

Test Report Prepared By:

Electronics Test Centre  
27 East Lake Hill  
Airdrie, Alberta  
Canada  
T4A 2K3

airdrie@etc-mpbtech.com  
<http://www.etc-mpb.com/>  
Telephone: (403) 912-0037  
Facsimile: (403) 912-0083

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**Emissions Testing of the BBX in accordance with FCC Part 90 (2003)**  
**Private Land Mobile Radio Services**

Test Personnel: Trung Nguyen, Jianming Zhang, David Raynes

Prepared for: Mentor Engineering Inc.

2891 Sunridge Way N.E.  
Suite 230  
Calgary, Alberta  
Canada  
T1Y 7K7

Telephone: 1-403-777-3760  
Facsimile: 1-403-777-3769

  
David Raynes  
draynes@etc-mpbtech.com  
Senior EMC Technologist  
Electronics Test Centre (Airdrie)  
Authorized Signatory

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APPENDIX A: Test Sample Description: BBX

## **1.0 INTRODUCTION**

### **1.1 SCOPE**

The purpose of this report is to present the findings and results of compliance testing performed in accordance with CFR Title 47 FCC Part 90 (2003), Private Land Mobile Radio Services.

### **1.2 APPLICANT**

This test report has been prepared for Mentor Engineering Inc., located in Calgary, Alberta, Canada.

### **1.3 APPLICABILITY**

All test procedures, limits, and results defined in this document apply to the Mentor Engineering Inc. BBX unit, referred to herein as the Equipment Under Test (EUT).

The results contained in this report relate only to the item tested.

This report does not imply product endorsement by NVLAP or the Canadian or US governments.

### **1.4 TEST SAMPLE DESCRIPTION**

The test sample provided for testing was a BBX:

|                |                    |
|----------------|--------------------|
| Product Type:  | mobile dispatch    |
| Model Number:  | BBX                |
| Serial Number: | n/a                |
| Power          | 12 VDC             |
| Requirements:  |                    |
| Peripheral     | roof-mount antenna |
| Equipment:     |                    |

More detailed information is provided by Mentor Engineering Inc. in Appendix A.

### **1.5 GENERAL TEST CONDITIONS AND ASSUMPTIONS**

The EUT was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated.

Where relevant, the EUT was only tested using the monitoring methods and test criteria defined in this report.

Environmental conditions are recorded for each test.

## 1.6 SCOPE OF TESTING

Testing was performed in accordance with FCC Part 90 (2003), and ANSI C63.4 (2003).

### 1.6.1 VARIATIONS IN TEST METHODS

There were no variations from the test procedures outlined above.

### 1.6.2 TEST SAMPLE CONFIGURATION & MODIFICATIONS

The EUT met the requirements without modification.

## **2.0 ACRONYMS**

|     |                         |
|-----|-------------------------|
| AP  | -Average Peak           |
| CE  | -Conducted Emissions    |
| E   | -Field - Electric Field |
| H   | -Field - Magnetic Field |
| N/T | -Not Tested             |
| N/A | -Not Applicable         |
| PK  | -Peak                   |
| QP  | -Quasi Peak             |
| RE  | -Radiated Emissions     |

## **3.0 MEASUREMENT UNCERTAINTY**

For Radiated E-Field Emissions and Conducted Emissions, the uncertainties in the measurements were calculated using the methods outlined in the NAMAS document, NIS81: May 1984.

|                |                 |
|----------------|-----------------|
| Frequency      | = $\pm 1$ kHz   |
| Amplitude (RE) | = $\pm 4.01$ dB |
| Amplitude (CE) | = $\pm 3.25$ dB |

## **4.0 TEST CONCLUSION**

### **STATEMENT OF COMPLIANCE**

The client equipment referred to in this report was found to comply with the requirements as stated below.

The EUT was subjected to the following tests. Compliance status is reported as a **PASS** or **FAIL**. Test conditions that are not applicable to the EUT are marked **n/a**. If testing was not performed at this time, the appropriate field is marked **n/t**.

The following table summarizes the test results in terms of the specification and class or level applied, the unique test sample identification, the EUT modification state, and configuration as applicable.

| TEST CASE | TEST TYPE                           | SPECIFICATION                           | TEST SAMPLE | MOD. STATE | CONFIGURATION | RESULT      |
|-----------|-------------------------------------|---|-------------|------------|---------------|-------------|
| §4.1      | Conducted Emissions at AC lines     | FCC Part 15.107 and 15.207              | BBX         | nil        | See § 1.6.2   | <b>n/a</b>  |
| §4.2      | Conducted Emissions at Antenna Port | FCC Part 90                             | BBX         | nil        | See § 1.6.2   | <b>PASS</b> |
| §4.3a     | Radiated Emissions (Rx Mode)        | FCC Part 15.109                         | BBX         | nil        | See § 1.6.2   | <b>PASS</b> |
| §4.3b     | Radiated Emissions (Tx Mode)        | FCC Parts 2.1053, 15.205, 15.209 and 90 | BBX         | nil        | See § 1.6.2   | <b>PASS</b> |
| §4.4      | Frequency Stability                 | FCC Part 2.1055                         | BBX         | nil        | See § 1.6.2   | <b>n/a</b>  |

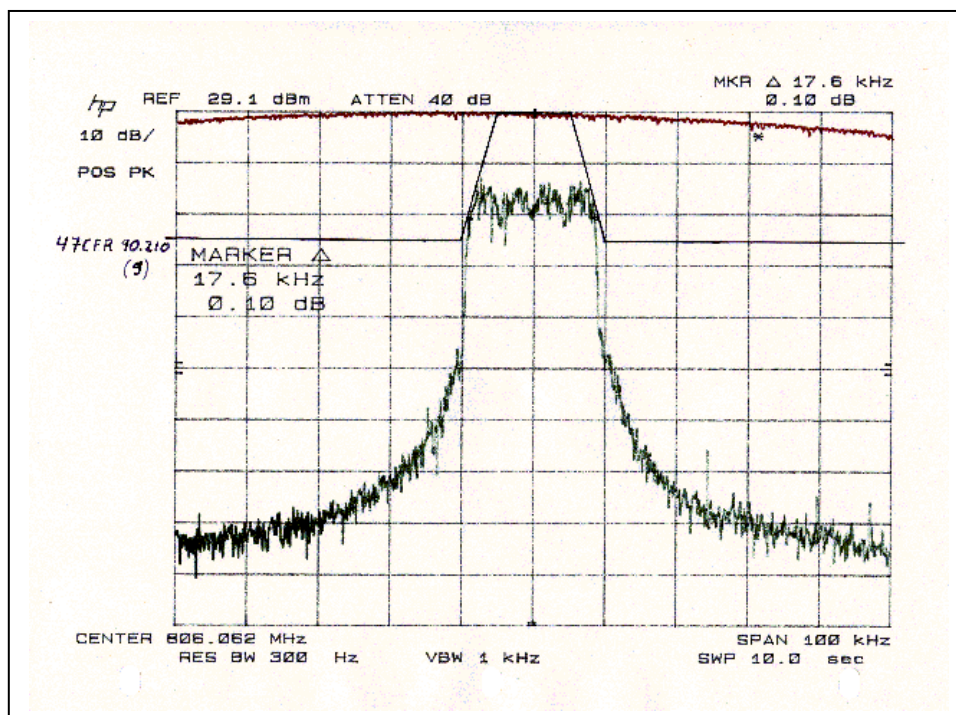
#### 4.1 CONDUCTED EMISSIONS ON AC POWER LINES

|   |                 |
|---|-----------------|
| Test Lab: Electronics Test Centre (Airdrie)<br>Test Personnel:<br>Test Date: n/a  | Product:<br>BBX |
| Test Result, BBX: <b>Not Applicable</b>   |                 |
| The BBX was not tested for Conducted Emissions. This is a DC powered device.<br>The power source is provided by the end user, not Mentor Engineering Inc.<br>There is no direct connection to the AC mains. |                 |

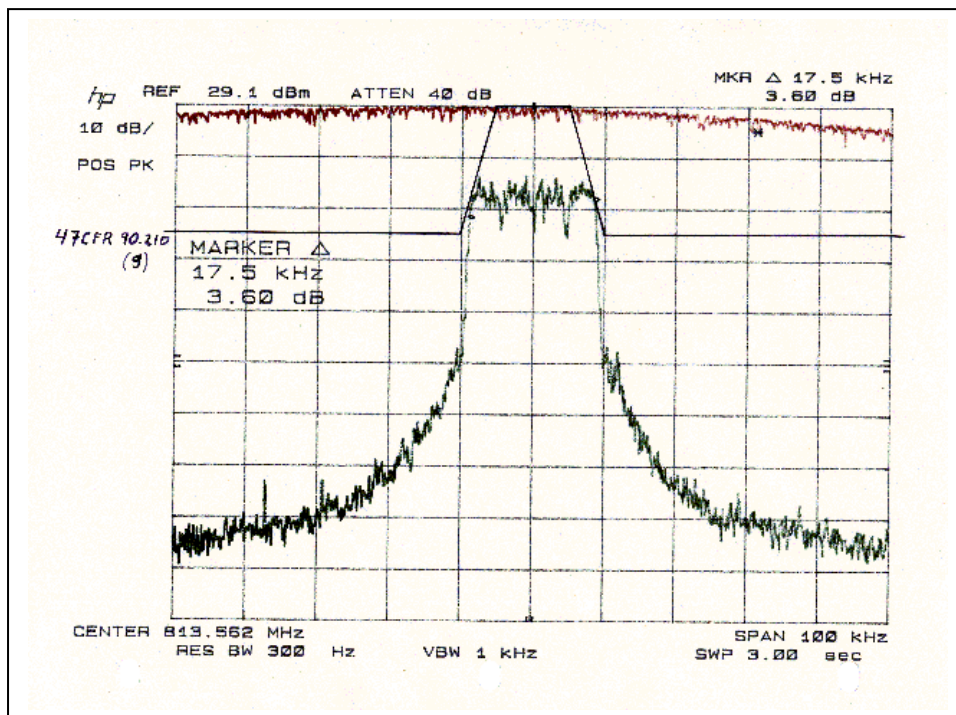
#### 4.2 CONDUCTED EMISSIONS MEASURED AT ANTENNA PORT

|  |                     |                        |                         |              |               |
|--|---------------------|------------------------|-------------------------|--------------|---------------|
| Test Lab: Electronics Test Centre (Airdrie)<br>Test Personnel: David Raynes<br>Test Date: 16 November 2004   |                     |                        | Product:<br>BBX         |              |               |
| Test Result, BBX: <b>PASS</b>  |                     |                        |                         |              |               |
| 90.209: BW $\leq$ 20 kHz   |                     |                        | 90.210 Emission mask G  |              |               |
| Carrier Frequency [MHz]  | 99% Bandwidth [kHz] | Delta from limit [kHz] | Carrier Frequency [MHz] | Low RF Power | High RF power |
| 806  | 17.6                | -2.4                   | 806                     | n/a          | <b>PASS</b>   |
| 813  | 17.5                | -2.5                   | 813                     | n/a          | <b>PASS</b>   |
| 821  | 17.6                | -2.4                   | 821                     | n/a          | <b>PASS</b>   |
| Measurements were performed while the BBX was transmitting continuous pulses.<br>The RF output power is not user-adjustable. Testing was only conducted at the default power level. The RF section is an OEM module, pre-approved under FCC ID # AZ492FT5826.<br>Refer to the test data and plots for more detail. |                     |                        |                         |              |               |

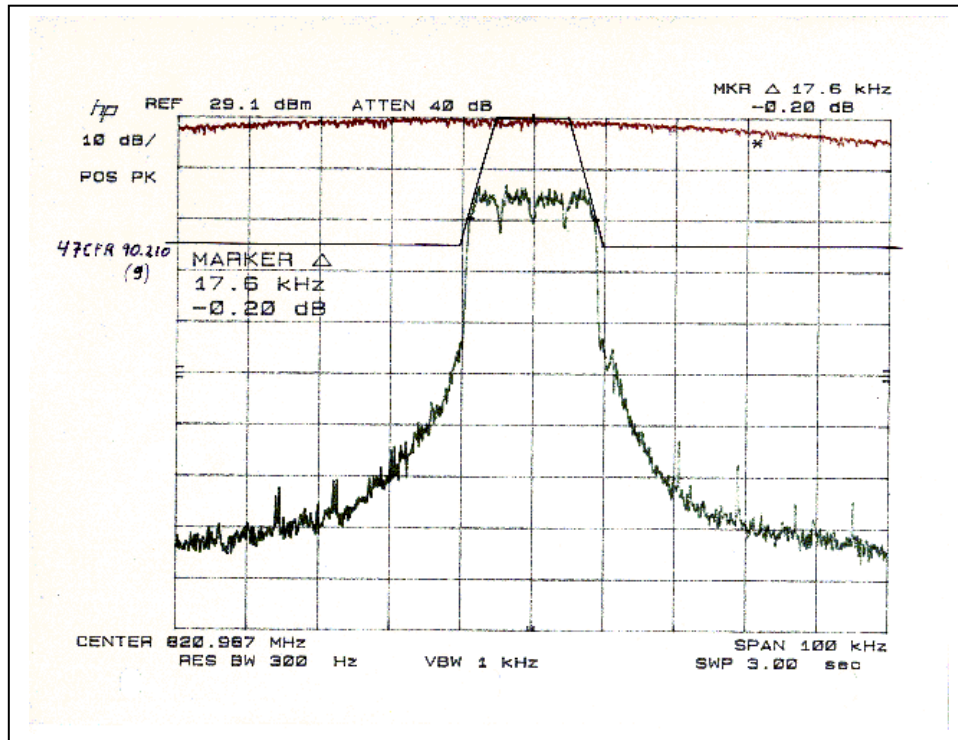
Spectrum Analyzer Plot: Emission Mask G: Tx @ 806 MHz



Spectrum Analyzer Plot: Emission Mask G: Tx @ 813 MHz

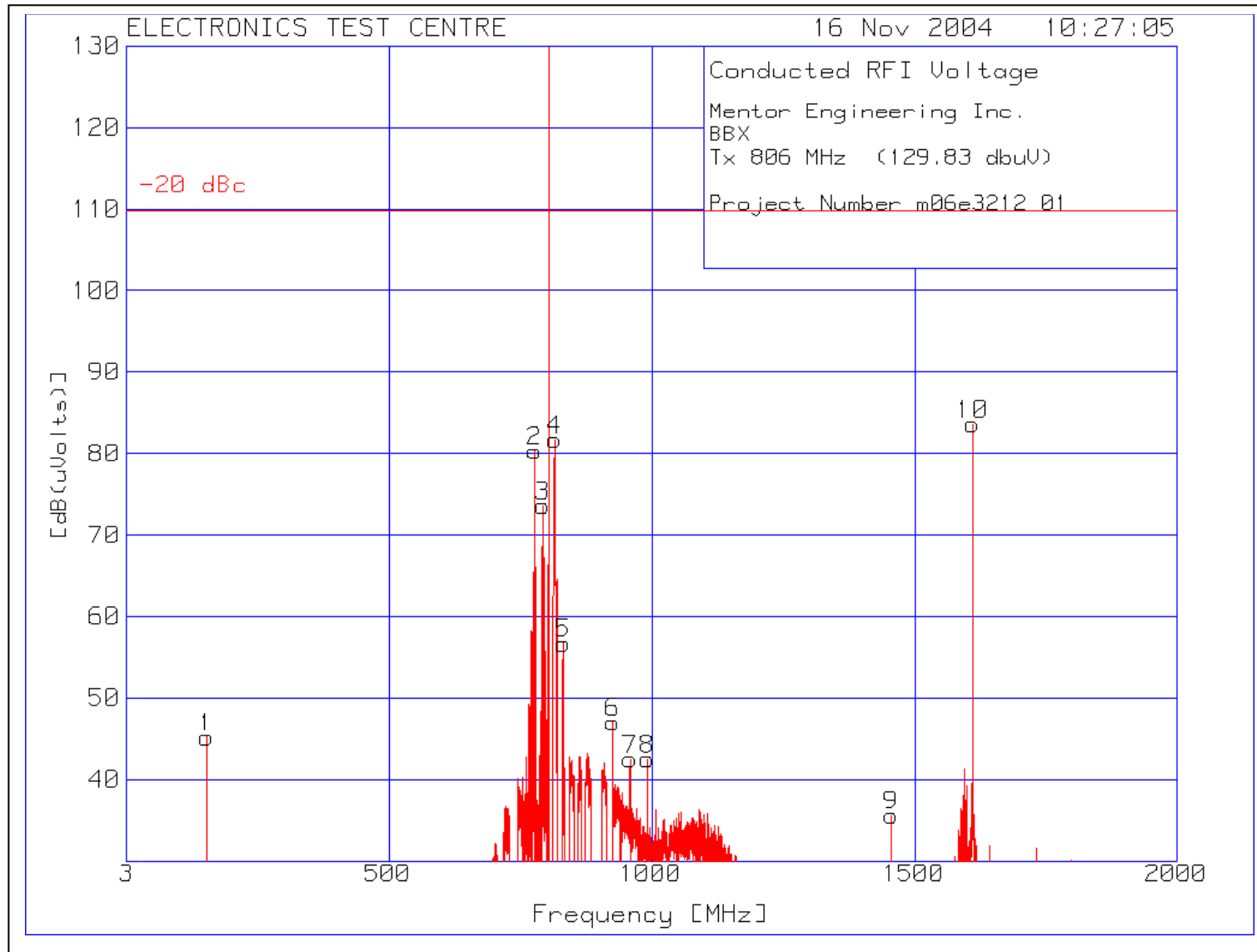


Spectrum Analyzer Plot: Emission Mask G: Tx @ 821 MHz

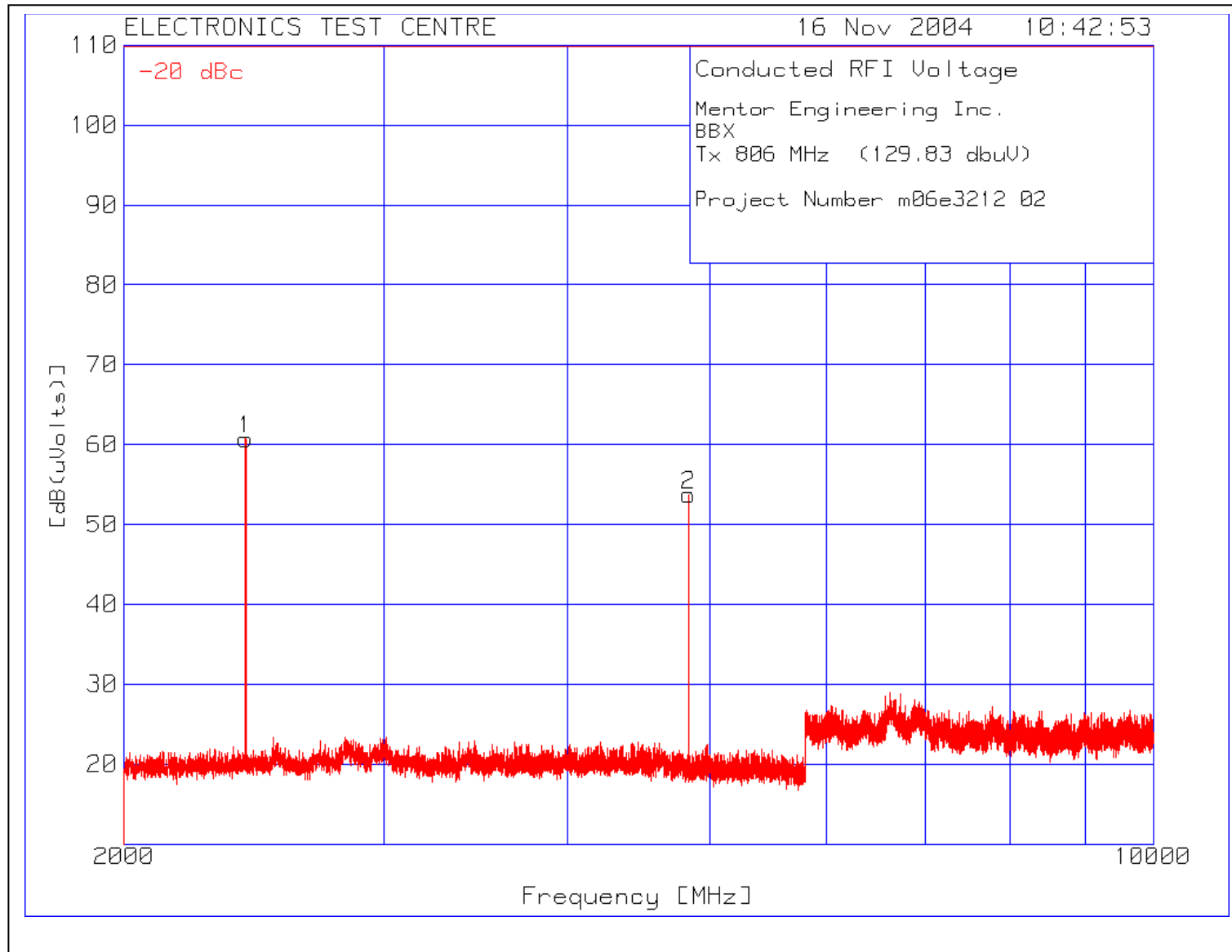




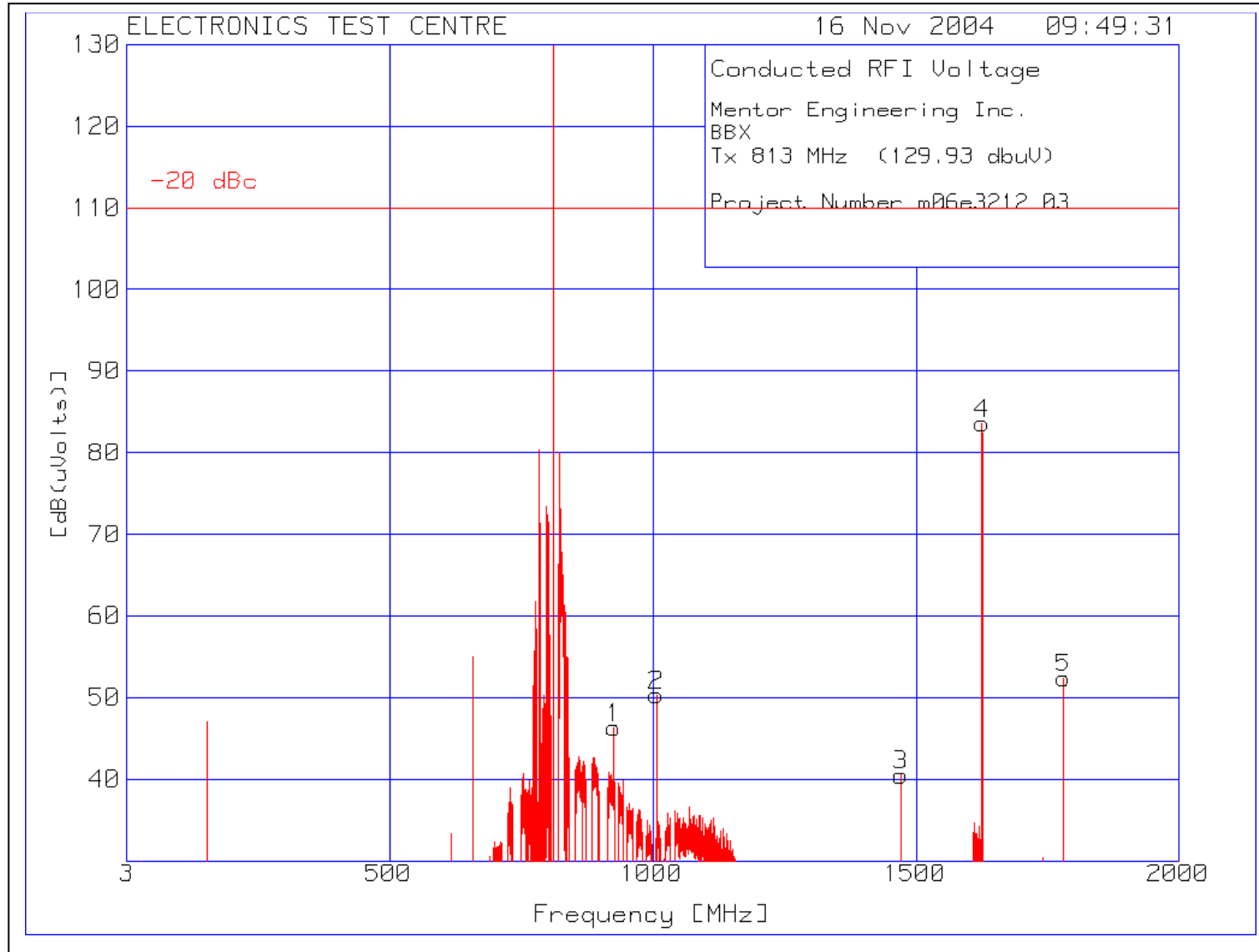
Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



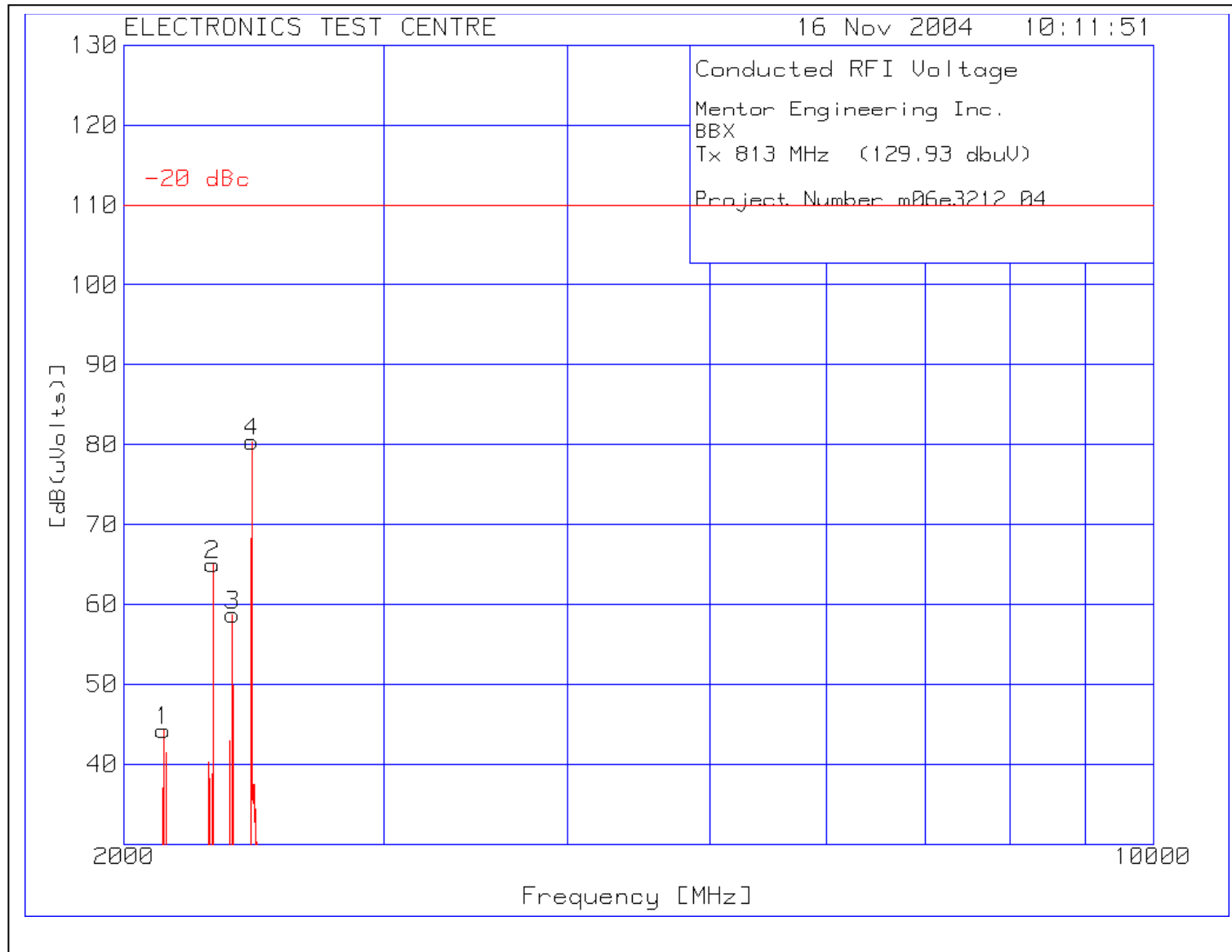
Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



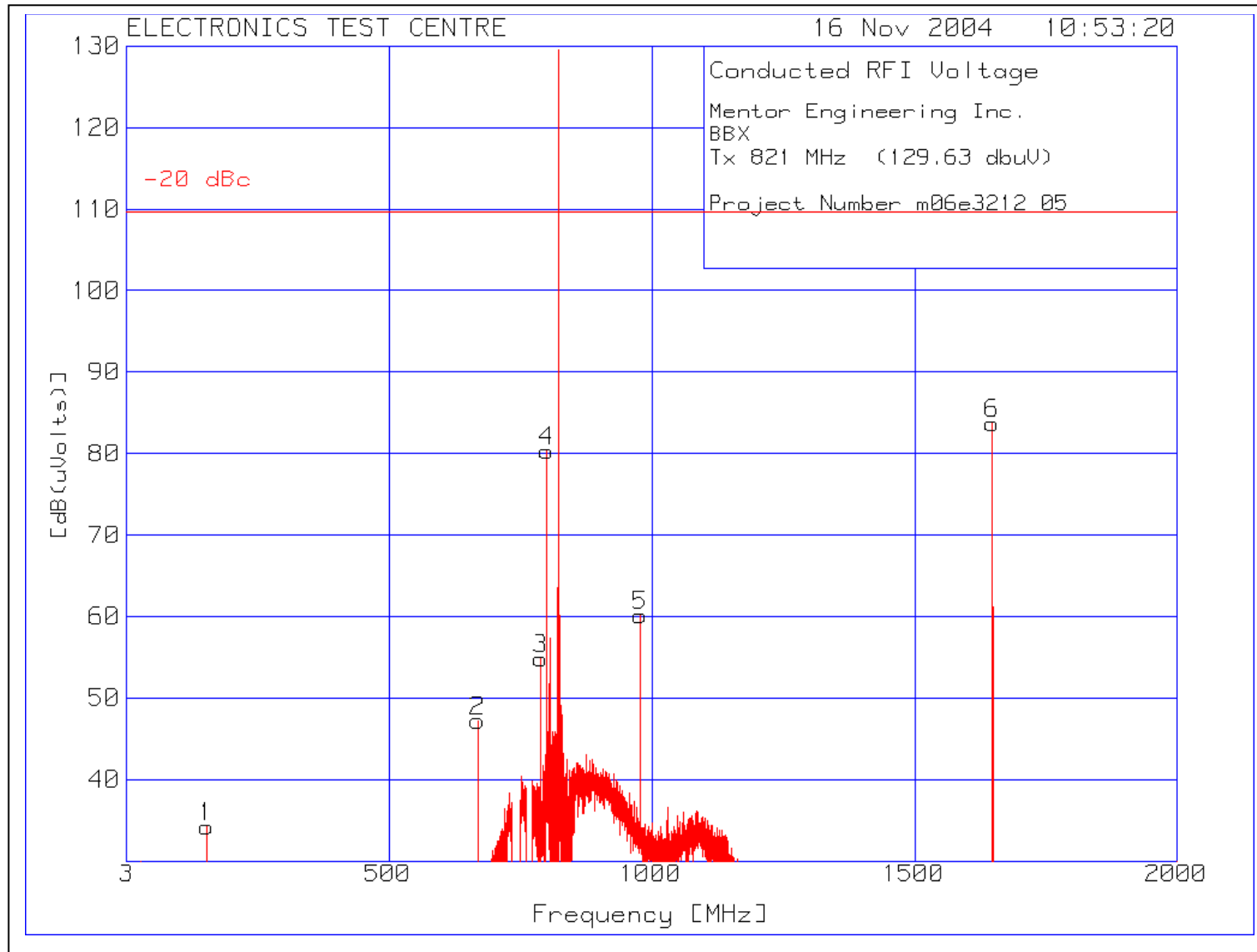
Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



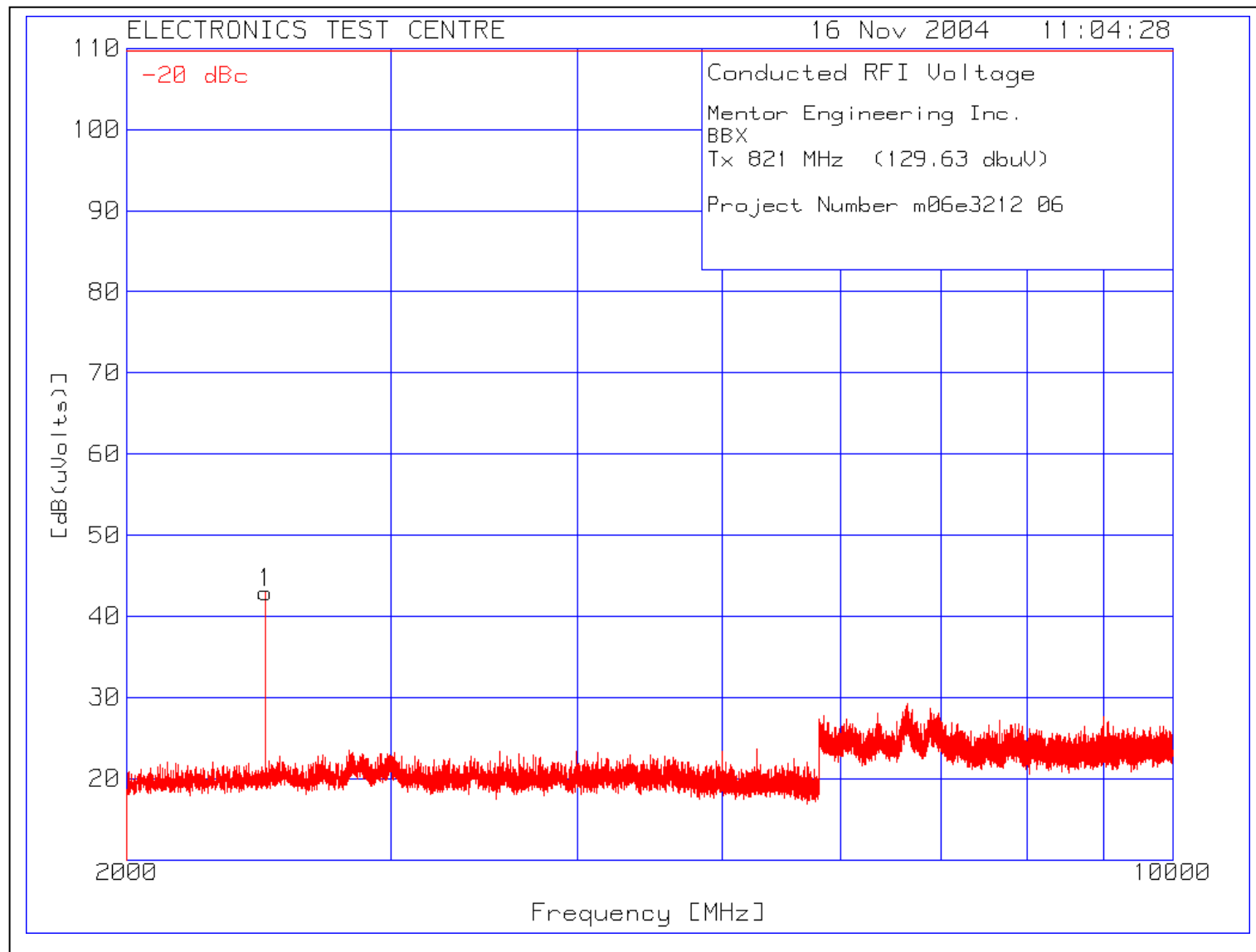
Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



Plot of Conducted Emissions: -13 dBm = 94 dB $\mu$ V



### 4.3 RADIATED EMISSIONS INCLUDING RESTRICTED BANDS OF OPERATION

#### 4.3a Receive Mode

|   |                         |                       |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
|---|-------------------------|-----------------------|---|-------------------------|-----------------------|-----------------|-----------------|-----------------|---------|-------|-------|----------|-------|-------|-----------|-------|-------|-----------|-------|-------|
| Test Lab: MPB Technologies Inc. Airdrie<br>Test Personnel: David Raynes<br>Test Date: 17 November 2004  |                         |                       | Product:<br>BBX   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| Test Result, BBX: <b>PASS</b>   |                         |                       |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| <p>Objectives/Criteria</p> <p>The Radiated E-Field emissions produced by a system or sub-system, measured at a distance of 3m from the EUT, shall not exceed the limits for the specifications as stated.</p> <p><b>Emission levels should meet the requirements with a margin of 6dB.</b></p> <p>The EUT was assessed against the requirements of <b><u>Class B</u></b>.</p> <p>Temperature = 19 °C    Humidity = 29 %</p> |                         |                       | <p>Specification: FCC Part 15 Subpart C</p> <table><tr><td>Frequency [MHz]</td><td>Class A QP @ 3m</td><td>Class B QP @ 3m</td></tr><tr><td>30 – 88</td><td>49.54</td><td>40.00</td></tr><tr><td>88 – 216</td><td>53.98</td><td>43.52</td></tr><tr><td>216 – 960</td><td>56.90</td><td>46.02</td></tr><tr><td>above 960</td><td>60.00</td><td>53.98</td></tr></table> |                         |                       | Frequency [MHz] | Class A QP @ 3m | Class B QP @ 3m | 30 – 88 | 49.54 | 40.00 | 88 – 216 | 53.98 | 43.52 | 216 – 960 | 56.90 | 46.02 | above 960 | 60.00 | 53.98 |
| Frequency [MHz]   | Class A QP @ 3m         | Class B QP @ 3m       |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 30 – 88   | 49.54                   | 40.00                 |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 88 – 216  | 53.98                   | 43.52                 |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 216 – 960   | 56.90                   | 46.02                 |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| above 960   | 60.00                   | 53.98                 |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| <b>Horizontal:</b>  |                         |                       | <b>Vertical:</b>  |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| Frequency [MHz]   | Field Strength [dBμV/m] | Delta [dB from limit] | Frequency [MHz]   | Field Strength [dBμV/m] | Delta [dB from limit] |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 704.8262  | 43.08                   | -2.94                 | 69.9631   | 35.46                   | -4.54                 |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 637.7345  | 41.55                   | -4.47                 | 65.9534   | 34.67                   | -5.33                 |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| 604.2090  | 41.15                   | -4.87                 | 73.9498   | 34.31                   | -5.69                 |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |
| Refer to the test data and plots for more detail.   |                         |                       |   |                         |                       |                 |                 |                 |         |       |       |          |       |       |           |       |       |           |       |       |

## Radiated Emissions Data:

The emissions data is presented in tabular form, showing the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value(s) of up to 4 limits at the frequency measured, and the margin between the result and the limit(s).

For example:

| Test Frequency [MHz] | Meter Reading [dB(uV)] | Gain/Loss Factor [dB] | Transducer Factor [dB] | Level [dB(uVolts)] | Limit:1 | 2    | 3    | 4    |
|----------------------|------------------------|-----------------------|------------------------|--------------------|---------|------|------|------|
| 94.0036              | 37.1 qp                | 2.2                   | 8.5                    | 47.8               | 54      | 43.5 | 50.5 | 40.5 |
| Azimuth: 156         | Height:113             | Vert                  | Margin [dB]            | -6.2               | 4.3     | -2.7 | 7.3  |      |



The applicable Limit

|                         |         |  |
|-------------------------|---------|--|
| Test Frequency [MHz]    | 94.0036 | Test Frequency f = 94.0036 MHz                           |
| Meter Reading [dB (uV)] | 37.1 qp | The reading with Quasi-Peak detector                     |
| Gain/Loss Factor [dB]   | 2.2     | Net correction for preamp gain & cable loss              |
| Transducer Factor [dB]  | 8.5     | Correction for antenna loss                              |
| Level [dB (uVolts)]     | 47.8    | Corrected value for field strength                       |
| Azimuth:                | 156     | The turntable was 156 degrees CW from facing the antenna |
| Height:                 | 113     | The antenna was 113 cm above the ground                  |
| Limit: 1                | 54      | The value of Limit 1 at 94.0036 MHz                      |
| Margin [dB]             | -6.2    | The field strength is 6.2 dB below Limit 1               |
| Limit: 2                | 43.5    | The value of Limit 2 at 94.0036 MHz                      |
| Margin [dB]             | 4.3     | The field strength is 4.3 dB above Limit 2               |
| Limit: 3                | 50.5    | The value of Limit 3 at 94.0036 MHz                      |
| Margin [dB]             | -2.7    | The field strength is 2.7 dB below Limit 3               |
| Limit: 4                | 40.5    | The value of Limit 4 at 94.0036 MHz                      |
| Margin [dB]             | 7.3     | The field strength is 7.3 dB above Limit 4               |

## Meter Reading in dBuV + Gain/Loss Factor in dB + Transducer Factor in dB = Corrected Field Strength

Note: When a preamp is used, the resulting gain is compensated.



Company: Mentor Engineering  
BBX  
Rx mode  
Project Number: M06e3212

| Test Frequency [MHz]  | Meter Reading [dB(uV)] | Gain/Loss Factor [dB] | Transducer Factor [dB] | Level dB[uVolts/meter] | Limit:1 | 2      | 3      | 4     |
|-----------------------|------------------------|-----------------------|------------------------|------------------------|---------|--------|--------|-------|
| =====                 |                        |                       |                        |                        |         |        |        |       |
| Range: 1 30 - 1000MHz |                        |                       |                        |                        |         |        |        |       |
| 201.3383              | 18.71 qp               | 3.85                  | 9.54                   | 32.1                   | 53.98   | 50     | 43.52  | 40.46 |
| Azimuth: 252          | Height:147             | Horz                  | Margin [dB]:           |                        | -21.88  | -17.9  | -11.42 | -8.36 |
| 218.1156              | 21.06 qp               | 4.11                  | 10.51                  | 35.68                  | 56.9    | 50     | 46.02  | 40.46 |
| Azimuth: 264          | Height:117             | Horz                  | Margin [dB]:           |                        | -21.22  | -14.32 | -10.34 | -4.78 |
| 604.209               | 16.09 qp               | 6.74                  | 18.32                  | 41.15                  | 56.9    | 57     | 46.02  | 47.46 |
| Azimuth: 128          | Height:130             | Horz                  | Margin [dB]:           |                        | -15.75  | -15.85 | -4.87  | -6.31 |
| 637.7345              | 16.04 qp               | 6.88                  | 18.63                  | 41.55                  | 56.9    | 57     | 46.02  | 47.46 |
| Azimuth: 130          | Height:133             | Horz                  | Margin [dB]:           |                        | -15.35  | -15.45 | -4.47  | -5.91 |
| 670.23                | 10.87 qp               | 7.08                  | 19.96                  | 37.91                  | 56.9    | 57     | 46.02  | 47.46 |
| Azimuth: 109          | Height:126             | Horz                  | Margin [dB]:           |                        | -18.99  | -19.09 | -8.11  | -9.55 |
| 704.8262              | 16.27 qp               | 7.27                  | 19.54                  | 43.08                  | 56.9    | 57     | 46.02  | 47.46 |
| Azimuth: 95           | Height:115             | Horz                  | Margin [dB]:           |                        | -13.82  | -13.92 | -2.94  | -4.38 |
| 738.4515              | 10.31 qp               | 7.46                  | 19.8                   | 37.57                  | 56.9    | 57     | 46.02  | 47.46 |
| Azimuth: 89           | Height:101             | Horz                  | Margin [dB]:           |                        | -19.33  | -19.43 | -8.45  | -9.89 |

LIMIT 1: FCC Part 15 Class A 3m  
LIMIT 2: ICES-003 Class A 3m  
LIMIT 3: FCC Part 15 Class B 3m ←  
LIMIT 4: ICES-003 Class B 3m

qp - Quasi-Peak detector

Company: Mentor Engineering  
BBX  
Rx mode  
Project Number: M06e3212

| Test<br>Frequency<br>[MHz] | Meter<br>Reading<br>[dB(uV)] | Gain/Loss<br>Factor<br>[dB] | Transducer<br>Factor<br>[dB] | Level<br>dB[uVolts/meter] | Limit:1 | 2      | 3      | 4     |
|----------------------------|------------------------------|-----------------------------|------------------------------|---------------------------|---------|--------|--------|-------|
| =====                      |                              |                             |                              |                           |         |        |        |       |
| Range: 1 30 - 1000MHz      |                              |                             |                              |                           |         |        |        |       |
| 65.9534                    | 25.72 qp                     | 2.25                        | 6.7                          | 34.67                     | 49.54   | 50     | 40     | 40.46 |
| Azimuth: 36                | Height:104                   | Vert                        | Margin                       | [dB]:                     | -14.87  | -15.33 | -5.33  | -5.79 |
| 65.9632                    | 25.04 qp                     | 2.25                        | 6.7                          | 33.99                     | 49.54   | 50     | 40     | 40.46 |
| Azimuth: 48                | Height:100                   | Vert                        | Margin                       | [dB]:                     | -15.55  | -16.01 | -6.01  | -6.47 |
| 69.9631                    | 26.42 qp                     | 2.34                        | 6.7                          | 35.46                     | 49.54   | 50     | 40     | 40.46 |
| Azimuth: 79                | Height:112                   | Vert                        | Margin                       | [dB]:                     | -14.08  | -14.54 | -4.54  | -5    |
| 73.9498                    | 25.17 qp                     | 2.44                        | 6.7                          | 34.31                     | 49.54   | 50     | 40     | 40.46 |
| Azimuth: 352               | Height:114                   | Vert                        | Margin                       | [dB]:                     | -15.23  | -15.69 | -5.69  | -6.15 |
| 184.5504                   | 19.35 qp                     | 3.89                        | 8.64                         | 31.88                     | 53.98   | 50     | 43.52  | 40.46 |
| Azimuth: 270               | Height:101                   | Vert                        | Margin                       | [dB]:                     | -22.1   | -18.12 | -11.64 | -8.58 |
| 201.0151                   | 20.66 qp                     | 3.85                        | 8.95                         | 33.46                     | 53.98   | 50     | 43.52  | 40.46 |
| Azimuth: 258               | Height:101                   | Vert                        | Margin                       | [dB]:                     | -20.52  | -16.54 | -10.06 | -7    |
| 217.9792                   | 22.24 qp                     | 4.11                        | 10.62                        | 36.97                     | 56.9    | 50     | 46.02  | 40.46 |
| Azimuth: 92                | Height:240                   | Vert                        | Margin                       | [dB]:                     | -19.93  | -13.03 | -9.05  | -3.49 |

LIMIT 1: FCC Part 15 Class A 3m  
LIMIT 2: ICES-003 Class A 3m  
LIMIT 3: FCC Part 15 Class B 3m  
LIMIT 4: ICES-003 Class B 3m

qp - Quasi-Peak detector

#### 4.3b Transmit Mode

| Test Lab: Electronics Test Centre (Airdrie)<br>Test Personnel: Trung Nguyen,<br>Jianming Zhang<br>Test Date: 17 November – 1 December 2004   | Product:<br><br>BBX   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
|--|---|-----------------|--------------------------|--------------|-------------|------------|-----------|----------|-------|---------|-------|----------|-------|-----------|-------|-----------|-------|
| Test Result, BBX: <b>PASS</b>  |   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| The Radiated E-Field emissions produced by EUT, measured at a distance of 3m, shall not exceed these limits within the restricted bands of operation. Any emissions lying outside these bands shall be at least 20 dB down from the level of the fundamental. Attenuation below the limits of 15.209 is not required.<br><br>ERP for harmonics and spurious must be less than -13 dBm, | <table> <tr> <th>Frequency [MHz]</th><th>Limit (QP @ 3m) [dBμV/m]</th></tr> <tr> <td>.009 – 0.490</td><td>88.5 – 53.8</td></tr> <tr> <td>.490 – 1.7</td><td>53.8 – 43</td></tr> <tr> <td>1.7 – 30</td><td>49.50</td></tr> <tr> <td>30 – 88</td><td>40.00</td></tr> <tr> <td>88 – 216</td><td>43.52</td></tr> <tr> <td>216 – 960</td><td>46.02</td></tr> <tr> <td>above 960</td><td>53.98</td></tr> </table> | Frequency [MHz] | Limit (QP @ 3m) [dBμV/m] | .009 – 0.490 | 88.5 – 53.8 | .490 – 1.7 | 53.8 – 43 | 1.7 – 30 | 49.50 | 30 – 88 | 40.00 | 88 – 216 | 43.52 | 216 – 960 | 46.02 | above 960 | 53.98 |
| Frequency [MHz]  | Limit (QP @ 3m) [dBμV/m]  |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| .009 – 0.490   | 88.5 – 53.8   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| .490 – 1.7   | 53.8 – 43   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| 1.7 – 30   | 49.50   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| 30 – 88  | 40.00   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| 88 – 216   | 43.52   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| 216 – 960  | 46.02   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |
| above 960  | 53.98   |                 |                          |              |             |            |           |          |       |         |       |          |       |           |       |           |       |

Restricted Bands of Operation per Part 15.205:

| MHz                   | MHz                   | MHz                   | MHz                   | MHz                   | GHz                   | GHz                   |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 0.0900000 – 0.1100000 | 8.2910000 - 8.2940000 | 16.804250 - 16.804750 | 162.01250 - 167.17000 | 1660.0000 – 1710.0000 | 3.6000000 – 4.4000000 | 14.470000 – 14.500000 |
| 0.4950000 - 0.5050000 | 8.3620000 - 8.3660000 | 25.500000 - 25.670000 | 167.72000 - 173.20000 | 1718.8000 – 1722.2000 | 4.5000000 – 5.1500000 | 15.350000 – 16.200000 |
| 2.1735000 - 2.1905000 | 8.3762500 - 8.3867500 | 37.500000 - 38.250000 | 240.00000 – 285.00000 | 2200.0000 – 2300.0000 | 5.3500000 – 5.4600000 | 17.700000 – 21.400000 |
| 4.1250000 - 4.1280000 | 8.4142500 - 8.4147500 | 73.000000 - 74.600000 | 322.00000 - 335.40000 | 2310.0000 – 2390.0000 | 7.2500000 – 7.7500000 | 22.010000 – 23.120000 |
| 4.1772500 - 4.1777500 | 12.290000 - 12.293000 | 74.800000 - 75.200000 | 399.90000 – 410.00000 | 2483.5000 – 2500.0000 | 8.0250000 – 8.5000000 | 23.600000 – 24.000000 |
| 4.2072500 - 4.2077500 | 12.519750 - 12.520250 | 108.00000 - 121.94000 | 608.00000 – 614.00000 | 2655.0000 – 2900.0000 | 9.0000000 – 9.2000000 | 31.200000 – 31.800000 |
| 5.6770000 - 5.6830000 | 12.576750 - 12.577250 | 123.00000 - 138.00000 | 960.00000 – 1240.0000 | 3260.0000 – 3267.0000 | 9.3000000 – 9.5000000 | 36.430000 – 36.500000 |
| 6.2150000 - 6.2180000 | 13.360000 - 13.410000 | 149.90000 - 150.05000 | 1300.0000 – 1427.0000 | 3332.0000 – 3339.0000 | 10.600000 – 12.700000 | Above 38.600000       |
| 6.2677500 - 6.2682500 | 16.420000 - 16.423000 | 156.52475 - 156.52525 | 1435.0000 – 1626.5000 | 3345.8000 – 3358.0000 | 13.250000 – 13.400000 |                       |
| 6.3117500 - 6.3122500 | 16.694750 - 16.695250 | 156.70000 - 156.90000 | 1645.5000 – 1646.5000 | 3500.0000 – 3600.0000 |                       |                       |

US only

\*\* Canada 108 – 138 MHz

\*\*\* Canada 960 – 1427 MHz

\*\*\*\* Canada only

Radiated Emissions Data:

Operation in Restricted Bands:

| nominal $f_c$<br>(MHz) | f (MHz)   | Field<br>Strength<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Delta<br>(dB) | Antenna<br>Polarization | Antenna<br>Height<br>(cm) | Azimuth<br>(Degrees) |
|------------------------|-----------|-------------------------------------|-------------------------|---------------|-------------------------|---------------------------|----------------------|
| 806                    | 73.7116   | 34.77                               | 40                      | -5.33         | V                       | 149                       | 144                  |
| 806                    | 1612.1250 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 806                    | 4030.3125 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 806                    | 4836.3750 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 806                    | 7254.5625 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 806                    | 8060.6250 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
|                        |           |                                     |                         |               |                         |                           |                      |
| 813                    | 73.7068   | 34.75                               | 40                      | -5.25         | V                       | 117                       | 224                  |
| 813                    | 4067.8125 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 813                    | 4881.3750 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 813                    | 7322.0625 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 813                    | 8135.6250 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
|                        |           |                                     |                         |               |                         |                           |                      |
| 821                    | 73.9498   | 34.31                               | 40                      | -5.69         | V                       | 114                       | 352                  |
| 821                    | 4104.9375 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 821                    | 4925.9250 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 821                    | 7388.8875 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |
| 821                    | 8209.8750 | $\leq 34$                           | 54                      | $\geq 20$     |                         |                           |                      |

Carrier and spurious emissions: nominal  $f_c = 806 \text{ MHz}$

| Frequency<br>(MHz) | EUT<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Substitute<br>Tx<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Power<br>Delivered<br>To Tx<br>Antenna<br>After<br>Cable<br>Loss<br>(dBm) | Corrected<br>Tx<br>Antenna<br>Power<br>(dBm) | Tx<br>Antenna<br>Gain<br>(dBi) | EIRP<br>(isotropic)<br>(dBm) | ERP<br>(dipole)<br>(dBm) | ERP<br>Limit<br>(dBm) | Delta<br>(dB) | ERP<br>(Watts) |
|--------------------|--|---|---|--|--------------------------------|------------------------------|--------------------------|-----------------------|---------------|----------------|
| 806.0625           | 73.70  | 75.45   | 17.75   | 16.00  | 6.3                            | 22.30                        | 20.15                    |                       |               | 0.10           |
| 806.0625           | 75.90  | 75.60   | 17.75   | 18.05  | 6.6                            | 24.65                        | 22.50                    |                       |               | 0.18           |
| 960                |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $2 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $3 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $4 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $5 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $6 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $7 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $8 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $9 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $10 f_c$           |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |

Carrier and spurious emissions: nominal  $f_c = 813 \text{ MHz}$

| Frequency<br>(MHz) | EUT<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Substitute<br>Tx<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Power<br>Delivered<br>To Tx<br>Antenna<br>After<br>Cable<br>Loss<br>(dBm) | Corrected<br>Tx<br>Antenna<br>Power<br>(dBm) | Tx<br>Antenna<br>Gain<br>(dBi) | EIRP<br>(isotropic)<br>(dBm) | ERP<br>(dipole)<br>(dBm) | ERP<br>Limit<br>(dBm) | Delta<br>(dB) | ERP<br>(Watts) |
|--------------------|--|---|---|--|--------------------------------|------------------------------|--------------------------|-----------------------|---------------|----------------|
| 813.5625           | 73.90  | 74.15   | 16.00   | 15.75  | 6.5                            | 22.25                        | 20.10                    |                       |               | 0.10           |
| 813.5625           | 76.10  | 76.00   | 18.15   | 18.25  | 6.6                            | 24.85                        | 22.70                    |                       |               | 0.19           |
| 960                |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $2 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $3 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $4 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $5 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $6 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $7 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $8 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $9 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $10 f_c$           |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |

Carrier and spurious emissions: nominal  $f_c = 821$  MHz

| Frequency<br>(MHz) | EUT<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Substitute<br>Tx<br>Spectrum<br>Analyzer<br>Reading<br>(dBuV) | Power<br>Delivered<br>To Tx<br>Antenna<br>After<br>Cable<br>Loss<br>(dBm) | Corrected<br>Tx<br>Antenna<br>Power<br>(dBm) | Tx<br>Antenna<br>Gain<br>(dBi) | EIRP<br>(isotropic)<br>(dBm) | ERP<br>(dipole)<br>(dBm) | ERP<br>Limit<br>(dBm) | Delta<br>(dB) | ERP<br>(Watts) |
|--------------------|--|---|---|--|--------------------------------|------------------------------|--------------------------|-----------------------|---------------|----------------|
| 820.9875           | 73.40  | 73.50   | 15.85   | 15.75  | 6.4                            | 22.15                        | 20.0                     |                       |               | 0.10           |
| 820.9875           | 75.60  | 75.05   | 17.50   | 18.05  | 6.5                            | 24.55                        | 22.4                     |                       |               | 0.17           |
| 960                |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $2 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $3 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $4 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $5 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $6 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $7 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $8 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $9 f_c$            |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |
| $10 f_c$           |  |   |   |  |                                |                              | $\leq 33$                | -13                   | $\geq 20$     |                |

#### 4.4 FREQUENCY STABILITY (§ 2.1055)

|   |                     |
|---|---------------------|
| Test Lab: Electronics Test Centre (Airdrie)<br>Test Personnel: n/a<br>Test Date: n/a                                      | Product:<br><br>BBX |
| Test Result, BBX: <b>Not Tested</b>   |                     |
| The BBX was not tested for frequency stability. The RF section is an OEM module, pre-approved under FCC ID # AZ492FT5826. |                     |

### 5.0 TEST FACILITY

#### 5.1 LOCATION

The EUT was tested for Electromagnetic Compatibility at the Electronics Test Centre, located in Airdrie, Alberta, Canada.

The RF Anechoic Chamber (RFAC) is identified as Chamber 1, located in the main building complex at the Electronics Test Centre. Its usable working space measures 10.6 m long x 7.3 m wide x 6.5 m high.

This test site is listed with the FCC under Registration Number 99541. Measurements taken at this site are accepted by Industry Canada per file number IC 2046-1.

The floor, walls and ceiling consist of annealed steel panels. The walls and ceiling are covered with ferrite tile, augmented by RF absorbant foam material on the end wall nearest the turntable, and on the adjacent walls and the ceiling. The chamber floor supports a 15 cm high internal floor, constructed of annealed steel panels, that forms the ground plane, and is bonded to the chamber walls.

The 3-m diameter turntable is flush-mounted with the floor. A sub-floor cable-way is provided to route cables between the turntable pit and EUT support equipment. Cables reach the EUT through an opening in the centre of the turntable.

Test instrumentation and EUT support equipment is located in two shielded vestibules located at the side of the main room. Cables are routed through bulkhead panels between the rooms as required. Power feeds are routed into the main room and vestibules through line filters providing at least 100 dB of attenuation between 10 kHz and 10 GHz.

#### 5.2 GROUNDING PLAN

The EUT was located on a wooden table 80 cm above the ground plane.

The EUT was grounded in accordance with Mentor Engineering Inc. specifications.

#### 5.3 POWER

AC power was supplied via an Underwriter's Laboratories ULW100-69, 100 dB, 100 Ampere wall mounted filter. Bonding to ground is implemented at the chamber wall.

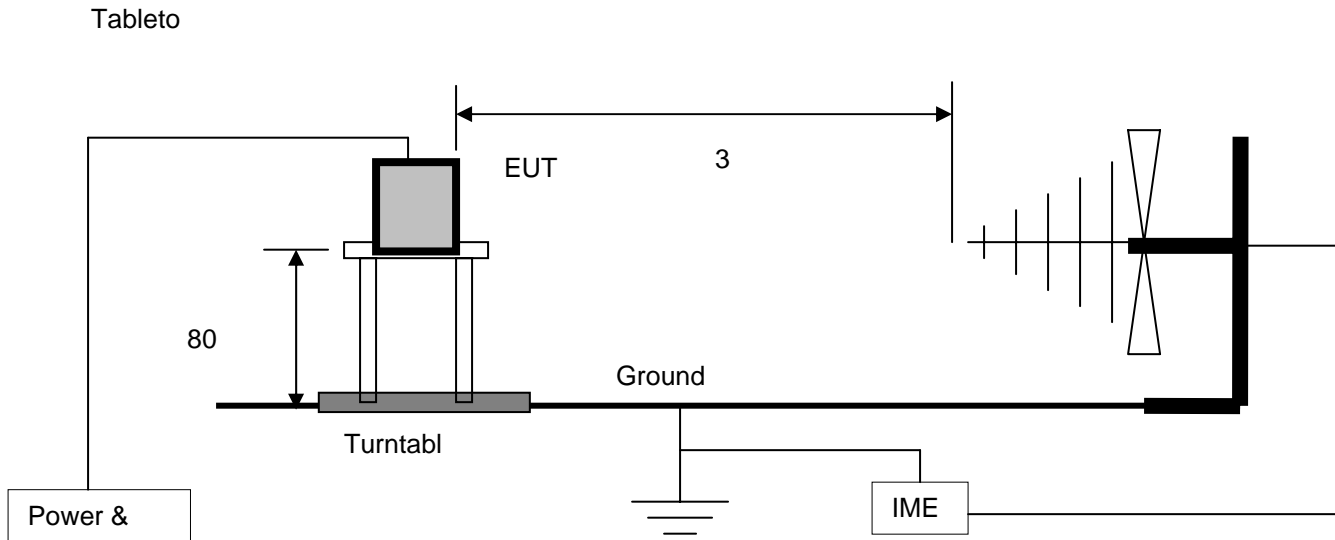


## 5.4 TEST CONFIGURATION

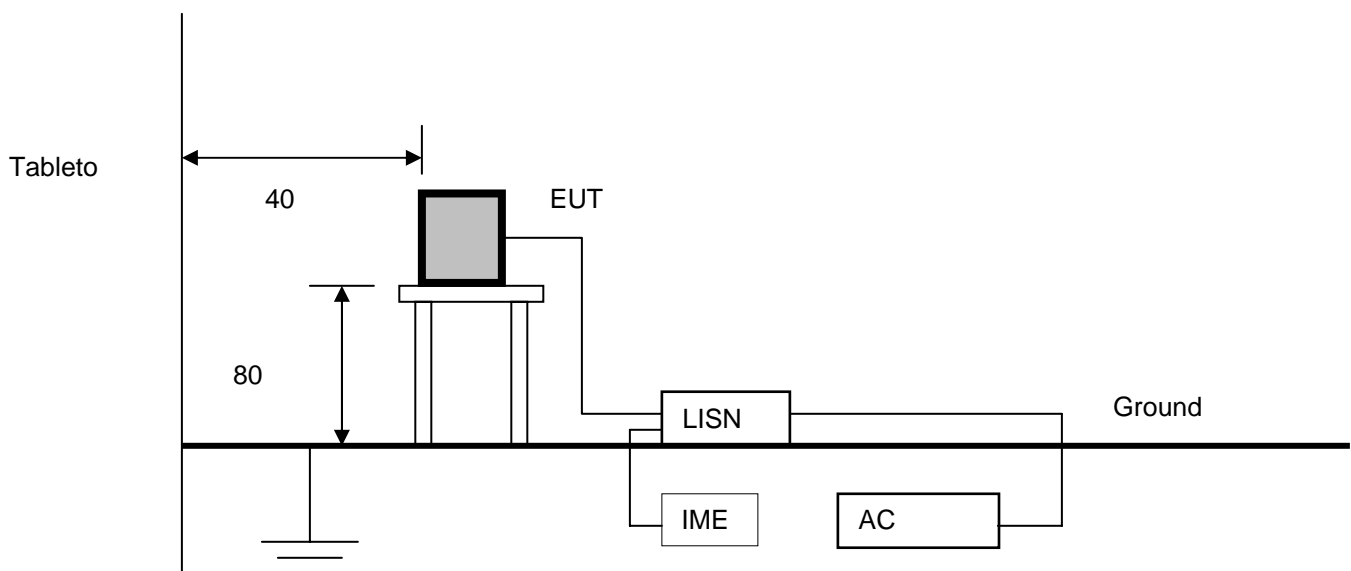
### 5.4.1 Tabletop Equipment

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of tabletop equipment.

#### Radiated



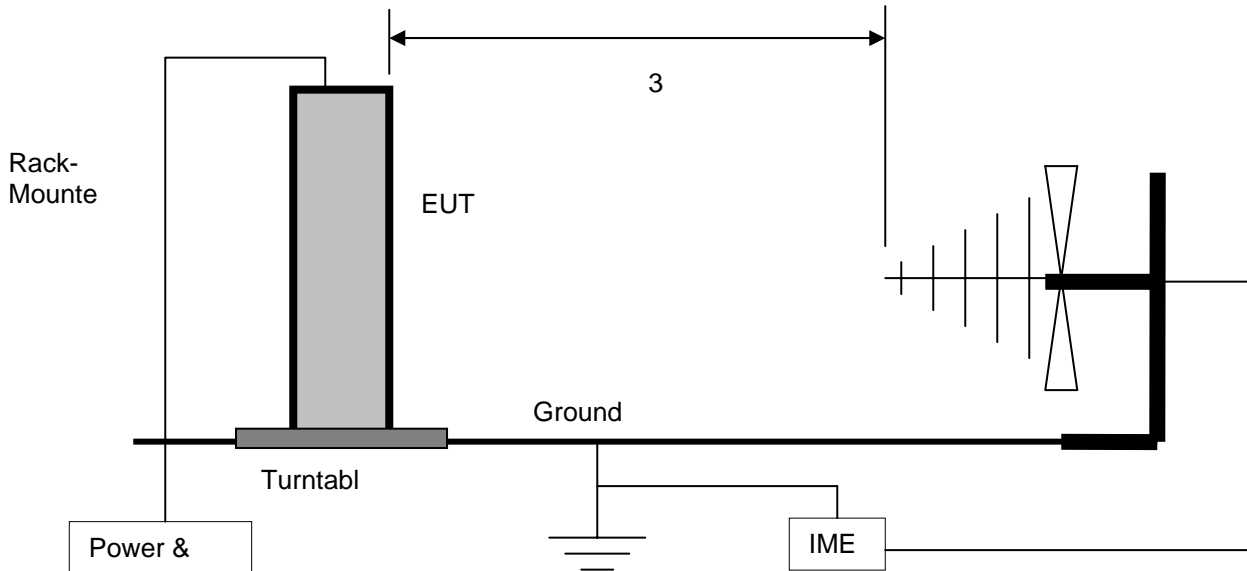
#### Conducted



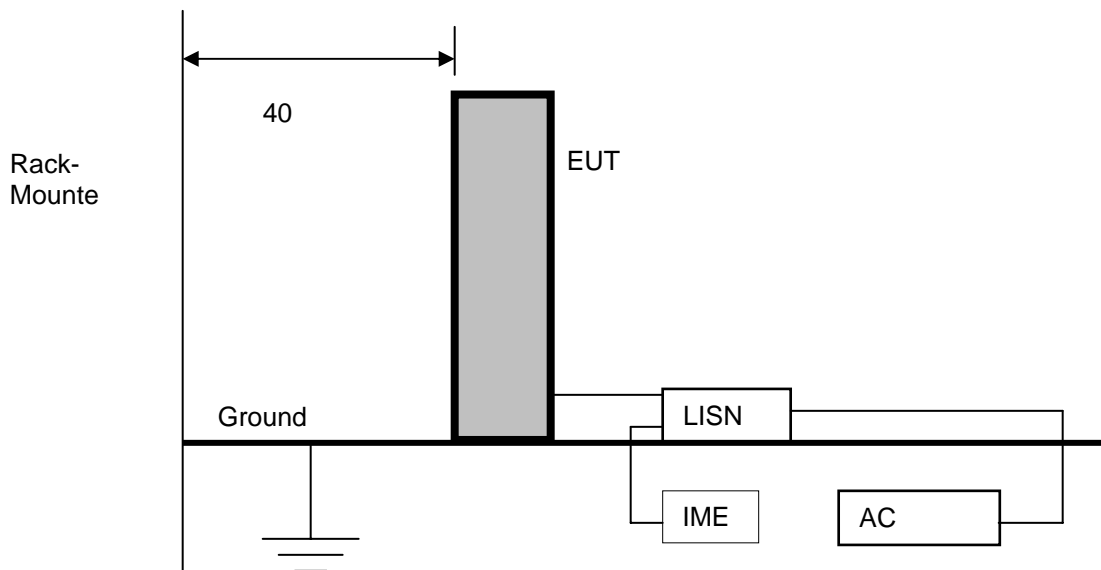
#### 5.4.2 Rack Mount

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of rack mounted equipment.

##### Radiated



##### Conducted



## **6.0 TEST EQUIPMENT**

The following equipment was used for this procedure. All measurement devices are calibrated annually, traceable to NIST.

### **6.1 RADIATED EMISSIONS**

- a) Spectrum Analyzer with RF Preselector
- b) CISPR Quasi-peak Adapter
- c) Power Isolation Transformers
- d) Biconilog antenna (20 MHz to 2 GHz)
- e) DRG horn antenna (1 – 18 GHz)
- f) Antenna mast positioner and controller
- g) Flush-mounted turntable and controller
- h) Personal Computer and EMC software

### **6.2 CONDUCTED EMISSIONS**

- a) Spectrum Analyzer with RF Preselector
- b) Line Impedance Stabilization Network, 50  $\mu$ H
- c) CISPR Quasi-peak Adapter
- d) Power Isolation Transformers
- e) Personal Computer and EMC software

### **6.3 CALIBRATION**

All measurement instrumentation conforms to ANSI C63.2. Calibration is maintained in accordance with manufacturer recommendations. Each measurement device is labeled with its ETC asset number and calibration due date.

#### **6.3.1 CALIBRATION ACCURACY**

Test equipment used to provide quantitative measurements are calibrated with standards traceable to the National Research Council, National Institute of Standards and Technology or other national standards. Instrumentation systems for emissions measurements have the following accuracies:

Frequency =  $\pm 1$  kHz  
Amplitude (RE) =  $\pm 4.01$  dB  
Amplitude (CE) =  $\pm 3.25$  dB

### 6.3.2 TEST EQUIPMENT DESCRIPTION

The equipment used in the tests was selected from the following list.

| Instrument                           | Manufacturer              | Model No.           | Asset No. | Calibration Due |
|--------------------------------------|---------------------------|---------------------|-----------|-----------------|
| Spectrum Analyzer & Display          | Hewlett Packard           | 8566B & 85662       | 9565      | 20 April 2005   |
| Spectrum Analyzer & Display          | Hewlett Packard           | 8566B & 85662       | 9168      | 17 August 2005  |
| RF Preselector                       | Hewlett Packard           | 85685A              | 9728      | 19 August 2005  |
| Quasi-Peak Adapter                   | Hewlett Packard           | 85650A              | 4411      | 20 August 2005  |
| Measurement System Software          | Underwriters Laboratories | Version 6.0         | 4443      | n/a             |
| Line Impedance Stabilization Network | EMCO                      | 3825/2r             | 9331      | 2 November 2005 |
| Line Impedance Stabilization Network | EMCO                      | 3825/2r             | 9259      | 2 November 2005 |
| Biconilog Antenna                    | ARA                       | Lpb-2520/A          | 4318      | 2 August 2005   |
| Dual Ridged Guide Antenna            | EMCO                      | 3115                | 9588      | 2 August 2005   |
| Low Noise Amplifier                  | MITEQ                     | JS43-01001800-21-5P | 4354      | 3 November 2005 |

## Appendix A

### BBX

### Test Sample Description (from data provided by Mentor Engineering Inc.)

#### CLIENT SAMPLE DESCRIPTION

|   |  |   |
|---|--|---|
| Company Name : Mentor Engineering Inc.  |  | Contact Name : Stephen Hickle   |
| Address : Suite 230, 2891 Sunridge Way NE   |  | Phone : (403) 777-3760  |
| Calgary, Alberta T1Y7K7   |  | Fax : (403) 777-3769  |
|   |  | E-mail : <a href="mailto:shickle@mentoreng.com">shickle@mentoreng.com</a> |
| Product Name: BBX   |  | # of units to be tested : One   |
| <b>Product Application</b><br><br>Commercial <input checked="" type="checkbox"/><br>Military <input type="checkbox"/> | <b>Designated Marketplaces</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Canada <input checked="" type="checkbox"/><br/>           United States of America <input checked="" type="checkbox"/><br/>           European Union <input type="checkbox"/> </div> <div>           Other <input type="checkbox"/><br/>           _____ <input type="checkbox"/><br/>           _____ <input type="checkbox"/> </div> </div> |   |

#### GENERAL INFORMATION REQUIRED FOR ALL PRODUCTS

|  |  |  |
|--|--|--|
| Dimensions (L x W x H)<br><b>6"x5.5"x2"</b>  | Weight: __0.5 lbs  |  |
| Power Requirements: AC <input type="checkbox"/> DC <input checked="" type="checkbox"/> | Voltage: ____VAC<br>Voltage: __12_VDC                      | # of AC phases: ____<br>current: ____Amps<br>frequency: ____Hz<br>current: __>5 Amps |
| Product Intended Application   | Mobile Dispatching Applications                            |  |
| Product Deployment Environments  | Automotive with antenna mounted on the roof of the vehicle |  |

Type of Radio Device (check all applicable Equipment Configurations)

|   |                                   |                                      |
|---|-----------------------------------|--------------------------------------|
| Intentional transmitter <input checked="" type="checkbox"/> | Receiver <input type="checkbox"/> | Transceiver <input type="checkbox"/> |
|---|-----------------------------------|--------------------------------------|

Type of Radio Operating License

|  |   |   |  |
|--|---|---|--|
| Unlicensed Personal Communication <input type="checkbox"/> | Unlicensed National Information Infrastructure <input type="checkbox"/> | Ultra-Wideband Operation <input type="checkbox"/> | Licensed <input checked="" type="checkbox"/> |
|--|---|---|--|

Type of Modulation of Radio Device : Quad-64 QAM, Quad-16 QAM and QPSK;

|   |   |   |
|---|---|---|
| CDMA <input type="checkbox"/>                       | TDMA <input type="checkbox"/>             | Other <input checked="" type="checkbox"/> |
| Spread Spectrum Technology <input type="checkbox"/> | Direct sequencer <input type="checkbox"/> | Frequency hopper <input type="checkbox"/> |
| Transmitter Power Output : Average 0.6W (1.5W ERP)  |   | Emission Designator : 18K3D7W             |

Information on Radio Frequencies

|  |   |
|--|---|
| Transmitter Operating Frequency(s) & Bandwidth                                       | 806.0 – 821.0 MHZ This device also operates at 821 - 825 MHz which are not operational in U.S. territories. |
| Transmitter Channel Frequencies & separations (If required, attach a separate sheet) |   |
| Receiver Operating Frequency(s) & Bandwidth  | 851-866 MHz   |
| Receiver Channel Frequencies & separations (If required, attach a separate sheet)    |   |

Information on Antenna(s)

|   |                              |                          |
|---|------------------------------|--------------------------|
| Is the antenna removable? YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> | Antenna Connector Type : SMA | Number of Antennas : One |
| Gain of Each Antenna (and tolerance)  | Maximum of 4.9dBi            |                          |

Radio Transmission Type

|   |  |   |
|---|--|---|
| Continuous <input type="checkbox"/>               | Intermittent <input checked="" type="checkbox"/> | ON Time/ OFF Time :                                       |
| Pre-Approved Radio Systems & Sub-Assemblies       |  |   |
| FCC ID: 92FT5826                                  | Grantee Code: AZ4                                | Approval Agency /TCB: PCTEST Engineering Laboratory, Inc. |
| Hardware additions to the Pre-Approved Equipment? | Integration into Mentor product                  |   |
| Prepared By: Stephen Hickie                       | Title: Director                                  | Date: Oct 22, 2004  |