



Engineering and Testing for EMC and Safety Compliance

## Type II Permissive Change Report FCC Part 15 & 90 and Industry Canada RSS-119

| <b>Test Lab:</b><br><br>Rhein Tech Laboratories, Inc.    Phone: 703-689-0368<br>360 Herndon Parkway              Fax: 703-689-2056<br>Suite 1400<br>Herndon, VA 20170<br>Web Site: <a href="http://www.rheintech.com">www.rheintech.com</a><br>E-Mail: <a href="mailto:ATCBINFO@rheintech.com">ATCBINFO@rheintech.com</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            | <b>Applicant:</b><br><br>M/A Com Inc.                      Phone: 434-455-9527<br>221 Jefferson Ridge Pkwy      Fax: 434-455-6851<br>Lynchburg, VA 24501<br>Contact: Daryl Popowitch<br>Email: popowitda@tycoelectronics.com |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
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| <b>FCC ID:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | OWDTR-0024-E               | <b>GRANTEE FRN:</b>                                                                                                                                                                                                          | 0004945812                            |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>PLAT FORM:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                        | <b>RTL WORK ORDER #:</b>                                                                                                                                                                                                     | 2003167                               |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>MODEL(S):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SMRMCX, SXRJTX             | <b>RTL QUOTE #:</b>                                                                                                                                                                                                          | QRTL03-101                            |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>DATE OF TEST REPORT:</b> September 15, 2003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>American National Standard Institute:</b> ANSI/TIA/EIA 603 and ANSI/TIA/EIA 603-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>FCC Classification:</b> TNB – Land Mobile Base Station                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>FCC Rule Part(s):</b> Part 90: Private Land Mobile Radio Services<br>Part 15: Radio Frequency Devices §15.109: Radiated Emissions Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>Industry Canada Standard:</b> RSS-119: Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>Digital Interface Information</b> Digital Interface was found to be compliant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <b>Receiver Information</b> Receiver was found to be compliant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |                                                                                                                                                                                                                              |                                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Frequency Range (MHz)</th> <th style="padding: 5px;">Output Power (W) Conducted</th> <th style="padding: 5px;">Frequency Tolerance</th> <th style="padding: 5px;">Emission Designator</th> </tr> </thead> <tbody> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>16K0F3E (Voice)</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>11K0F3E (Voice)</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>7K8F1D (2 level NB 4800)</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>7K8F1E (2 level NB 4800)</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>7K1F1D (2 level NB XNB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>7K1F1E (2 level NB XNB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>10K0F1D (2 level NB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>10K0F1E (2 level NB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>12K0F1D (2 level WB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>12K0F1E (2 level WB 9600) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>10K13F1D (4 Level) measured</td></tr> <tr><td>403 - 425</td><td>90.57</td><td>1.5</td><td>10K13F1E (4 Level) measured</td></tr> </tbody> </table> |                            |                                                                                                                                                                                                                              |                                       | Frequency Range (MHz) | Output Power (W) Conducted | Frequency Tolerance | Emission Designator | 403 - 425 | 90.57 | 1.5 | 16K0F3E (Voice) | 403 - 425 | 90.57 | 1.5 | 11K0F3E (Voice) | 403 - 425 | 90.57 | 1.5 | 7K8F1D (2 level NB 4800) | 403 - 425 | 90.57 | 1.5 | 7K8F1E (2 level NB 4800) | 403 - 425 | 90.57 | 1.5 | 7K1F1D (2 level NB XNB 9600) measured | 403 - 425 | 90.57 | 1.5 | 7K1F1E (2 level NB XNB 9600) measured | 403 - 425 | 90.57 | 1.5 | 10K0F1D (2 level NB 9600) measured | 403 - 425 | 90.57 | 1.5 | 10K0F1E (2 level NB 9600) measured | 403 - 425 | 90.57 | 1.5 | 12K0F1D (2 level WB 9600) measured | 403 - 425 | 90.57 | 1.5 | 12K0F1E (2 level WB 9600) measured | 403 - 425 | 90.57 | 1.5 | 10K13F1D (4 Level) measured | 403 - 425 | 90.57 | 1.5 | 10K13F1E (4 Level) measured |
| Frequency Range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Output Power (W) Conducted | Frequency Tolerance                                                                                                                                                                                                          | Emission Designator                   |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 16K0F3E (Voice)                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 11K0F3E (Voice)                       |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 7K8F1D (2 level NB 4800)              |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 7K8F1E (2 level NB 4800)              |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 7K1F1D (2 level NB XNB 9600) measured |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 7K1F1E (2 level NB XNB 9600) measured |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 10K0F1D (2 level NB 9600) measured    |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 10K0F1E (2 level NB 9600) measured    |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 12K0F1D (2 level WB 9600) measured    |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 12K0F1E (2 level WB 9600) measured    |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 10K13F1D (4 Level) measured           |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |
| 403 - 425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 90.57                      | 1.5                                                                                                                                                                                                                          | 10K13F1E (4 Level) measured           |                       |                            |                     |                     |           |       |     |                 |           |       |     |                 |           |       |     |                          |           |       |     |                          |           |       |     |                                       |           |       |     |                                       |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                                    |           |       |     |                             |           |       |     |                             |



Engineering and Testing for EMC and Safety Compliance

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from, the FCC Part 2, FCC Part 15, FCC Part 90, Industry Canada RSS-119, ANSI C63.4, ANSI/TIA/EIA603 and ANSI/TIA/EIA 603-1.

Signature: Desmond A. Fraser

October 16, 2003

Typed/Printed Name: Desmond A. Fraser

Position: President

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## 1 General Information

The following report of a Class II Permissive Change application is prepared on behalf of **M/A Com, Inc.**, in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commission rules and regulations and Industry Canada RSS-215. The Equipment Under Test (EUT) was Model: MASTRIII Sitepro Trunking Base Station UHF Radio, 403 - 425 MHz, (Model # SMRMCX, SXRJTX), FCC ID: OWDTR-0024-E. The test results reported in this document relate only to this model.

All measurements contained in this application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurements were performed manually at Rhein Tech Laboratories, Inc. The radiated emissions measurements required by the rules were performed on the (three/ten) meter open field test range. Complete description and site attenuation measurement data has been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure. Rhein Tech Laboratories is accepted by the FCC as a facility available to do measurement work for others on a contract basis.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated in the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding errors.*

### 1.1 Modifications

No modifications were made to the EUT during testing in order to achieve compliance.

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

This is a Class II Permissive Change report for the original application for FCC ID: OWDTR-0024-E.

### 1.3 Description of Change in Device

A hardware modification was made to meet modulation mask requirements (CFR 47 Part 90.210D mask) when operating in 2-Level XNB Narrowband 9600 baud mode. The modification comprises a frequency change of crystal Y1, located on the Analog Filter Board (CB101070V1) within the SitePro Shelf, from 400 kHz to 384 kHz, plus adjustment of the peak FM deviation of the transmitter. The crystal change has the effect of reducing the (programmable) modulation filter bandwidth by 4% allowing equipment to meet the mask with the required deviation setting.

## ***1.4 Test Methodology***

Radiated testing was performed according to the procedures in ANSI C63.4 2000. Radiated testing was performed at an antenna-to-EUT distance of 3 meters.

# **2 System Test Configuration**

## ***2.1 Justification***

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optimal reception. The EUT's Intermediate Frequencies (IF), Local Oscillators (LO), 2<sup>nd</sup> Local Oscillators (LO), crystal oscillators and harmonics of each were investigated. Conducted emission was measured from the AC port of the power supply. All modes were investigated and tested including standby mode. The final radiated data was taken with the EUT locked to a set frequency.

## ***2.2 Exercising the EUT***

The MASTRIII is a transceiver designed to function at the following frequency range: 403 MHz – 425 MHz. The following channel frequency was tested: 413.525 MHz. This frequency was measured independently. In order to activate the receiver circuitry; a signal was transmitted from a signal generator. This allowed the EUT to function in its typical state throughout the course of all testing.

### 3 Test System Details

#### 3.1 Tested Configuration

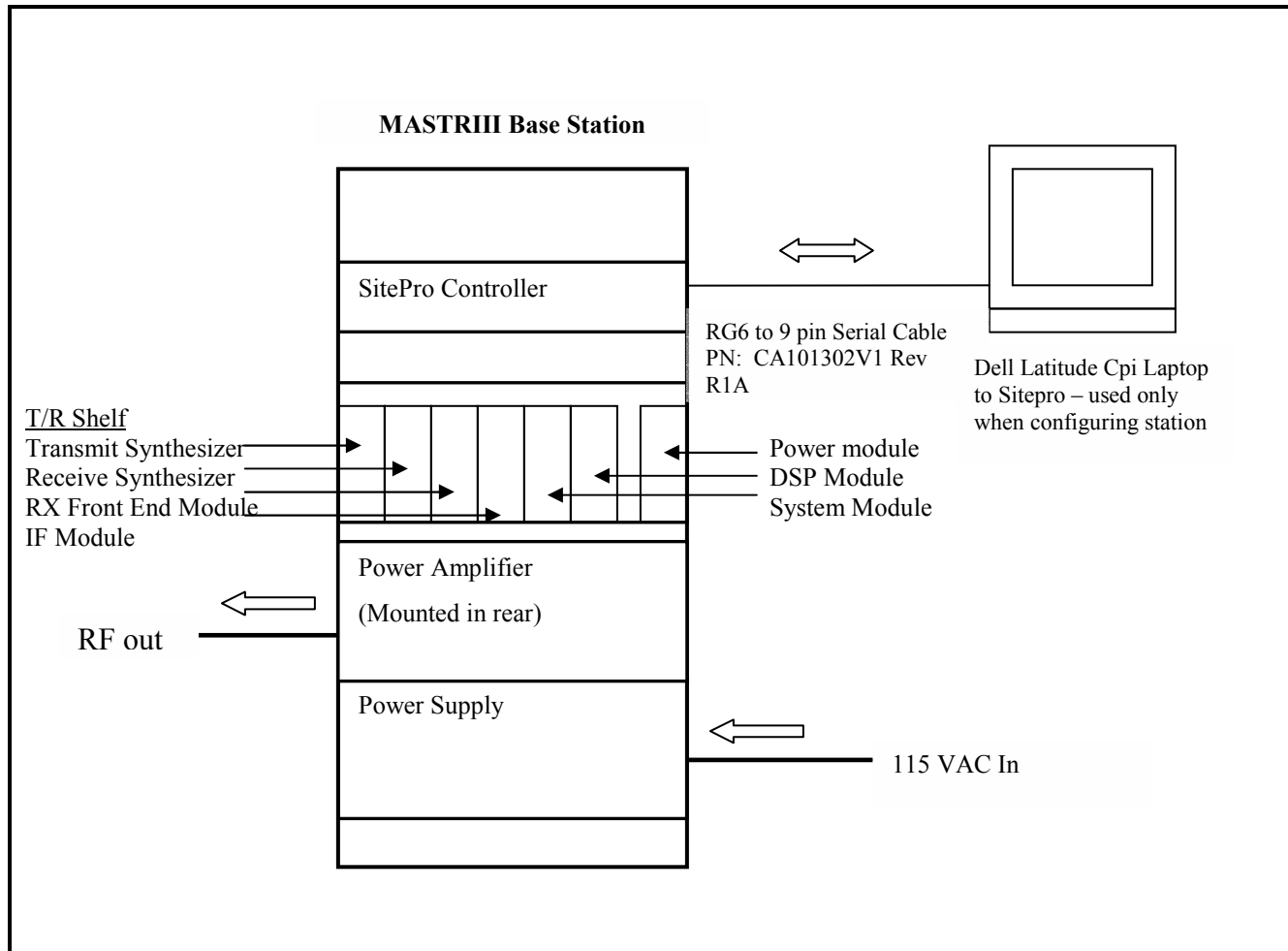
TABLE 3-1: EQUIPMENT UNDER TEST

| PART                                                                                                                       | MANUFACTURER  | MODEL          | SERIAL NUMBER                                                                                        | FCC ID       | CABLE DESCRIPTION | RTL BAR CODE |
|----------------------------------------------------------------------------------------------------------------------------|---------------|----------------|------------------------------------------------------------------------------------------------------|--------------|-------------------|--------------|
| UHF Basestation Radio                                                                                                      | M/A-COM, INC. | SMRMCX, SXRJTX | N/A                                                                                                  | OWDTR-0024-E | N/A               |              |
| T/R Shelf<br>Transmit Synthesizer<br>Receive Synthesizer<br>RX Front End Module<br>IF Module<br>DSP module<br>Power module | M/A-COM, INC. | 403-425 MHz    | 19D902839G2<br>19D902780G6<br>19D902781G3<br>19D902782G11<br>EA101401V1<br>EA101800V1<br>19D902589G2 | N/A          |                   | 15247        |
| T/R Shelf<br>Transmit Synthesizer<br>Receive Synthesizer<br>RX Front End Module<br>IF Module<br>DSP module<br>Power module | M/A-COM, INC. | 403-425 MHz    | 19D902839G2<br>19D902780G6<br>19D902781G3<br>19D902782G11<br>EA101401V1<br>EA101800V1<br>19D902589G2 | N/A          |                   | 15255        |
| Power amplifier                                                                                                            | M/A-COM, INC. | 403-425 MHz    | 19D902797G11                                                                                         | N/A          |                   | 15354        |
| SitePro Controller                                                                                                         | M/A-COM, INC. |                | EA101209V1                                                                                           | N/A          |                   | 15253        |
| Power Supply                                                                                                               | M/A-COM, INC. |                | 19A149978P1/<br>03109467                                                                             | N/A          |                   | N/A          |

TABLE 3-2: SUPPORT EQUIPMENT

| PART                         | MANUFACTURER | MODEL        | SERIAL NUMBER         | FCC ID | CABLE DESCRIPTION        | RTL BAR CODE |
|------------------------------|--------------|--------------|-----------------------|--------|--------------------------|--------------|
| Laptop Computer              | Dell         | Latitude Cpi | N/A                   | N/A    | N/A                      | 900917       |
| RG6 to 9 pin<br>Serial Cable |              |              | CA101302V1<br>Rev R1A | N/A    | shielded serial<br>cable | 14886        |

### 3.1.1 Tested Configuration Diagram



## **4 Test Results**

### **4.1 *Amendments to Emissions Test Methodology***

#### **4.1.1 Deviations from Test Methodology**

There was no deviation from, additions to, or exclusions from, ANSI C63.4: 1992.

### **4.2 *Radiated Emissions Measurements***

#### **4.2.1 Site and Test Description**

Before final radiated emissions measurements were made on the OATS, the EUT was scanned indoors at both one and three meter distances. This was done in order to determine its emission spectrum signal. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS, at each frequency, in order to ensure that maximum emission amplitudes were measured.

Final radiated emissions measurements were made on the OATS at a distance of 3 meters. The floor-standing EUT was placed on a nonconductive turntable at a height of 1m.

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emissions maximum levels. Measurements were taken using both horizontal and vertical antenna polarization. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

## 4.2.2 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dB\mu V / m) = SAR(dB\mu V) + SCF(dB / m)$$

FI=Field Intensity

SAR=Spectrum Analyzer Reading

SCF=Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB / m) = -PG(dB) + AF(dB / m) + CL(dB)$$

SCF=Site Correction Factor

PG=Pre-Amplifier Gain

AF=Antenna Factor

CL=Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\mu V / m) = 10^{FI(dB\mu V / m) / 20}$$

For example, assume a signal frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m.

The actual radiated field strength is calculated as follows:

$$49.3dB\mu V - 11.5dB / m = 37.8dB\mu V / m$$

$$10^{37.8 / 20} = 10^{1.89} = 77.6\mu V / m$$

### 4.2.3 Measurement Uncertainty

Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

### 4.2.4 Test Limits

TABLE 4-1: TEST LIMITS

| FCC Class B Radiated Emissions |                |
|--------------------------------|----------------|
| Frequency (MHz)                | At 3m (dBμV/m) |
| 30-88                          | 40.0           |
| 88-216                         | 43.5           |
| 216-960                        | 46.0           |
| > 1000                         | 54             |

## 4.2.5 Radiated Emissions Data

TABLE 4-2: RADIATED EMISSIONS – MODE RX

| Emission Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|--------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|
| 110.638                  | Qp            | V                      | 145                     | 1.0                | 39.6                    | -15.7                         | 23.9                    | 43.5           | -19.6       |
| 147.488                  | Qp            | V                      | 185                     | 1.0                | 49.2                    | -17.0                         | 32.2                    | 43.5           | -11.3       |
| 177.008                  | Qp            | V                      | 145                     | 1.0                | 42.6                    | -18.2                         | 24.4                    | 43.5           | -19.1       |
| 206.508                  | Qp            | H                      | 45                      | 2.3                | 47.6                    | -18.0                         | 29.6                    | 43.5           | -13.9       |
| 213.878                  | Qp            | V                      | 180                     | 1.0                | 45.7                    | -17.6                         | 28.1                    | 43.5           | -15.4       |
| 221.248                  | Qp            | H                      | 45                      | 2.3                | 42.5                    | -18.2                         | 24.3                    | 46.0           | -21.7       |
| 235.988                  | Qp            | H                      | 145                     | 2.3                | 43.4                    | -16.8                         | 26.6                    | 46.0           | -19.4       |
| 250.756                  | Qp            | V                      | 180                     | 1.0                | 47.3                    | -15.8                         | 31.5                    | 46.0           | -14.5       |
| 265.419                  | Qp            | V                      | 180                     | 1.0                | 44.6                    | -15.1                         | 29.5                    | 46.0           | -16.5       |
| 402.080                  | Qp            | V                      | 145                     | 1.0                | 38.7                    | -11.5                         | 27.2                    | 46.0           | -18.8       |
| 413.016                  | Qp            | V                      | 180                     | 1.0                | 37.6                    | -10.8                         | 26.8                    | 46.0           | -19.2       |

TEST PERSONNEL:

Signature: 

Date: September 15, 2003

Typed Name: Franck Schuppious

### 4.3 AC Conducted Measurement

#### 4.3.1 Conducted Emissions Data (TX mode)

TABLE 4-3: NEUTRAL SIDE (LINE 1); TX MODE; LIMIT CISPR B

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | FCC B Limit (dBuV) | FCC B Margin (dBuV) |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|---------------------|
| 0.174                    | Pk            | 34.8                    | 1.8                         | 36.6                  | 54.8               | -18.2               |
| 0.208                    | Pk            | 26.0                    | 1.5                         | 27.5                  | 53.3               | -25.8               |
| 0.283                    | Pk            | 23.1                    | 1.0                         | 24.1                  | 50.7               | -26.6               |
| 0.548                    | Pk            | 19.0                    | 0.7                         | 19.7                  | 46.0               | -26.3               |
| 2.452                    | Pk            | 26.9                    | 1.3                         | 28.2                  | 46.0               | -17.8               |
| 10.240                   | Pk            | 27.1                    | 2.1                         | 29.2                  | 50.0               | -20.8               |
| 29.500                   | Pk            | 28.1                    | 3.6                         | 31.7                  | 50.0               | -18.3               |

TABLE 4-4: HOT SIDE (LINE 2); TX MODE; LIMIT CISPR B

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | FCC B Limit (dBuV) | FCC B Margin (dBuV) |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|---------------------|
| 0.169                    | Pk            | 33.9                    | 1.9                         | 35.8                  | 55.0               | -19.2               |
| 2.452                    | Pk            | 28.1                    | 1.3                         | 29.4                  | 46.0               | -16.6               |
| 9.835                    | Pk            | 24.7                    | 1.4                         | 26.1                  | 50.0               | -23.9               |
| 10.220                   | Pk            | 34.4                    | 1.5                         | 35.9                  | 50.0               | -14.1               |
| 12.280                   | Pk            | 38.9                    | 2.5                         | 41.4                  | 50.0               | -8.6                |
| 22.510                   | Pk            | 24.5                    | 3.3                         | 27.8                  | 50.0               | -22.2               |
| 26.620                   | Pk            | 25.7                    | 3.5                         | 29.2                  | 50.0               | -20.8               |

<sup>(1)</sup>Pk = Peak; QP = Quasi-Peak; Av = Average

### 4.3.2 Conducted Emissions Data (RX mode)

TABLE 4-5: NEUTRAL SIDE (LINE 1); RX MODE; LIMIT CISPR B

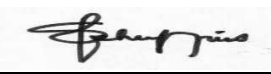
| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | FCC B Limit (dBuV) | FCC B Margin (dBuV) | Pass/Fail |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|---------------------|-----------|
| 0.169                    | Pk            | 35.5                    | 1.9                         | 37.4                  | 55.0               | -17.6               | Pass      |
| 0.517                    | Pk            | 18.9                    | 0.7                         | 19.6                  | 46.0               | -26.4               | Pass      |
| 2.452                    | Pk            | 27.2                    | 1.3                         | 28.5                  | 46.0               | -17.5               | Pass      |
| 8.185                    | Pk            | 22.6                    | 2.0                         | 24.6                  | 50.0               | -25.4               | Pass      |
| 10.220                   | Pk            | 25.0                    | 2.1                         | 27.1                  | 50.0               | -22.9               | Pass      |
| 12.280                   | Pk            | 28.0                    | 2.5                         | 30.5                  | 50.0               | -19.5               | Pass      |
| 26.620                   | Pk            | 24.2                    | 3.4                         | 27.6                  | 50.0               | -22.4               | Pass      |
| 0.169                    | Pk            | 35.5                    | 1.9                         | 37.4                  | 55.0               | -17.6               | Pass      |

TABLE 4-6: HOT SIDE (LINE 2); RX MODE; LIMIT CISPR B

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBuV) | Site Correction Factor (dB) | Emission Level (dBuV) | FCC B Limit (dBuV) | FCC B Margin (dBuV) | Pass/Fail |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|---------------------|-----------|
| 0.170                    | Pk            | 35.5                    | 1.8                         | 37.3                  | 55.0               | -17.7               | Pass      |
| 0.520                    | Pk            | 18.7                    | 0.7                         | 19.4                  | 46.0               | -26.6               | Pass      |
| 2.452                    | Pk            | 28.1                    | 1.3                         | 29.4                  | 46.0               | -16.6               | Pass      |
| 8.185                    | Pk            | 23.0                    | 2.0                         | 25.0                  | 50.0               | -25.0               | Pass      |
| 9.940                    | Pk            | 25.7                    | 1.4                         | 27.1                  | 50.0               | -22.9               | Pass      |
| 10.220                   | Pk            | 34.6                    | 1.5                         | 36.1                  | 50.0               | -13.9               | Pass      |
| 12.280                   | Pk            | 39.2                    | 2.5                         | 41.7                  | 50.0               | -8.3                | Pass      |
| 22.520                   | Pk            | 24.8                    | 3.3                         | 28.1                  | 50.0               | -21.9               | Pass      |
| 26.620                   | Pk            | 26.1                    | 3.5                         | 29.6                  | 50.0               | -20.4               | Pass      |

<sup>(1)</sup>Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: 

Date: September 15, 2003

Typed Name: Franck Schuppis

#### 4.4 FCC Rules and Regulations Part 2 §2.1049 (c) (1): Occupied Bandwidth

Occupied Bandwidth - Compliance with the emission masks

##### 4.4.1 Test Procedure

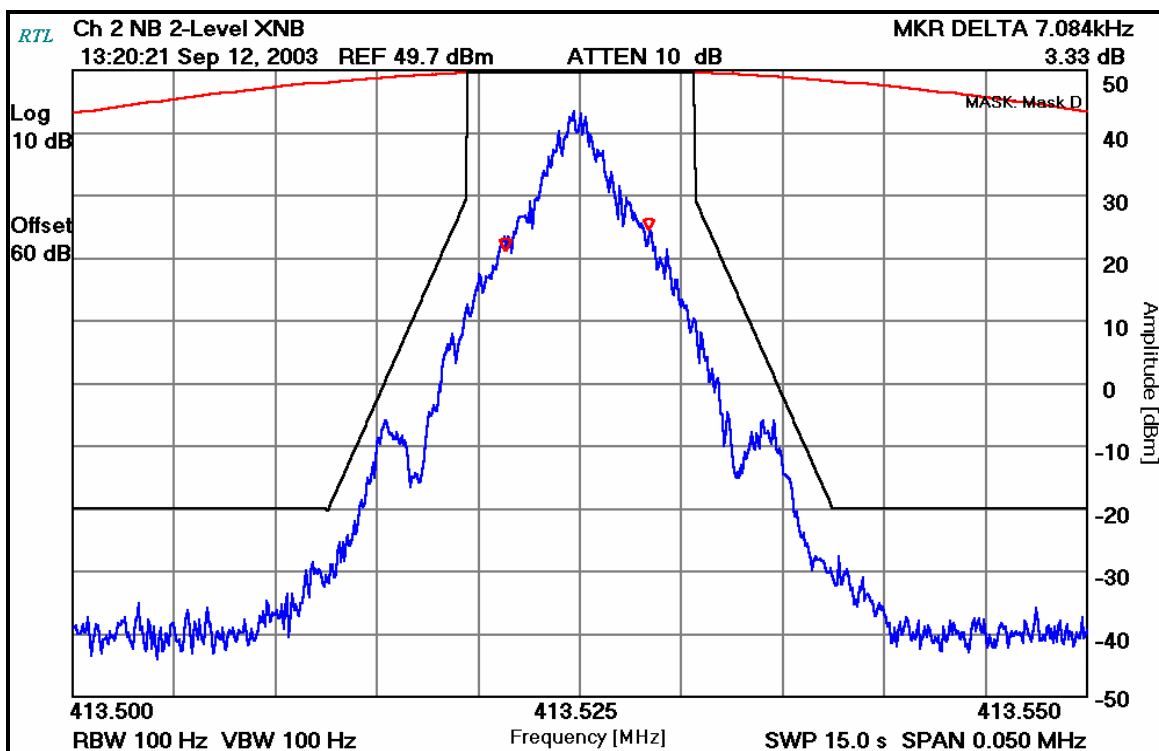
ANSI/TIA/EIA-603-1992, section 2.2.11 and TIA/EIA-102.CAAA-1999 section 2.2.5

Device with audio modulation: Transmitter was modulated with a 2,500 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1,000 Hz.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps.

##### 4.4.2 Test Data

PLOT 4-1: 99% OCCUPIED BANDWIDTH - 2 LEVEL DIGITAL; NARROW BAND; 9600 BAUD; XNB MODE



TEST PERSONNEL:

Signature: 

Date: September 12, 2003

Typed Name: Daniel Biggs

#### ***4.5 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth***

Type of Emission: F1D, F1E

Necessary Bandwidth and Emission Bandwidth:

**Digital voice and data – 12.5 kHz separation; 9600 Baud; XNB Mode**

Measurement: 99.0% Occupied Bandwidth

$B_n = 7.084 \text{ kHz}$

Emission designator: 7K1F1D, 7K1F1E

## 5 Test Equipment Used

TABLE 5-1: TEST EQUIPMENT USED

| RTL Asset Number | Manufacturer    | Model                 | Part Type                                   | Serial Number | Calibration due date |
|------------------|-----------------|-----------------------|---------------------------------------------|---------------|----------------------|
| 900969           | Hewlett Packard | 85650A                | Quasi-Peak Adapter (30 Hz – 40 GHz)         | 2412A00414    | 05/12/04             |
| 900931           | Hewlett Packard | 8566B                 | Spectrum Analyzer (100 Hz – 22 GHz)         | 3138A07771    | 05/12/04             |
| 901053           | Schaffner-Chase | CBL6112               | Antenna (25 MHz – 2 GHz)                    | 2648          | 07/03/04             |
| 900930           | Hewlett Packard | 85662A                | Spectrum Analyzer Display                   | 3144A20839    | 05/12/04             |
| 901084           | AFJ             | LS16                  | 16A LISN                                    | 16010020082   | 11/04/03             |
| 900268           | Taylor          | 5565                  | Hygrometer / Thermometer                    | N/A           | 02/05/04             |
| 900339           | Hewlett Packard | 85650A                | Quasi peak adapter                          | 2521A00743    | 04/17/04             |
| 900970           | Hewlett Packard | 85662A                | Spectrum Analyzer Display                   | 2542A11239    | 04/17/04             |
| 900968           | Hewlett Packard | 8567A                 | Spectrum Analyzer                           | 2602A00160    | 04/17/04             |
| 900889           | Hewlett Packard | 85685A                | RF Preselector (20 Hz – 2 GHz)              | 3146A01309    | 03/05/04             |
| 901020           | Hewlett Packard | 8564E                 | Portable Spectrum Analyzer (9 kHz - 40 GHz) | 3943A01719    | 07/15/04             |
| 901118           | Hewlett Packard | 8901A<br>Opt. 002-003 | Modulation Analyzer                         | 2406A00178    | 06/18/04             |

## 6 Conclusion

The data in this measurement report shows that the M/A Com, Inc., Model: MASTRII Sitepro Trunking Base Station UHF Radio, 403 - 425 MHz, (Model # SMRMCX, SXRJTX), FCC ID: OWDTR-0024-E, complies with all the requirements of Parts 90 and 15 of the FCC Rules, and Industry Canada RSS-119, Issue 1.