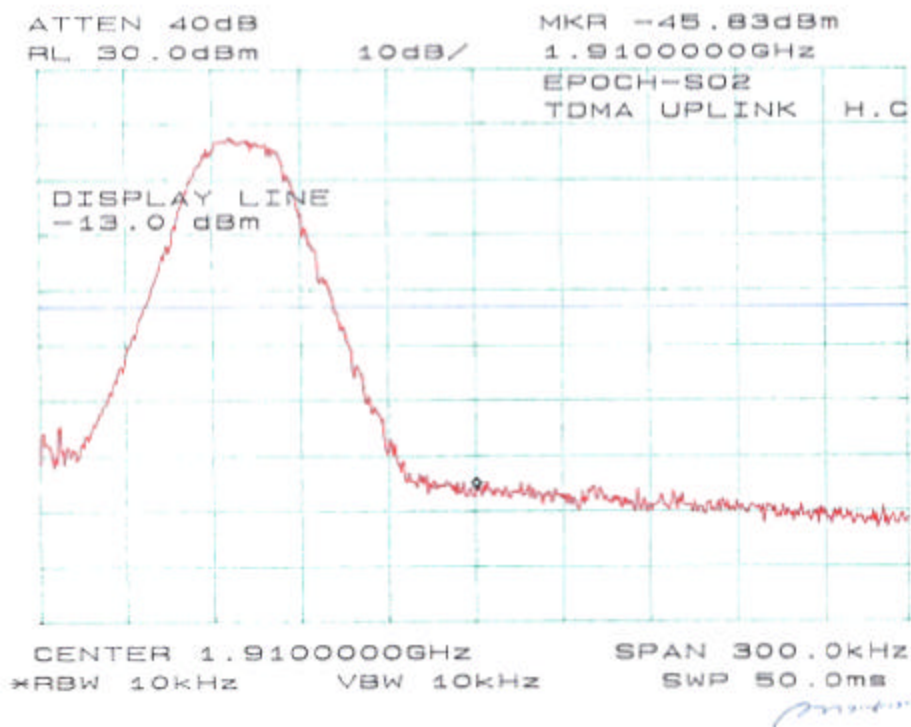
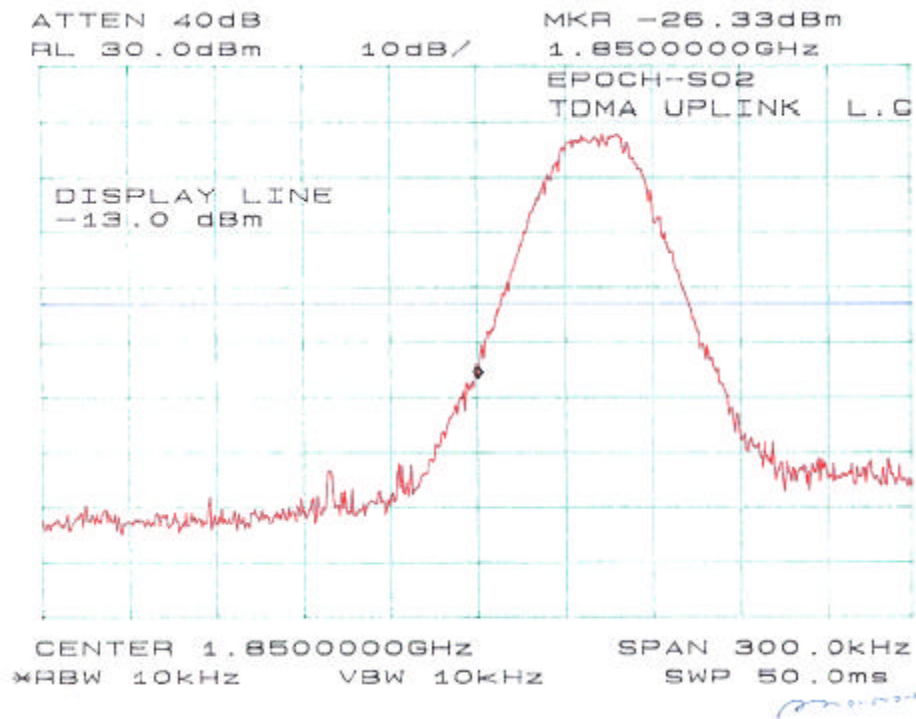
Please refer to plots hereinafter.

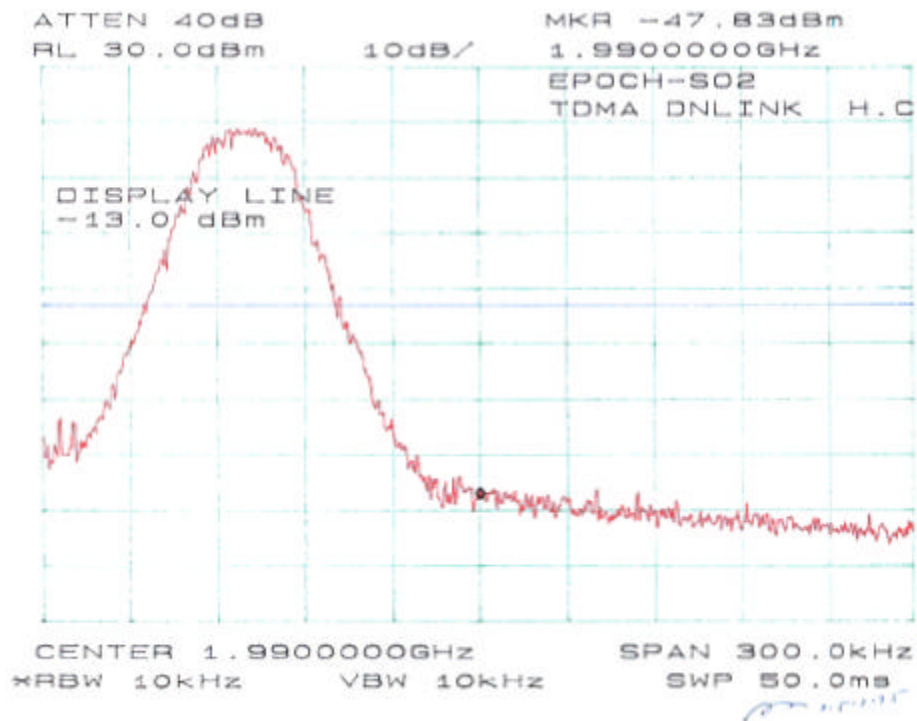
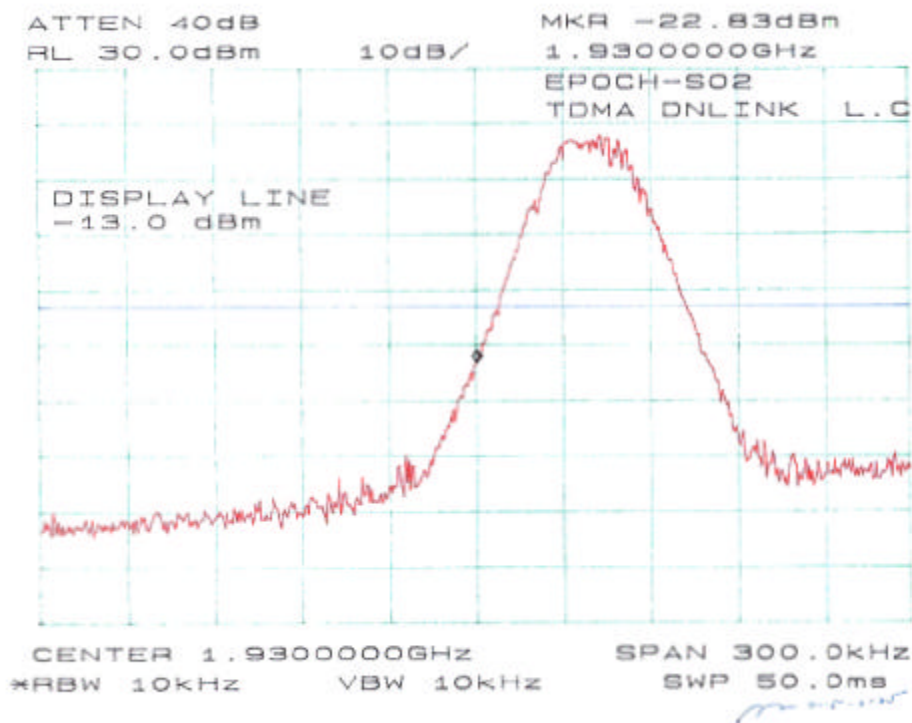












## **§2.1047 – Modulation Characteristics**

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This EUT only is a PCS 1900 Repeater, it is not a transmitter. There is no modulating circuit in the EUT and no modulating characteristics measurement required.

## §2.1055(a0, §2.1055(d) & §24.235 - FREQUENCY STABILITY

### Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) and § 24.235

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

### 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 frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The power leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

### Test Equipment List and Details

| Manufacturer | Description         | Model   | Serial Number | Cal. Date  |
|--------------|---------------------|---------|---------------|------------|
| HP           | Frequency Counter   | 5342A   | 2232A06380    | 2004-09-07 |
| Blue M       | Temperature Chamber | FR-251E | AA-814        | N/A        |
| SANKE        | Power Supply        | TDGC2J  | N/A           | N/A        |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 21° C     |
| Relative Humidity: | 37%       |
| ATM Pressure:      | 1032 mbar |

\* *The testing was performed by Ming Jin on 2005-02-25.*

**Test Results***Frequency Stability Versus Temperature*

| Environment Temperature<br>(°C) | Power Supplied<br>(Vac) | Reference Frequency: CDMA 1880 MHz,<br>Frequency Measure with Time Elapsed |           |
|---------------------------------|-------------------------|----------------------------------------------------------------------------|-----------|
|                                 |                         | MCF (MHz)                                                                  | PPM Error |
| 50                              | 110                     | 1879.9998                                                                  | -0.09     |
| 40                              | 110                     | 1879.9999                                                                  | -0.05     |
| 30                              | 110                     | 1879.9999                                                                  | -0.05     |
| 20                              | 110                     | 1880.0001                                                                  | 0.05      |
| 10                              | 110                     | 1880.0001                                                                  | 0.05      |
| 0                               | 110                     | 1880.0001                                                                  | 0.05      |
| -10                             | 110                     | 1880.0002                                                                  | 0.09      |
| -20                             | 110                     | 1880.0002                                                                  | 0.09      |
| -30                             | 110                     | 1880.0002                                                                  | 0.09      |

*Frequency Stability Versus Input Voltage*

| Power Supplied<br>(Vac) | Reference Frequency: CDMA1880 MHz,<br>Frequency Measure with Time Elapsed |      |
|-------------------------|---------------------------------------------------------------------------|------|
|                         | MHz                                                                       | PPM  |
| 126.5                   | 1880.0001                                                                 | 0.05 |
| 93.5                    | 1880.0001                                                                 | 0.05 |

Conclusion: The EUT complied with the applicable Frequency Stability Limits.