



Engineering and Testing for EMC and Safety Compliance

## APPLICATION FOR FCC CERTIFICATION DIRECT SEQUENCE SPREAD SPECTRUM TRANSMITTER

**Part 15 Unlicensed Modular Transmitter Approval (DA00-1407 June 26, 2000)**

CISCO Systems, Inc.  
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Akron, OH 44333  
330-664-7362 (Jim Nicholson)

Model: AIR-MPI352  
FCC ID:LDK102042

February 28, 2001

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------|
| PART 2: 1999                         | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS    |
| PART 15: 1999                        | RADIO FREQUENCY DEVICES                                                          |
| FCC 97-114                           | GUIDANCE ON MEASUREMENTS FOR DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS             |
| ANSI C63.4-1992                      | STANDARD FORMAT MEASUREMENT / TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS |
| RSS-210, Issue 3: 2000               | LOW POWER LICENCE-EXEMPT RADIOCOMMUNICATION DEVICES (ALL FREQUENCY BANDS)        |
| RSS-102, Issue 1: 1999               | EVALUATION PROCEDURE FOR MOBILE AND PORTABLE RADIO TRANSMITTERS                  |

| FCC Rules Parts   | Frequency Range  | Output Power (W) | Freq. Tolerance | Emission Designator |
|-------------------|------------------|------------------|-----------------|---------------------|
| Part 15.247       | 2412 to 2462 MHz | 0.109            |                 |                     |
| Canadian Sections | Frequency Range  | Output Power (W) | Freq. Tolerance | Emission Designator |
| 6.2.2 (o)         | 2412 to 2462 MHz | 0.109            |                 |                     |

|                                                                                                                                                                 |  |                                                     |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------|-----------------------------------------|
| This report concerns (check one):                                                                                                                               |  | Original Grant: <input checked="" type="checkbox"/> | Class II Change:                        |
| Equipment Type: PCI Board                                                                                                                                       |  |                                                     |                                         |
| Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)                                                                                                          |  | Yes:                                                | No: <input checked="" type="checkbox"/> |
| If yes, defer until:                                                                                                                                            |  |                                                     |                                         |
| Company name agrees to notify the Commission by: _____ (date) of the intended date of announcement of the product so that the grant can be issued on that date. |  |                                                     |                                         |
| Transition Rules Request per 15.37? Yes:                                                                                                                        |  | No: <input checked="" type="checkbox"/>             |                                         |
| If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR. [10-1-90 Edition] provision.                                                    |  |                                                     |                                         |

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Document Number: 2001041

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## 1 INTRODUCTION

The following Application for FCC Certification for a Direct Sequence Spread Spectrum transmitter is prepared on behalf of Cisco System in accordance with Part 15.247 of the Federal Communications Commissions. The Equipment Under Test (EUT) was the **AIR-MPI352, FCC ID: LDK102042**. The test results reported in this document relate only to the item that was tested. The afore mentioned device fulfills the requirement for a Part 15 Unlicensed Modular Transmitter per FCC public notice DA 00-1407 released in June 26, 2000.

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.

### 1.1 RELATED SUBMITTAL (S)/GRANT (S)

This is an original application for certification.

### 1.2 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters. Emissions above 1 GHz were video averaged.

### 1.3 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).



## 1.4 EMISSIONS EQUIPMENT LIST

| RTL Asset Number | Manufacturer              | Model                               | Part Type                                       | Serial Number      | Calibration due date |
|------------------|---------------------------|-------------------------------------|-------------------------------------------------|--------------------|----------------------|
| 900969           | Hewlett Packard           | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)             | 2412A00414         | 03/23/01             |
| 900929           | Hewlett Packard           | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)             | 2811A01276         | 03/28/01             |
| 900901           | Hewlett Packard           | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)             | 3145A01599         | 11/02/01             |
| 900339           | Hewlett Packard           | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)             | 2521A00743         | 03/27/01             |
| 900042           | Hewlett Packard           | 85650A                              | Quasi-Peak Adapter (30 Hz – 40 GHz)             | 2521A01032         | 11/05/01             |
| 900924           | Amplifier Research        | 75A220                              | Amplifier (10 kHz – 220 MHz)                    |                    | N/A                  |
| 900933           | Hewlett Packard           | 11975A                              | Power Amplifier (2 - 8 GHz)                     | 2304A00348         | 11/15/01             |
| 901067           | Hewlett Packard           | 8903B                               | Audio Analyzer                                  | 2303A00307         | 06/28/01             |
| 901055           | Hewlett Packard           | 8901A Opt. 002-003                  | Modulation Analyzer                             | 2545A04102         | 06/08/01             |
| 900718           | Voltech                   | PM3000A                             | Power Analyzer                                  | 6836-002-10        | 11/08/01             |
| 900397           | Associated Research, Inc. | 6554SA                              | Electrical Safety Compliance Analyzer           | 940281             | 11/08/01             |
| 900926           | Hewlett Packard           | 8753D                               | RF Vector Network Analyzer                      | 3410A09659         | 03/28/01             |
| 901089           | Hewlett Packard           | HP875ET                             | Transmission/Reflection Network Analyzer        | US39170052         | N/A                  |
| 900968           | Hewlett Packard           | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)            | 2602A00160         | 03/23/01             |
| 900903           | Hewlett Packard           | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)            | 2841A00614         | 11/02/01             |
| 900897           | Hewlett Packard           | 8567A                               | Spectrum Analyzer (10 kHz – 1.5 GHz)            | 2727A00535         | 11/08/01             |
| 900931           | Hewlett Packard           | 8566B                               | Spectrum Analyzer (100 Hz – 22 GHz)             | 3138A07771         | 03/27/01             |
| 900912           | Hewlett Packard           | 8568A                               | RF Spectrum Analyzer (100 Hz – 1.5 GHz)         | 2634A02704         | 08/02/01             |
| 900824           | Hewlett Packard           | 8591E                               | RF Spectrum Analyzer (9 KHz – 1.8 GHz)          | 3710A06135         | 11/14/01             |
| 900724           | ARA                       | LPB-2520                            | Log Periodic / Biconical Antenna (25-1000 MHz)  | 1037               | 2/1/01               |
| 900725           | ARA                       | LPB-2520                            | Log Periodic / Biconical Antenna (25-1000 MHz)  | 1036               | 07/12/01             |
| 900967           | A.H. Systems              | TDS-206/535-1 through TDS-206/535-4 | Tuned Dipole set (30 – 1000 MHz)                | 126, 128, 129, 132 | 12/15/00             |
| 900154           | Compliance Design         | Roberts Dipole                      | Adjustable Elements Dipole antenna (30-1000MHz) | N/A                | 7/26/01              |
| 900814           | Electro-Metrics           | RGA -60                             | Double Ridges Guide Antenna (1-18 GHz)          | 2310               | 2/26/01              |
| 900081           | EMCO                      | 3146                                | Log-Periodic Antenna (200-1000 MHz)             | 1850               |                      |
| 900800           | EMCO                      | 3301B                               | Active Monopole (Rod antenna) (30 Hz – 50 MHz)  | 9809-4071          | 05/02/01             |
| 900151           | Rohde@Schwarz             | HFH@-Z2                             | Loop Antenna (9kHz-30 MHz)                      | 82825/019          | 05/26/01             |
| 900791           | Schaffner –Chase          | CSL6112                             | Bilog antenna (30 MHz – 2GHz)                   | 2099               | 2/22/01              |
| 901053           | Schaffner –Chase          | CBL6112B                            | Bilog Chase antenna (200 MHz – 2 GHz)           | 2648               | 05/24/01             |
| 900060           | Hewlett Packard           | 86634B                              | Auxiliary Section for External Pulse Modulator  | 1314A02913         | 11/08/01             |
| 901041           | ACO Pacific               | 511E                                | Sound Level Calibrator                          | 028751             | In calibration       |
| 900970           | Hewlett Packard           | 85662A                              | Spectrum Analyzer Display                       | 254211239          | 03/23/01             |
| 900930           | Hewlett Packard           | 85662A                              | Spectrum Analyzer Display                       | 3144A20839         | 03/28/01             |
| 900911           | Hewlett Packard           | 85662A                              | Spectrum Analyzer Display                       | 2542A12739         | 08/02/01             |
| 900902           | Hewlett Packard           | 85662A                              | Spectrum Analyzer Display                       | 2848A17585         | 11/02/01             |
| 900896           | Hewlett Packard           | 85662A                              | Spectrum Analyzer Display                       | 2816A16471         | 11/02/01             |



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| RTL Asset Number | Manufacturer       | Model            | Part Type                                        | Serial Number | Calibration due date |
|------------------|--------------------|------------------|--------------------------------------------------|---------------|----------------------|
| 900914           | Hewlett Packard    | 8546OA           | RF Filter Section, (100 KHz to 6.5 GHz)          | 3330A00107    | 11/07/01             |
| 901057           | Hewlett Packard    | 3336B            | Synthesizer/Level Generator                      | 2514A02585    | 06/21/01             |
| 900059           | Hewlett Packard    | 8660C            | Signal Generator (9 KHz – 3200 MHz)              | 1947A02956    | 11/08/01             |
| 900960           | Hewlett Packard    | 8444A            | Tracking Generator (0.5 – 1500MHz)               | 2325A07827    | 03/08/01             |
| 900917           | Hewlett Packard    | 8648C            | Synthesized. Signal Generator (9 KHz – 3200 MHz) | 3537A01741    | 03/28/01             |
| 900821           | Hewlett Packard    | 33120A           | 15 MHz Function / Arbitrary Waveform Generator   | US36029992    | 11/14/01             |
| 900059           | Hewlett Packard    | 8660C            | Synthesized. Signal Generator (9 kHz – 3200 MHz) | 1947A02956    | 11/08/01             |
| 900560           | Haefely            | PESD 1600        | ESD Generator                                    | H 703146      | 10/05/01             |
| 900099           | Marconi            | 52022-910E       | Signal Generator (10 kHz – 1 GHz)                | 119044-189    | 11/14/01             |
| 900195           | Tektronix          | CFG280           | Function Generator (0.1 Hz – 11 MHz)             | TW12167       | N/A                  |
| 900927           | Tektronix          | ASG 100          | Audio Signal Generator                           | B03274 V2.3   | N/A                  |
| 900935           | Wavetek            | 3510B            | Signal Generator                                 | 5372160       | 03/28/00             |
| 900660           | Philips            | PM5418TDS        | TV Generator                                     | LO 604891     | 11/21/01             |
| 900369           | Philips            | PM5418TDS        | TV Generator                                     | LR81436C      | N/A                  |
| 900268           | Taylor             | 5565             | Hygrometer / Thermometer                         | N/A           | 09/05/01             |
| 901056           | Hewlett Packard    | 8954A, Opt.H03   | Transceiver Interface                            | 2924A00830    | 06/02/01             |
| 901088           | Hewlett Packard    | 8954A            | Transceiver Interface                            | 2146A00139    | 07/28/01             |
| 901082           | AFJ International  | AFJ LS16         | LISN (9 kHz – 30 MHz)                            | 16010020081   | 06/16/01             |
| 901083           | AFJ International  | AFJ LS16         | LISN (9 kHz – 30 MHz)                            | 16010020082   | 06/16/01             |
| 901084           | AFJ International  | AFJ LS16         | LISN (9 kHz – 30 MHz)                            | 16010020080   | 06/16/01             |
| 901090           | Bajog electronic   | 4V-100/200       | LISN (150 kHz – 30 MHz)                          | 00-44-007     | 08/03/01             |
| 900726           | Solar              | 7225-1           | LISN                                             | N/A           | 03/29/01             |
| 900727           | Solar              | 7225-1           | LISN                                             | N/A           | 03/29/01             |
| 900078           | Solar              | 7225-1           | LISN                                             | N/A           | 03/29/01             |
| 900077           | Solar              | 7225-1           | LISN                                             | N/A           | 03/29/01             |
| 901054           | Hewlett Packard    | HP 3586B         | Selective Level Meter                            | 1928A01892    | 06/08/01             |
| 900770           | Hewlett Packard    | 437B             | Power Meter                                      | 2949A02966    | In cal.              |
| 900793           | Hewlett Packard    | 432A             | Thermistor Power Meter                           | 1848a22632    | N/A                  |
| 900126           | Hewlett Packard    | 11970A           | Harmonic Mixer (26-40 GHz)                       | 2332A01199    | 11/10/02             |
| 900396           | Hewlett Packard    | 11970K           | Harmonic Mixer (18-26 GHz)                       | 2332A00563    | 11/00/02             |
| 900921           | Haefely            | IP 6.2           | Coupling Network                                 | 083-334-13    | 11/10/01             |
| 900918           | Voltech            | IEC Standard 555 | Reference Impedance Network (rented)             | 7701          | 11/08/01             |
| 900061           | Hewlett Packard    | 86603A           | RF Plug-in (1 to 2600 MHz)                       | 2221A02967    | 11/08/01             |
| 900160           | Pacific            | 112-AMX          | AC Power Source (rented)                         | 0187          | 11/15/01             |
| 900932           | Hewlett Packard    | 8449B OPT H02    | Preamplifier (1-26.5 GHz)                        | 3008A00505    | 09/15/01             |
| 900045           | Hewlett Packard    | 8447F            | Preamplifier                                     | 2944A03783    | N/A                  |
| 901040           | Industrial         | SMX100           | Wide Band Preamplifier (0.01-1000 MHz)           | 1736-0696     | 11/17/01             |
| 900721           | Hewlett Packard    | 8447D            | Preamplifier (0.1-1300 MHz)                      | 2727A05397    | N/A                  |
| 900889           | Hewlett Packard    | 85685A           | RF Preselector for HP 8566B or 8568B (20Hz-2GHz) | 3146A01309    | 11/14/01             |
| 900566           | Amplifier Research | FP 2000          | Isotropic Field Probe                            | 20760         | 08/29/01             |
| 900174           | FCC                | F-120-9A         | RF Injection Probe (10 kHz – 300 MHz)            | N/A           | 05/31/01             |
| 901044           | FCC                | F-120-5          | Bulk Current Injection Probe (10 kHz – 150 MHz)  | 17            | 05/12/01             |
| 901042           | FCC                | F-72-1           | RF Current Probe (10 Hz – 100 MHz)               | 44            | 05/11/01             |
| 900704           | FCC                | F-14-1           | Current Probe (10 Hz – 500 kHz)                  | 33            | 05/12/01             |



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| RTL Asset Number | Manufacturer             | Model       | Part Type                                 | Serial Number | Calibration due date |
|------------------|--------------------------|-------------|-------------------------------------------|---------------|----------------------|
| 900894           | FCC                      | F-33-1      | RF Current Probe (10 kHz – 250 MHz)       | 303           | 05/30/01             |
| 900854           | Solar Electronics Co     | 9119-IN     | RF Current Probe                          | 972501        |                      |
| 900849           | Solar Electronics Co     | 9121-IN     | Injection Probe (10 MHz – 1 GHz)          | 953501        |                      |
| 900848           | Solar Electronics Co     | 9320-IN     | RF Current Probe                          | 990521        |                      |
| 900913           | Hewlett Packard          | 85462A      | EMI Receiver RF Section (9 KHz – 6.5 GHz) | 3325A00159    | 03/29/01             |
| 900769           | Hewlett Packard          | 8481B       | Power Sensor                              | 2702A05059    | In cal.              |
| 900937           | Hewlett Packard          | 8482H       | 3-watt Power Sensor (100 KHz to 4.2 GHz)  | 3318A08961    | 12/02/01             |
| 900928           | Hewlett Packard          | 83752A      | Synthesized Sweeper, 0.01 to 20 GHz       | 3610A00866    | 03/28/01             |
| 900946           | Tenney Engineering, Inc. | TH65        | Temperature Chamber with Humidity         | 11380         | 11/07/01             |
| 900111           | Omega Engineering        | DP41-TC-DSS | Temperature Monitor                       | 2060123       | In cal.              |
| 901043           | FCC                      |             | Terminator for RF Current Probe F-72-1    |               | 05/12/01             |
| 900731           | Haefely                  | PEFT.1      | Burst Tester with Coupling Network        | 082 106-29    | 11/10/01             |
| 900402           | BAPCO Electro-Com        | IEC 601 L   | Safety Tester                             | 000028        | 11/10/01             |
| 900720           | Haefely                  | Psurge 4.1  | Surge Tester                              | 083-342-02    | 11/10/01             |
| 900839           | Bird                     | 43P         | Peak Reading Wattmeter                    | 3110          | 11/10/01             |
| 901137           | Par Electronics          | Notch       | Notch Filter (2.3 GHz to 2.5 GHz)         | N/A           | N/A                  |



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## **2 SYSTEM TEST CONFIGURATION**

### **2.1 JUSTIFICATION**

The EUT was tested in all three orthogonal planes in order to determine worst-case emission. Channel 1 at 2.412 GHz, Channel 6 at 2.442 GHz and Channel 11 at 2.462 GHz were tested and investigated from 9kHz to 24GHz. All three channels were investigated and tested. Data for all three channels are presented in this report.

To complete the configuration required by the FCC, the transmitter was tested in a full computer with an external antenna connected to the antenna port similar to its intended use.

The EUT was investigated with the external antenna. The worst-case data taken in this report represents the highest data rate at 11 MBPS. Data rates of 5.5MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance.

### **2.2 EUT EXERCISE SOFTWARE**

The EUT was provided with the software to continuously transmit during testing. The carrier was also checked to verify that the information was being transmitted.

### **2.3 SPECIAL ACCESSORIES**

N/A.



## 2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

### EXTERNAL COMPONENTS

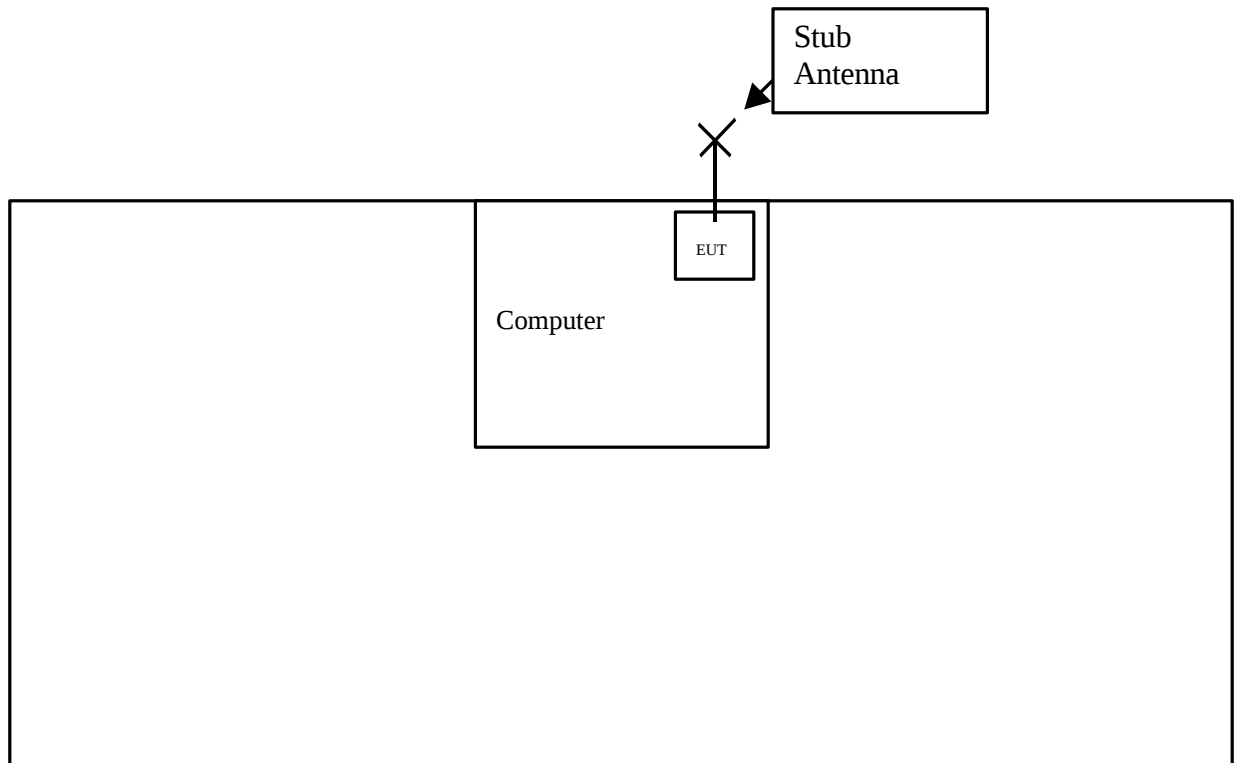
| PART     | MANUFACTURER     | MODEL             | SERIAL NUMBER | FCC ID  | CABLE DESCRIPTION                                   | RTL BAR CODE |
|----------|------------------|-------------------|---------------|---------|-----------------------------------------------------|--------------|
| MOUSE    | MICROSOFT        | INTELLIMOUSE 1.1A | 00332324      | C3KKMP5 | SHIELDED I/O                                        | 900589       |
| KEYBOARD | NMB TECHNOLOGIES | PCB:44J           | PS2           | SAMPLE  | SHIELDED I/O                                        | 012728       |
| MONITOR  | LG ELECTRONICS   | EVF700 17"        | N/A           | SAMPLE  | SHIELDED, FERRITE BOTH ENDS I/O<br>UNSHIELDED POWER | 011929       |
| SYSTEM   | CISCO SYSTEM, VA | N/A               | 253886        | N/A     | UNSHIELDED POWER                                    | 012956       |

### Internal Components

| PART                           | MANUFACTURER                               | MODEL                     | SERIAL NUMBER          | FCC ID     | CABLE DESCRIPTION              | RTL BAR CODE  |
|--------------------------------|--------------------------------------------|---------------------------|------------------------|------------|--------------------------------|---------------|
| ANTENNA                        | CISCO SYSTEM, VA                           | ANTENNA FOR WIRELESS CARD | N/A                    | N/A        | N/A                            | 013055        |
| CONTROLLER CARD                | CATALYST COMMUNICATIONS TECHNOLOGIES, INC. | PCIA564                   | 384-0030-002 REV B     | N/A        | N/A                            | 013047        |
| MINI PCI CARD                  | CATALYST COMMUNICATIONS TECHNOLOGIES, INC. | TYPE III                  | WIRELESS LAN SUPPORT   | N/A        | N/A                            | 013053        |
| <b>WIRELESS LAN CARD (EUT)</b> | <b>CISCO SYSTEM, VA</b>                    | <b>AIR-MP1350 (100mW)</b> | <b>LDK102042 (001)</b> | <b>DOC</b> | <b>N/A</b>                     | <b>013054</b> |
| MODEM                          | CISCO SYSTEM, VA                           | V1456VQH-R7               | 00V237C00135480        | DOC        | N/A                            | 013048        |
| MOTHERBOARD                    | CISCO SYSTEM, VA                           | EP-693A                   | N/A                    | N/A        | INTERNAL I/O<br>INTERNAL POWER | 013049        |
| CD-ROM DRIVE                   | DELTA PRODUCTS CORPORATION, CA             | CD5200A                   | 011039052161           | DOC        | INTERNAL I/O<br>INTERNAL POWER | 013058        |
| POWER SUPPLY                   | ASTEC CUSTOM POWER                         | SA320-3505-1412           | 99-3578                | N/A        | UNSHIELDED POWER               | 011211        |
| FLOPPY DRIVE                   | MITSUMI                                    | D359M3D                   | 0J15AX0837             | N/A        | INTERNAL I/O<br>INTERNAL POWER | 013057        |



## 2.5 CONFIGURATION OF TESTED SYSTEM





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### 3 CONFORMANCE STATEMENT

| STANDARDS REFERENCED FOR THIS REPORT |                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------|
| <b>PART 2: 1999</b>                  | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS  |
| <b>PART 15: 1999</b>                 | RADIO FREQUENCY DEVICES                                                        |
| <b>FCC 97-114</b>                    | GUIDANCE ON MEASUREMENTS FOR DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS           |
| <b>ANSI C63.4-1992</b>               | STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS |
| <b>RSS-210, Issue 3: 2000</b>        | LOW POWER LICENSE-EXEMPT RADIOCOMMUNICATION DEVICES (ALL FREQUENCY BANDS)      |
| <b>RSS-102, Issue 1: 1999</b>        | EVALUATION PROCEDURE FOR MOBILE AND PORTABLE RADIO TRANSMITTERS                |

| FCC Rules Parts   | Frequency Range  | Output Power (W) | Freq. Tolerance | Emission Designator |
|-------------------|------------------|------------------|-----------------|---------------------|
| Part 15.247       | 2412 to 2462 MHz | 0.109            |                 |                     |
| Canadian Sections | Frequency Range  | Output Power (W) | Freq. Tolerance | Emission Designator |
| 6.2.2 (o)         | 2412 to 2462 MHz | 0.109            |                 |                     |

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. Modifications were not made during testing to the equipment in order to achieve compliance with these standards.

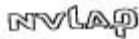
Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: 

Date: *February 28, 2001*

Typed/Printed Name: Desmond A. Fraser

Position: President  
(NVLAP Signatory)



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

**Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.**



## 4 FIELD STRENGTH CALCULATION

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:

$$FI(\text{dBuV/m}) = SAR(\text{dBuV}) + SCF(\text{dB/m})$$

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:

$$SCF(\text{dB/m}) = -PG(\text{dB}) + AF(\text{dB/m}) + CL(\text{dB})$$

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:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a 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:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$
$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

**EIRP calculation:** Power from power meter in (dBm) + antenna gain in (dBi)



## 5 CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 7 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 7 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or average mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.



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## 5.1 CONDUCTED EMISSIONS TEST

The following table lists worst-case conducted emission data. Specifically: Emission Frequency, Test Detector, Analyzer Reading, Site Correction Factor, corrected Emission Level, Quasi Peak Limit and Margin, and the Average Limit and Margin.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.



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### 5.1.1 CONDUCTED EMISSIONS (CHANNEL 1 WITH THE EXTERNAL ANTENNA)

#### NEUTRAL SIDE (Line 1)

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBmV) | Site Correction Factor (dB) | Emission Level (dBmV) | FCC B Limit (dBmV) | FCC B Margin (dB) |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|-------------------|
| 11.781                   | Pk            | 47.6                    | -3.0                        | 44.6                  | 48.0               | -3.4              |
| 14.727                   | Pk            | 47.4                    | -3.3                        | 44.1                  | 48.0               | -3.9              |
| 20.617                   | Pk            | 48.1                    | -3.9                        | 44.2                  | 48.0               | -3.8              |
| 29.454                   | Pk            | 45.4                    | -4.5                        | 40.9                  | 48.0               | -7.1              |

#### HOT SIDE (Line 2)

| Emission Frequency (MHz) | Test Detector | Analyzer Reading (dBmV) | Site Correction Factor (dB) | Emission Level (dBmV) | FCC B Limit (dBmV) | FCC B Margin (dB) |
|--------------------------|---------------|-------------------------|-----------------------------|-----------------------|--------------------|-------------------|
| 11.781                   | Pk            | 47.8                    | -3.0                        | 44.8                  | 48.0               | -3.2              |
| 20.617                   | Pk            | 48.8                    | -3.9                        | 44.9                  | 48.0               | -3.1              |
| 26.507                   | Pk            | 43.3                    | -4.3                        | 39.0                  | 48.0               | -9.0              |
| 29.453                   | Pk            | 45.3                    | -4.5                        | 40.8                  | 48.0               | -7.2              |

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

**TEST PERSONNEL:** ELIZABETH BAUMAN

Typed/Printed Name :

Date: February 28, 2001



## 6 RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was scanned indoor at one and three meter distances. This was done in order to determine its emissions spectrum signature. 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 emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. . **For radiated measurements above 1 GHz, a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz are used.**

*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 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.*



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## 6.1 RADIATED EMISSIONS TEST

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit.

### 6.1.1 RADIATED EMISSION DIGITAL NOISE (CHANNEL 1 WITH THE EXTERNAL ANTENNA)

| Emission Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBmV) | Site Correction Factor (dB/m) | Emission Level (dBmV/m) | Limit (dBmV/m) | Margin (dB) |
|--------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|
| 263.998                  | Qp            | H                      | 190                     | 1.0                | 38.2                    | -13.5                         | 24.7                    | 46.0           | -21.3       |
| 352.006                  | Qp            | H                      | 160                     | 1.0                | 44.3                    | -11.4                         | 32.9                    | 46.0           | -13.1       |
| 483.998                  | Qp            | H                      | 25                      | 1.3                | 27.4                    | -8.3                          | 19.1                    | 46.0           | -26.9       |
| 747.998                  | Qp            | H                      | 150                     | 1.0                | 29.1                    | -4.5                          | 24.6                    | 46.0           | -21.4       |
| 835.998                  | Qp            | H                      | 145                     | 1.0                | 25.8                    | -3.4                          | 22.4                    | 46.0           | -23.6       |
| 923.998                  | Qp            | H                      | 140                     | 1.0                | 25.2                    | -2.4                          | 22.8                    | 46.0           | -23.2       |

QUASI PEAK =120 KHZ

**TEST PERSONNEL: ELIZABETH BAUMAN**

Typed/Printed Name :

Date: February 28, 2001



## 7 MODULATED BANDWIDTH

The minimum 6 dB bandwidth per FCC 15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The Minimum 6 dB modulated bandwidths are the following:

| Channel | 6(dB) Bandwidth (MHz) |
|---------|-----------------------|
| 1       | 11.0                  |
| 6       | 11.5                  |
| 11      | 11.4                  |

The 6dB bandwidth is listed in figures Section 26 of this report.

## 8 CONDUCTED POWER OUTPUT

The conducted and radiated output power per FCC 15.247(b) was measured on the EUT using a power meter. The radiated EIRP measurement data are results from our outdoor 3-meter range.

| Channel | Radiated EIRP (dBm)* | Power conducted output (dBm) |
|---------|----------------------|------------------------------|
| 1       | 22.5                 | 19.4                         |
| 6       | 22.5                 | 20.4                         |
| 11      | 20.4                 | 18.4                         |

\*Measurement accuracy is +/- 1.5 dB



## 9 ANTENNA CONDUCTED SPURIOUS EMISSIONS

Antenna spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at 2.413GHz for Channel 1, 2.443GHz for Channel 6 and 2.462GHz for Channel 11. No other harmonics or spurs were found within 20 dB of the carrier level, and from 9kHz to the carriers 10<sup>th</sup> harmonic. See antenna conducted spurious noise table.

FCC 97 114 appendix C specifies 100KHz/300KHz resolution and video bandwidth for the authorized band up to the 10<sup>th</sup> harmonic. All spurs and harmonic must be 20 dB down from the carrier within the authorized band. A 2.4 GHz notch filter was used to attenuate the carrier so that the spectrum analyzer would not be overloaded. The insertion loss of the notch filter was added to the spurious level on the table below.

| Channel 1       |                      |                 |
|-----------------|----------------------|-----------------|
| Frequency (MHz) | Spurious level (dBm) | FCC Margin (dB) |
| 18.990          | -45.0                | -30.0           |
| 602.300         | -28.0                | -13.0           |
| 801.760         | -33.0                | -18.0           |
| 951.954         | -46.0                | -31.0           |
| 1808.600        | -35.0                | -20.0           |
| 2445.510        | -49.0                | -34.0           |
| 2548.070        | -55.0                | -40.0           |
| 2785.510        | -51.0                | -36.0           |
| 4824.060        | -41.7                | -26,7           |

| Channel 6       |                      |                 |
|-----------------|----------------------|-----------------|
| Frequency (MHz) | Spurious level (dBm) | FCC Margin (dB) |
| 8.000           | -28.8                | -14.8           |
| 10.990          | -28.5                | -14.5           |
| 27.440          | -37.0                | -23.0           |
| 82.300          | -37.6                | -23.6           |
| 631.320         | -19.6                | -5.6            |
| 841.735         | -31.7                | -17.7           |
| 946.950         | -52.0                | -38.0           |
| 2815.510        | -54.0                | -40.0           |
| 4884.030        | -36.1                | -22.1           |

| Channel 11      |                      |                 |
|-----------------|----------------------|-----------------|
| Frequency (MHz) | Spurious level (dBm) | FCC Margin (dB) |
| 8.020           | -41.0                | -24.4           |
| 144.500         | -48.0                | -31.4           |
| 650.800         | -28.5                | -11.9           |
| 850.100         | -38.7                | -22.1           |
| 1880.000        | -42.7                | -26.1           |
| 2407.489        | -57.0                | -40.4           |
| 2440.940        | -50.0                | -33.4           |
| 2835.000        | -59.0                | -42.4           |
| 4922.000        | -43.0                | -26.4           |
| 4927.000        | -57.0                | -40.4           |



## 10 RADIATED SPURIOUS EMISSIONS

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Section 15.205. The maximum permitted average field strength for the restricted band is listed in Section 15.209. A 2.4 GHz notch filter was used to attenuate the carrier so that the spectrum analyzer would not be overloaded. The insertion loss of the notch filter was added to the spurious level on the table below.

### 10.1.1 RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 1)

| Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBmV) | Site Correction Factor (dB/m) | Level in (dBmV/m) | Limit in (dBmV/m) | Margin (dB) |
|-----------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------|-------------------|-------------|
| 2413.07         | AV            | V                      | 90                      | 1.5                | 98.5                    | 8.9                           | 107.4             | Fundamental       |             |
| 2413.07         | PK            | V                      | 90                      | 1.5                | 108.4                   | 8.9                           | 117.3             | Fundamental       |             |
| 2785.51         | AV            | V                      | 95                      | 1.5                | 37.0                    | 9.0                           | 46.0              | 54.0              | -8          |
| 4824.33         | AV            | V                      | 90                      | 1.5                | 33.5                    |                               |                   | 54.0              |             |
| 7239.21         | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 87.4              |             |
| 9652.28         | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 87.4              |             |
| 12065.35        | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 54.0              |             |
| 14478.42        | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 54.0              |             |
| 16891.49        | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 87.4              |             |
| 19304.56        | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 54.0              |             |
| 21717.63        | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 87.4              |             |
| 24130.7         | AV            | V                      | 90                      | 1.5                | NF                      |                               |                   | 87.4              |             |

Average Measurement (AV: resolution bandwidth. =1 MHz, video bandwidth = 10 Hz; NF = noise floor

Peak Measurement (PK) = resolution bandwidth = 1 MHz, video bandwidth = 1 MHz

NF = Noise Floor

### 10.1.2 RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 6)

| Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBmV) | Site Correction Factor (dB/m) | Level in (dBmV/m) | Limit in (dBmV/m) | Margin (dB) |
|-----------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------|-------------------|-------------|
| 2442.97         | AV            | V                      | 95                      | 1.                 | 98.7                    | 8.9                           | 107.6             | Fundamental       |             |
| 2442.97         | PK            | V                      | 95                      | 1.                 | 108.8                   | 8.9                           | 117.7             | Fundamental       |             |
| 4884.13         | AV            | V                      | 95                      | 1.                 | 34.7                    |                               | NF                | 54.0              |             |
| 7328.91         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 87.6              |             |
| 9771.88         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 12214.85        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 14657.82        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 87.6              |             |
| 17100.79        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 87.6              |             |
| 19543.76        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 21986.73        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 87.6              |             |
| 24429.70        | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 87.6              |             |

Average Measurement (AV: resolution bandwidth. =1 MHz, video bandwidth = 10 Hz; NF = noise floor



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Peak Measurement (PK) = resolution bandwidth = 1 MHz, video bandwidth = 1 MHz  
NF = Noise Floor

### 10.1.3 RADIATED EMISSIONS HARMONICS/SPURIOUS (CHANNEL 11)

| Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBmV) | Site Correction Factor (dB/m) | Level in (dBmV/m) | Limit in (dBmV/m) | Margin (dB) |
|-----------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------|-------------------|-------------|
| 2462.9          | AV            | V                      | 95                      | 1.                 | 98.5                    | 7.5                           | 106.0             | Fundamental       |             |
| 2462.9          | PK            | V                      | 95                      | 1.                 | 108.3                   | 7.5                           | 115.8             | Fundamental       |             |
| 4925.8          | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 7388.7          | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 9851.6          | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 86.0              |             |
| 12314.5         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 14777.4         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 86.0              |             |
| 17240.3         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 86.0              |             |
| 19703.2         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 54.0              |             |
| 22166.1         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 86.0              |             |
| 24629.0         | AV            | V                      | 95                      | 1.                 | NF                      |                               |                   | 86.0              |             |

Average Measurement (AV: resolution bandwidth. =1 MHz, video bandwidth = 10 Hz; NF = noise floor  
Peak Measurement (PK) = resolution bandwidth = 1 MHz, video bandwidth = 1 MHz  
NF = Noise Floor

#### **TEST PERSONNEL:**

**Typed/Printed Name:** Rachid SEHB

**Date:** February 28, 2001



## 11 POWER SPECTRAL DENSITY

The Power spectral density per FCC 15.247(d) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 3kHz, and the sweep time set at 17 second. The spectral lines were resolved for the modulated carriers at 2.412GHz, 2.442GHz and 2.462GHz respectively. These levels are well below the +8 dBm limit. See power spectral density table below and the plots in Section 16 of this report.

| Channel | Power Spectral Density limit = +8dBm |
|---------|--------------------------------------|
| 1       | -12.3                                |
| 6       | -11.6                                |
| 11      | -13.9                                |

## 12 COMPLIANCE WITH THE RESTRICTED BAND EDGE

Compliance with the band edges was performed using the FCC's "Radiated Measurement at a Band Edge" guidance document. The final data derived below were from radiated measurements only. The data taken in this report represents the worst case at 11 MBPS. Data rates of 5.5MBPS, 2 MBPS and 1 MBPS were investigated and found to be in compliance. Both absolute and delta method were performed with the same results.

| Band edge Measurement |         |            |                               |                          |                    |                 |
|-----------------------|---------|------------|-------------------------------|--------------------------|--------------------|-----------------|
| Antenna               | Channel | Delta (dB) | Field Strength Level (dBmV/m) | Corrected level (dBmV/m) | FCC Limit (dBmV/m) | FCC Margin (dB) |
| External              | 1       | -54.3      | 107.4                         | 53.1                     | 54                 | -0.9            |
| External              | 11      | -52.1      | 106.0                         | 53.9                     | 54                 | -0.1            |



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## 13 RECIEVER DATA

### Radiated Test

| Temperature: 47°F Humidity: 41% |               |                        |                         |                    |                         |                               |                         |                |             |
|---------------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|
| 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) |
| 263.998                         | Qp            | H                      | 185                     | 1.2                | 42.5                    | -13.5                         | 29.0                    | 46.0           | -17.0       |
| 351.998                         | Qp            | H                      | 180                     | 1.0                | 43.5                    | -11.4                         | 32.1                    | 46.0           | -13.9       |
| 747.998                         | Qp            | H                      | 150                     | 1.0                | 29.8                    | -4.5                          | 25.3                    | 46.0           | -20.7       |
| 791.998                         | Qp            | H                      | 160                     | 1.0                | 27.8                    | -3.7                          | 24.1                    | 46.0           | -21.9       |
| 835.998                         | Qp            | H                      | 145                     | 1.0                | 30.4                    | -3.4                          | 27.0                    | 46.0           | -19.0       |
| 923.998                         | Qp            | H                      | 165                     | 1.0                | 26.1                    | -2.4                          | 23.7                    | 46.0           | -22.3       |



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## 14 ANTENNA SPECIFICATIONS

### External antenna

#### Electrical Specifications:

|                              |                                             |
|------------------------------|---------------------------------------------|
| <b>Model No.</b>             | Dual pattern antenna with diversity support |
| <b>Frequency Range</b>       | 2.4-2.5GHz                                  |
| <b>Bandwidth</b>             | 100MHz                                      |
| <b>Gain</b>                  | 2.2dBi                                      |
| <b>V.S.W.R</b>               | <1.9                                        |
| <b>Radiation Pattern</b>     | Omni-Directional                            |
| <b>Polarization</b>          | Vertical                                    |
| <b>Impedance</b>             | 50ohms                                      |
| <b>Operating Temperature</b> |                                             |

#### Electrical Specifications:

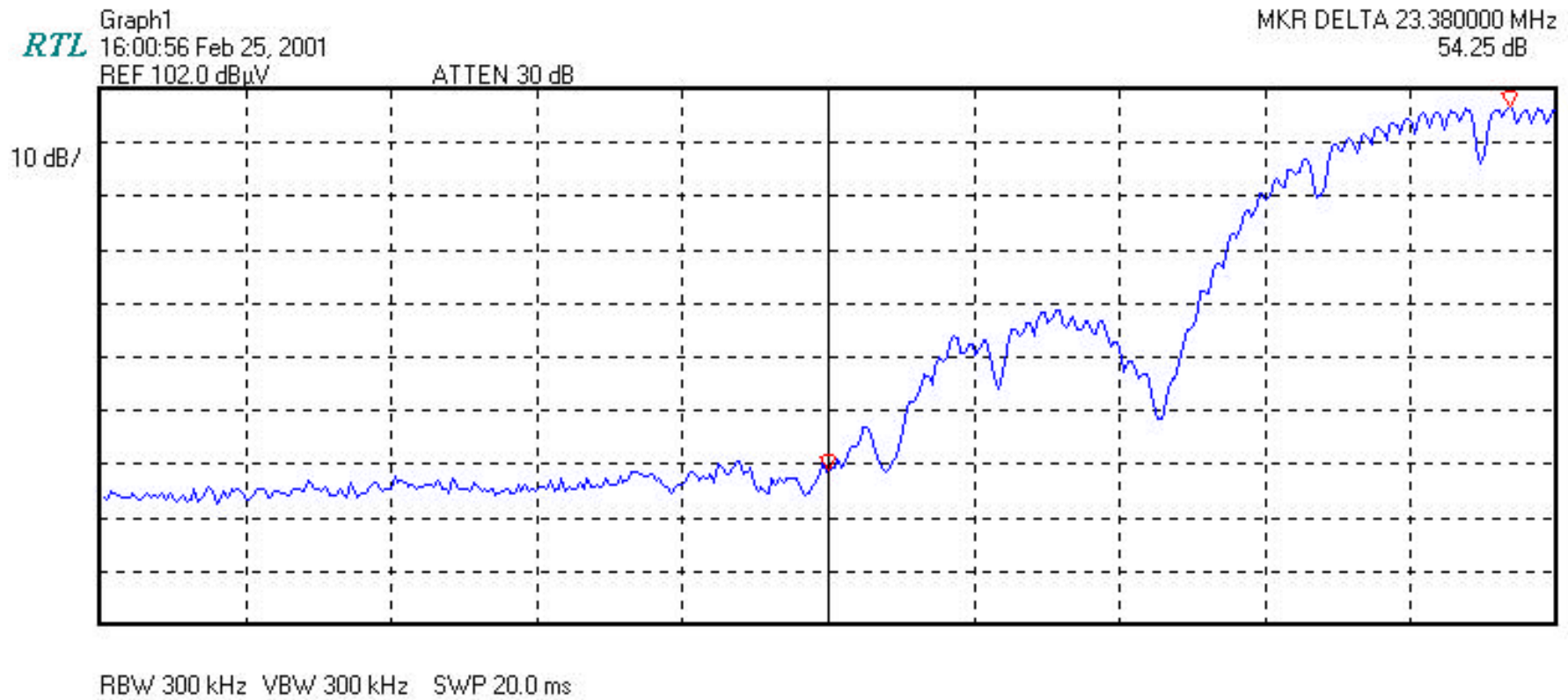
|                         |     |
|-------------------------|-----|
| <b>Dimension</b>        | N/A |
| <b>Pulling Strength</b> | N/A |
| <b>Swivel Torque</b>    | N/A |
| <b>Input Connector</b>  |     |



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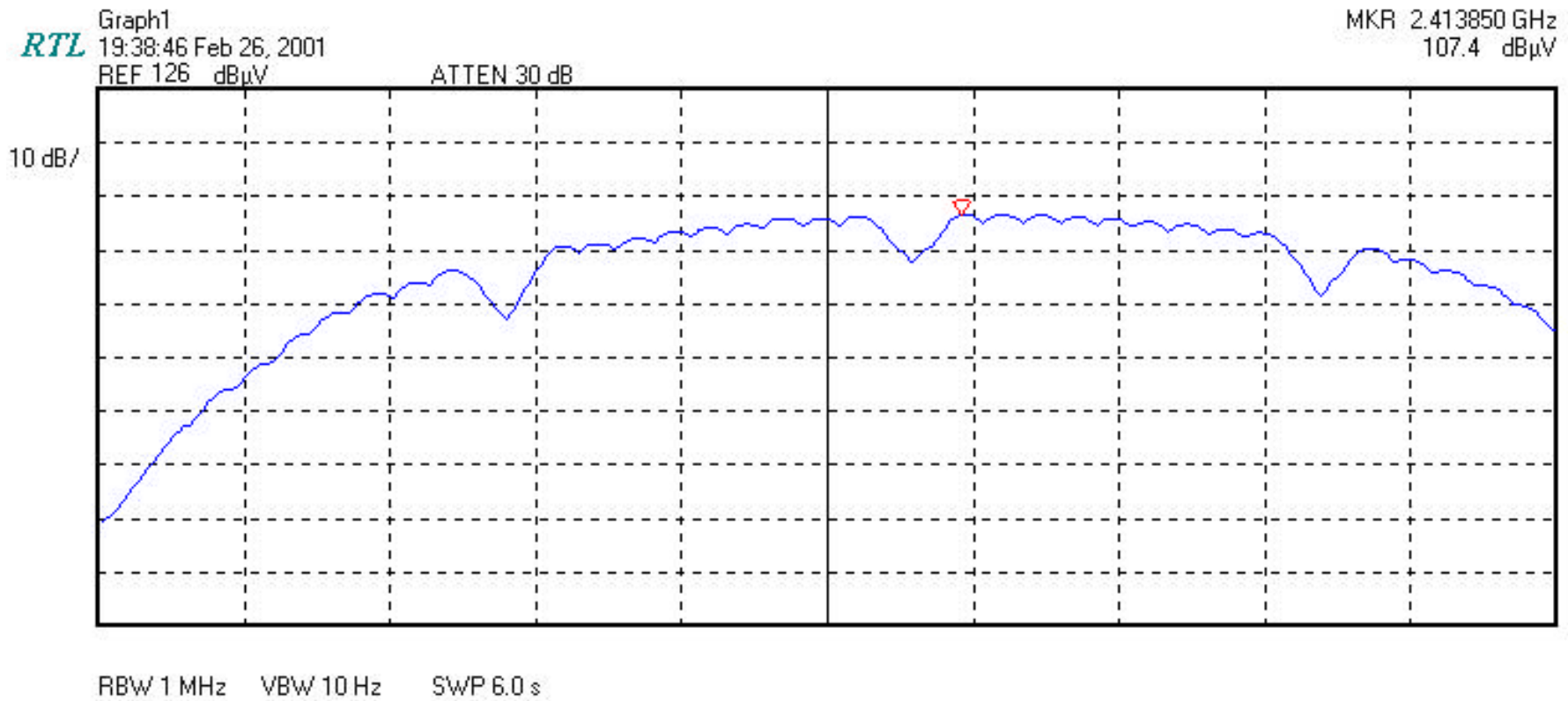
## 15 BANDEDGE PLOTS

### CHANNEL 1





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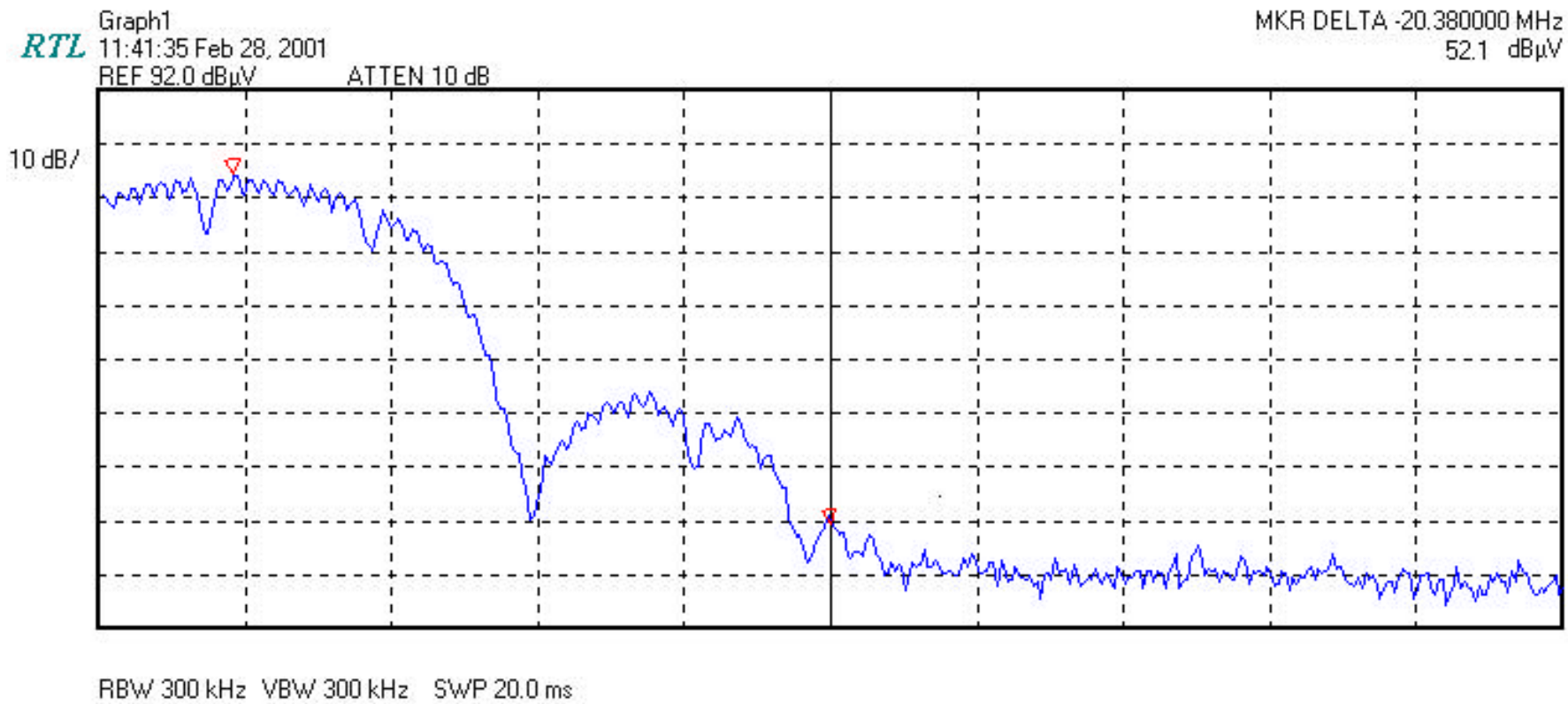


**Note site factor entered into analyzer register for corrected final result.**



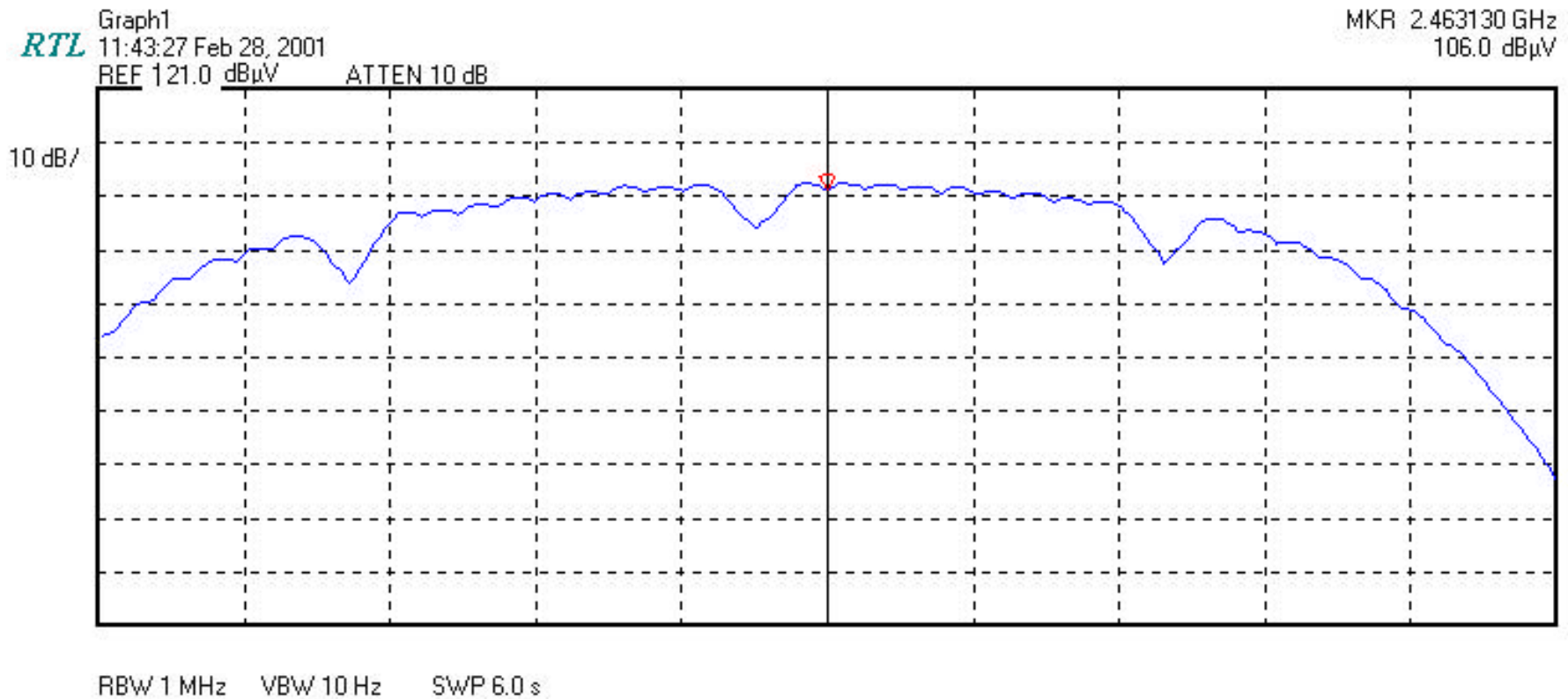
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## CHANNEL 11





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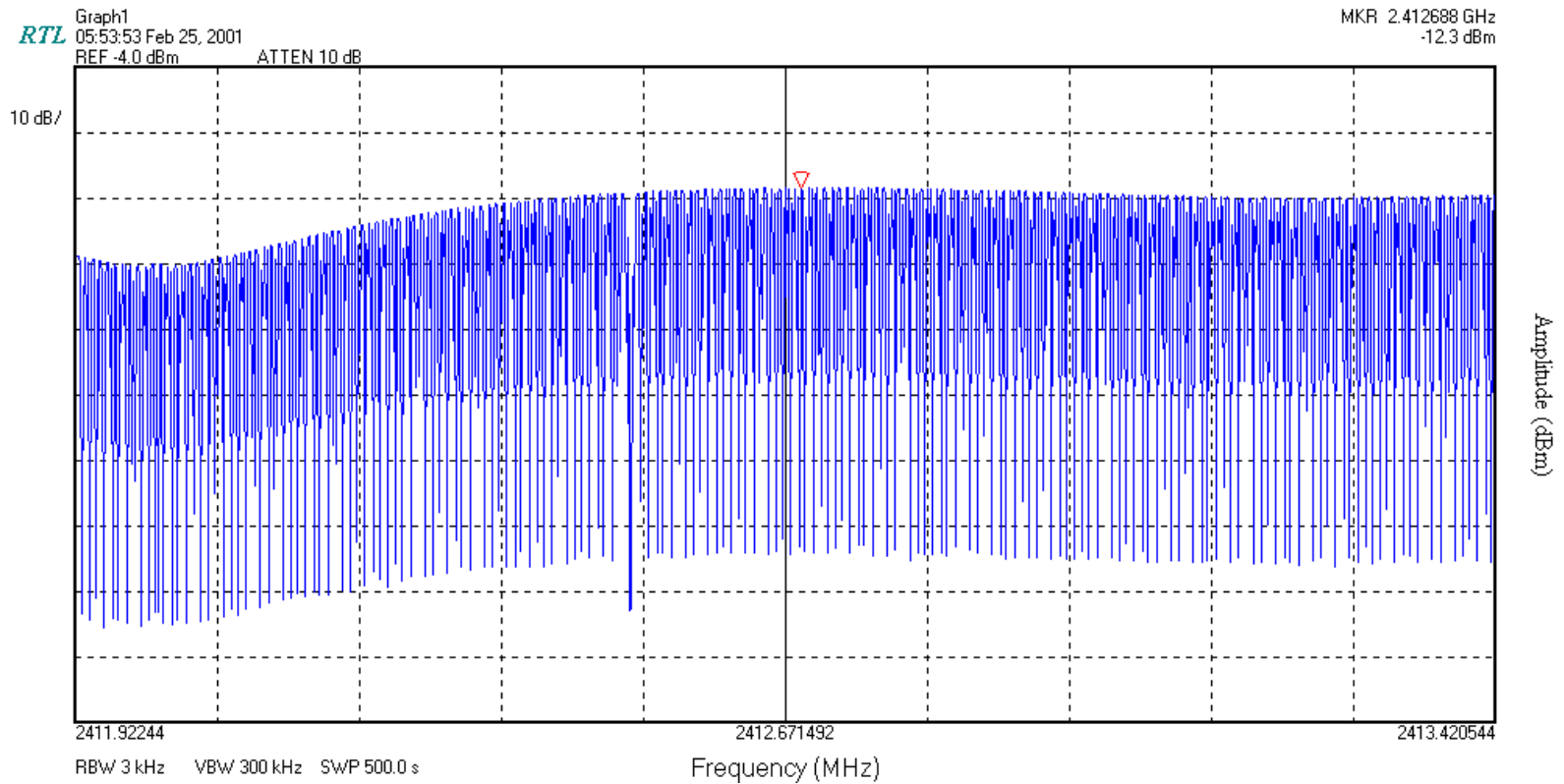


Note site factor entered into analyzer register for corrected final result.



## 16 SPECTRAL DENSITY PLOTS

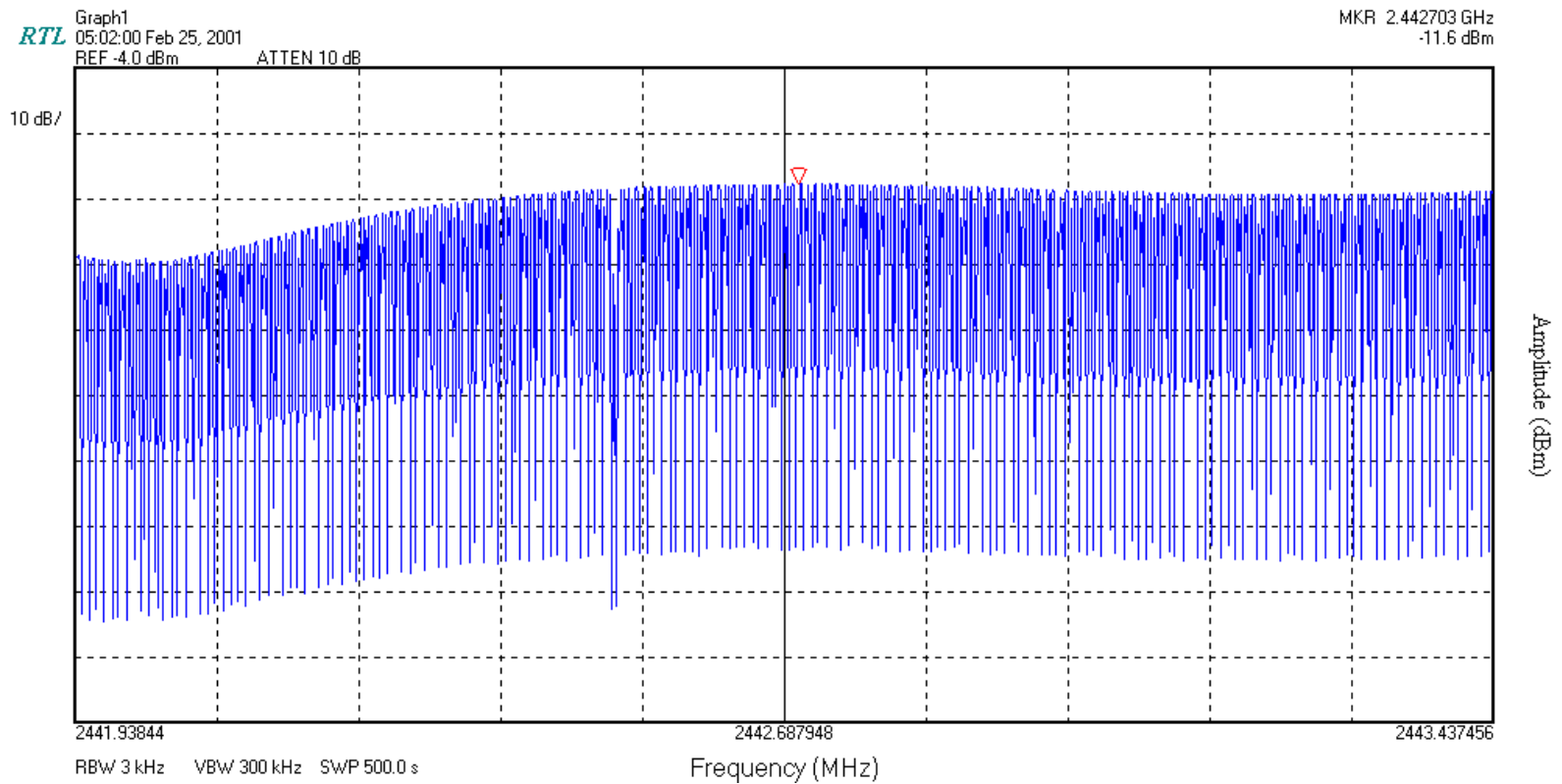
### CHANNEL 1





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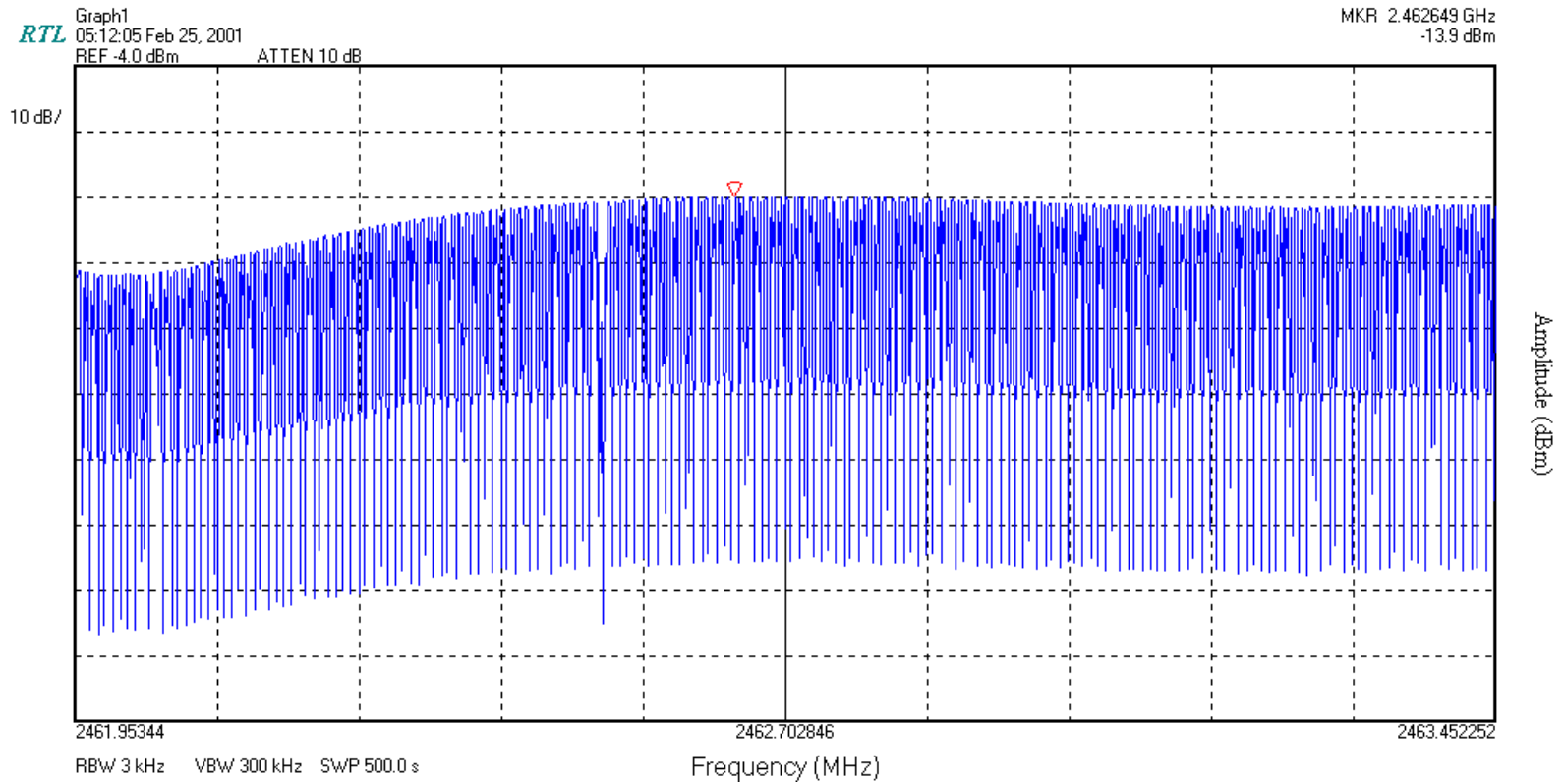
## CHANNEL 6





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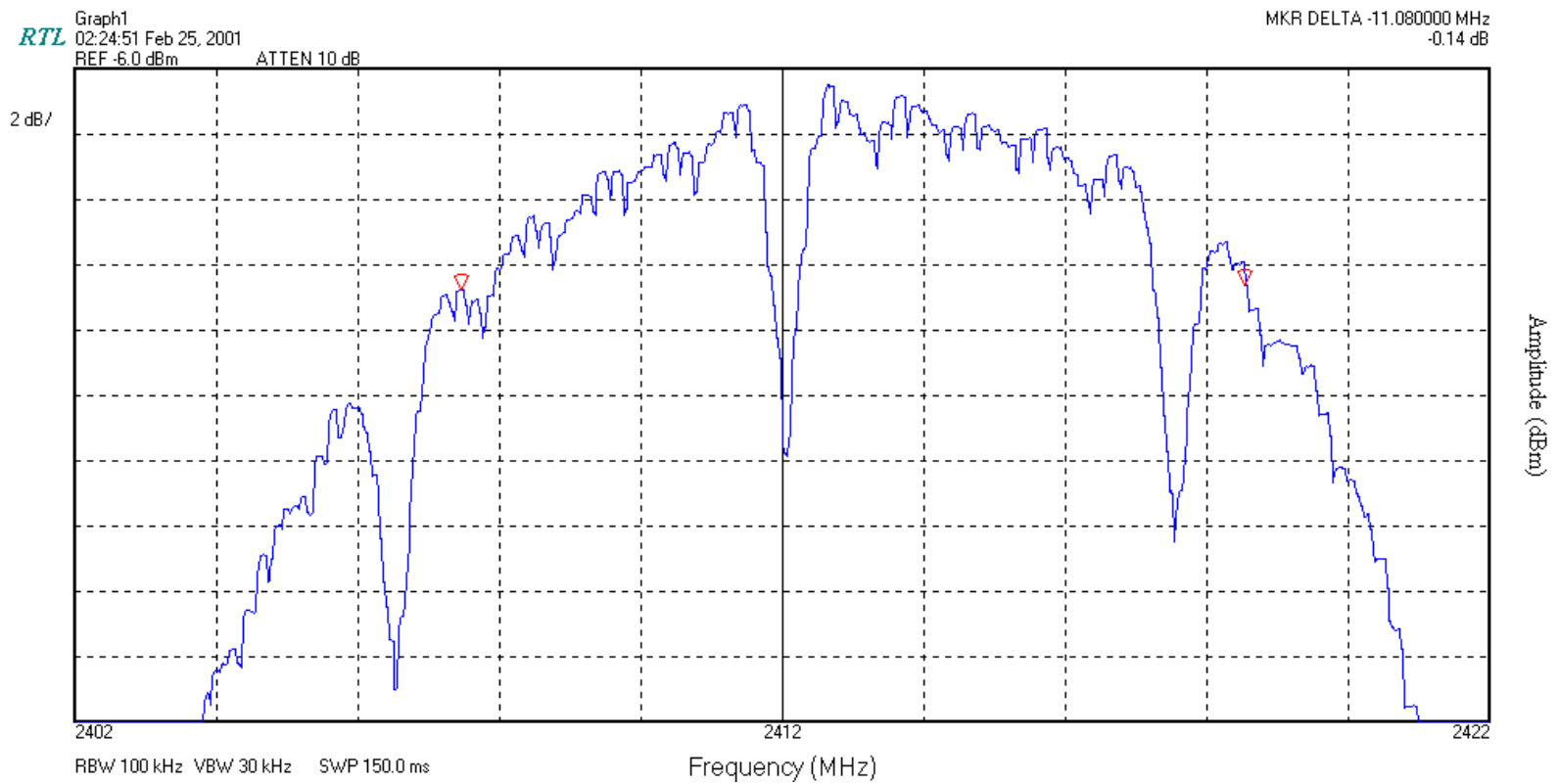
## CHANNEL 11





## 17 6dB PLOTS

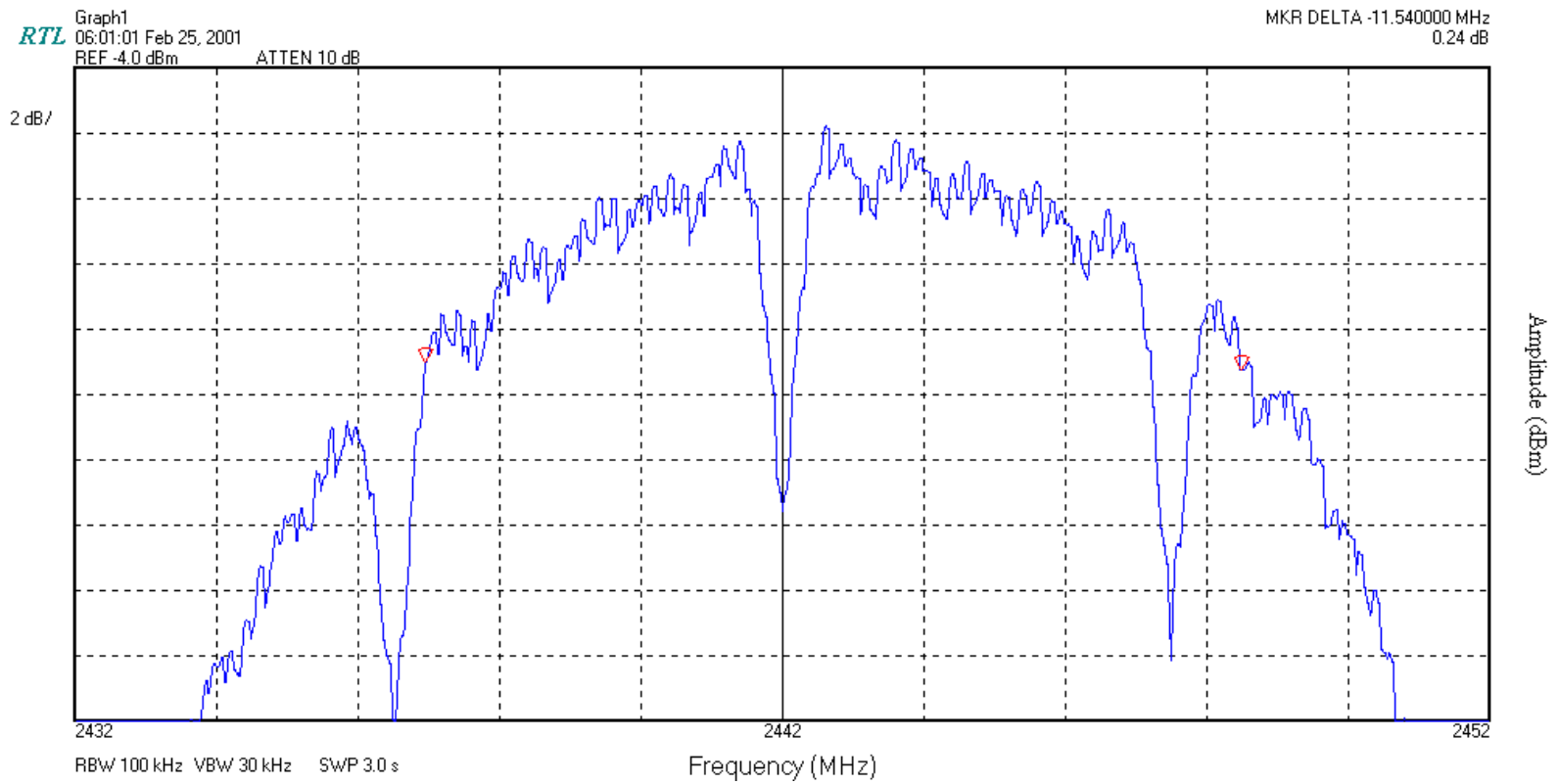
### CHANNEL 1





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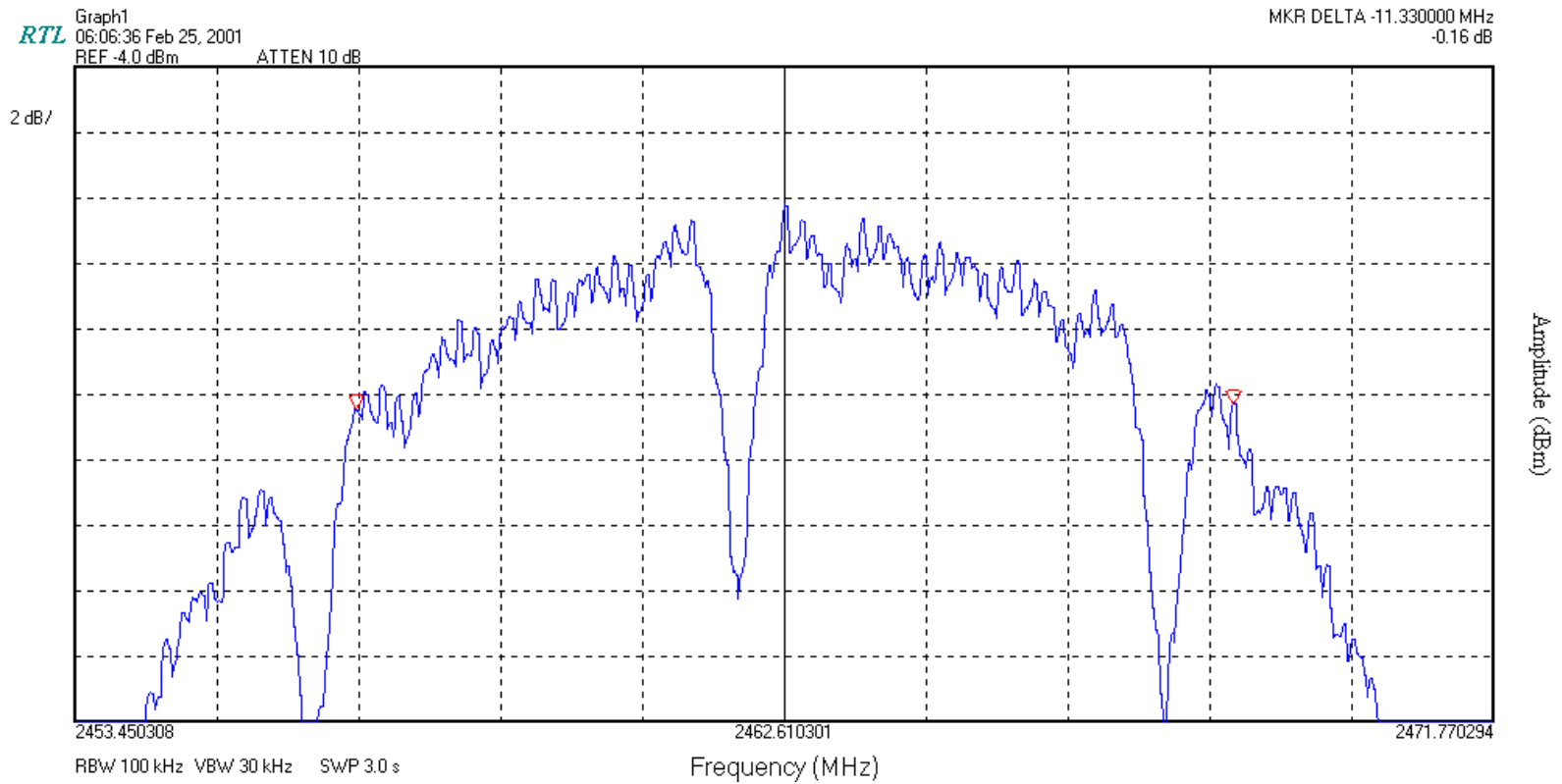
## CHANNEL 6





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## CHANNEL 11



## **ATTACHMENT A – RADIATED DATA**

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## EXHIBIT A – Test Results (Cont.)

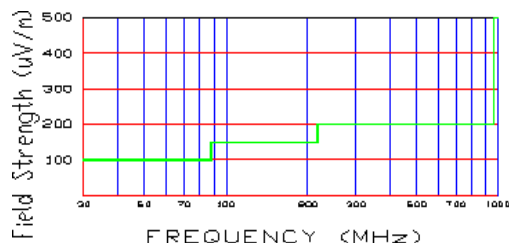
### Radiated Measurements

§15.247(b) / §15.205 & §15.209

Transfer Rate: 1 Mbps  
Distance of Measurements: 3 Meters  
Channel: 01

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4824            | -98.4       | 40.4      | V         | 49.0          | 281.5       | 5.0         |
| 7236            | -104.3      | 47.4      | V         | 50.1          | 320.6       | 3.9         |
| 9648            | -115.8      | 50.3      | V         | 41.5          | 118.8       | 12.5        |
| 12060           | -135.0      | 53.7      | V         | 25.7          | 19.3        | 28.3        |

**Table A-6. Radiated Measurements @ 3 meters**



**Figure A-5. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 1 of 15                    |

## EXHIBIT A – Test Results (Cont.)

### Radiated Measurements (Cont.)

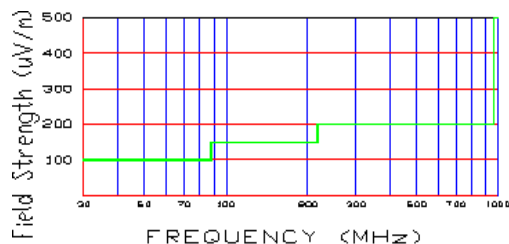
§15.247(b) / §15.205 & §15.209

Transfer Rate: 1 Mbps  
Distance of Measurements: 3 Meters  
Channel: 06

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (mV/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|------------|-------------|
| 4874            | -98.1       | 40.5      | V         | 49.4          | 295.1      | 4.6         |
| 7311            | -104.1      | 48.0      | V         | 50.9          | 350.7      | 3.1         |
| 9748            | -115.7      | 50.3      | V         | 41.6          | 120.2      | 12.4        |
| 12185           | -135.0      | 53.7      | V         | 25.7          | 19.3       | 28.3        |

**Table A-7. Radiated Measurements @ 3 meters**

#### NOTES:



**Figure A-6. Radiated limits at 3 meters.**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 2 of 15                    |

## EXHIBIT A – Test Results (Cont.)

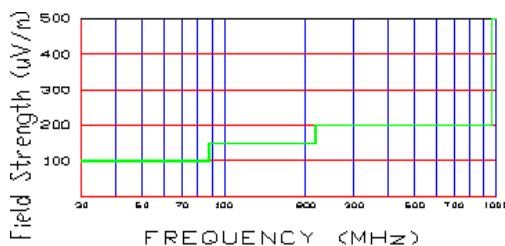
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 1 Mbps  
Distance of Measurements: 3 Meters  
Channel: 11

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (mV/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|------------|-------------|
| 4924            | -99.1       | 40.7      | V         | 48.6          | 269.1      | 5.4         |
| 7386            | -104.7      | 48.2      | V         | 50.5          | 335.0      | 3.5         |
| 9848            | -116.1      | 50.4      | V         | 41.3          | 116.1      | 12.7        |
| 12310           | -135.0      | 53.8      | V         | 25.8          | 19.5       | 28.2        |

**Table A-8. Radiated Measurements @ 3 meters**



**Figure A-7. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 3 of 15                    |

## EXHIBIT A – Test Results (Cont.)

### Radiated Measurements (Cont.)

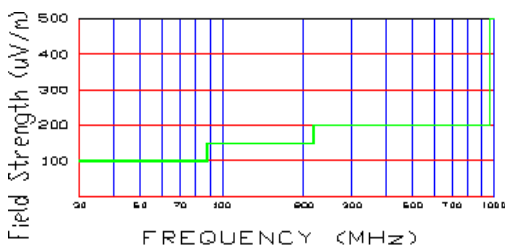
§15.247(b) / §15.205 & §15.209

Transfer Rate: 2 Mbps  
Distance of Measurements: 3 Meters  
Channel: 01

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4824            | -98.6       | 40.4      | V         | 48.8          | 275.1       | 5.2         |
| 7236            | -104.8      | 47.4      | V         | 49.6          | 302.7       | 4.4         |
| 9648            | -115.9      | 50.3      | V         | 41.4          | 117.5       | 12.6        |
| 12060           | -135.0      | 53.7      | V         | 25.7          | 19.3        | 28.3        |

**Table A-9. Radiated Measurements @ 3 meters**

#### NOTES:



**Figure A-8. Radiated limits at 3 meters.**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                          |                            |                          |                                 |
|----------------------------------|--------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 | PCTEST<br>Complete Wireless Lab<br>FCC CERTIFICATION REPORT <b>PAXAR</b> |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 4 of 15                    |

## EXHIBIT A – Test Results (Cont.)

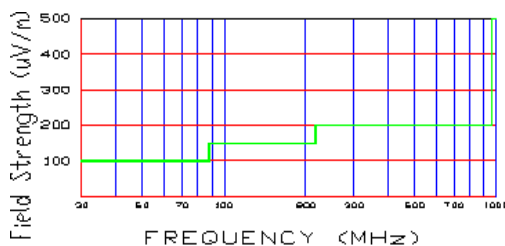
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 2 Mbps  
Distance of Measurements: 3 Meters  
Channel: 06

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4874            | -98.4       | 40.5      | V         | 49.1          | 285.1       | 4.9         |
| 7311            | -104.3      | 48.0      | V         | 50.7          | 342.8       | 3.3         |
| 9748            | -115.9      | 50.3      | V         | 41.4          | 117.5       | 12.6        |
| 12185           | -135.0      | 53.7      | V         | 25.7          | 19.27       | 28.3        |

**Table A-10. Radiated Measurements @ 3 meters**



**Figure A-9. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 5 of 15                    |

## EXHIBIT A – Test Results (Cont.)

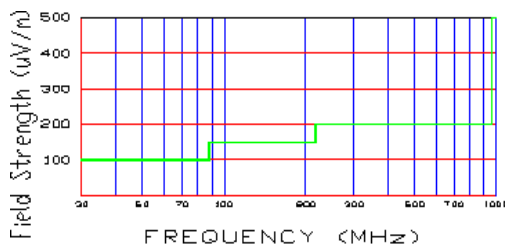
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 2 Mbps  
Distance of Measurements: 3 Meters  
Channel: 11

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4924            | -99.2       | 40.7      | V         | 48.5          | 266.1       | 5.5         |
| 7386            | -104.8      | 48.2      | V         | 50.4          | 331.1       | 3.6         |
| 9848            | -117.1      | 50.4      | V         | 40.3          | 103.5       | 13.7        |
| 12310           | -135.0      | 53.8      | V         | 25.8          | 19.5        | 28.2        |

**Table A-11. Radiated Measurements @ 3 meters**



**Figure A-10. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 6 of 15                    |

## EXHIBIT A – Test Results (Cont.)

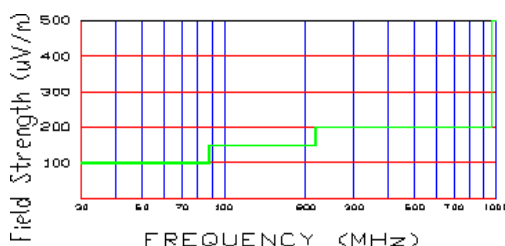
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 5.5 Mbps  
Distance of Measurements: 3 Meters  
Channel: 01

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4824            | -98.8       | 40.4      | V         | 48.6          | 268.8       | 5.4         |
| 7236            | -105.1      | 47.4      | V         | 49.3          | 282.4       | 4.7         |
| 9648            | -117.7      | 50.3      | V         | 39.6          | 95.5        | 14.4        |
| 12060           | -135.0      | 53.7      | V         | 25.7          | 19.3        | 28.3        |

**Table A-12. Radiated Measurements @ 3 meters**



**Figure A-11. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 7 of 15                    |

## EXHIBIT A – Test Results (Cont.)

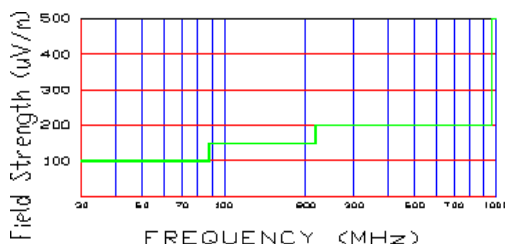
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 5.5 Mbps  
Distance of Measurements: 3 Meters  
Channel: 06

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4874            | -98.1       | 40.5      | V         | 49.5          | 295.1       | 4.6         |
| 7311            | -104.5      | 48.0      | V         | 50.5          | 335.0       | 3.5         |
| 9748            | -115.7      | 50.3      | V         | 41.6          | 120.2       | 12.4        |
| 12185           | -135.0      | 53.7      | V         | 25.7          | 19.3        | 28.3        |

**Table A-13. Radiated Measurements @ 3 meters**



**Figure A-12. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 8 of 15                    |

## EXHIBIT A – Test Results (Cont.)

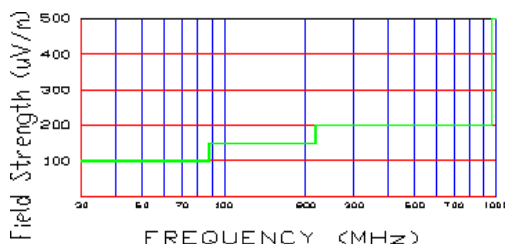
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 5.5 Mbps  
Distance of Measurements: 3 Meters  
Channel: 11

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4924            | -99.1       | 40.7      | V         | 48.6          | 269.1       | 5.4         |
| 7386            | -105.7      | 48.2      | V         | 49.5          | 298.5       | 4.5         |
| 9848            | -118.1      | 50.4      | V         | 39.3          | 92.2        | 14.7        |
| 12310           | -135.0      | 53.8      | V         | 25.8          | 19.5        | 28.2        |

**Table A-14. Radiated Measurements @ 3 meters**



**Figure A-13. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                                   |                            |                          |                                 |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 | <div><b>FCC CERTIFICATION REPORT</b></div> |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                                       | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 9 of 15                    |

## **EXHIBIT A – Test Results (Cont.)** **Radiated Measurements (Cont.)**

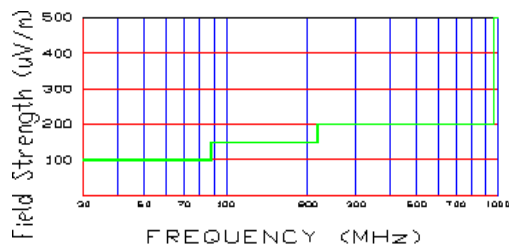
§15.247(b) / §15.205 & §15.209

Transfer Rate: 11 Mbps  
Distance of Measurements: 3 Meters  
Channel: 01

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4824            | -99.1       | 40.4      | V         | 48.3          | 259.7       | 5.7         |
| 7236            | -104.8      | 47.4      | V         | 49.6          | 302.7       | 4.4         |
| 9648            | -117.7      | 50.3      | V         | 39.6          | 95.5        | 14.4        |
| 12060           | -135.0      | 53.7      | V         | 27.1          | 19.3        | 28.3        |

**Table A-15. Radiated Measurements @ 3 meters**

**NOTES:**



**Figure A-14. Radiated limits at 3 meters.**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 10 of 15                   |

## EXHIBIT A – Test Results (Cont.)

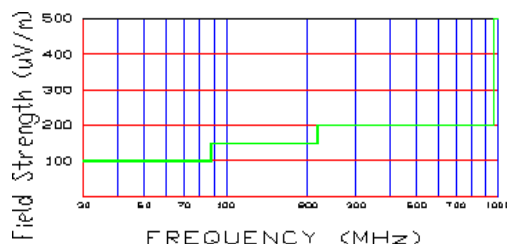
### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 11 Mbps  
Distance of Measurements: 3 Meters  
Channel: 06

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4874            | -98.1       | 40.5      | V         | 49.4          | 295.1       | 4.6         |
| 7311            | -105.3      | 48.0      | V         | 49.7          | 305.5       | 4.3         |
| 9748            | -115.7      | 50.3      | V         | 41.6          | 120.2       | 12.4        |
| 12185           | -133.6      | 53.7      | V         | 27.1          | 22.6        | 26.9        |

**Table A-16. Radiated Measurements @ 3 meters**



**Figure A-15. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  <b>FCC CERTIFICATION REPORT</b>  |                            |                          | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 11 of 15                   |

## EXHIBIT A – Test Results (Cont.)

### Radiated Measurements (Cont.)

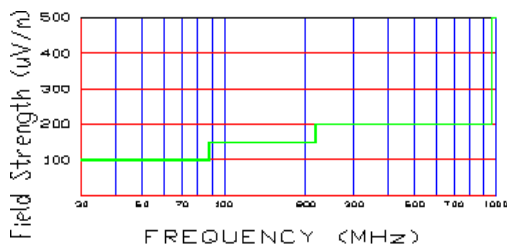
§15.247(b) / §15.205 & §15.209

Transfer Rate: 11 Mbps  
Distance of Measurements: 3 Meters  
Channel: 11

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBm V/m) | F/S (m V/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|---------------|-------------|-------------|
| 4924            | -99.1       | 40.7      | V         | 48.6          | 269.1       | 5.4         |
| 7386            | -106.2      | 48.2      | V         | 49.0          | 281.8       | 5.0         |
| 9848            | -18.1       | 50.4      | V         | 39.3          | 92.2        | 14.7        |
| 12310           | -135.0      | 53.8      | V         | 25.8          | 19.5        | 28.2        |

**Table A-17. Radiated Measurements @ 3 meters**

#### NOTES:



**Figure A-16. Radiated limits at 3 meters.**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table G-1. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                                                                                                                                          |                            |                          |                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|---------------------------------|
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| Filename:<br>15.220520313.GU6    | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner | FCC ID:<br>GU66037LMC352 | Page 12 of 15                   |

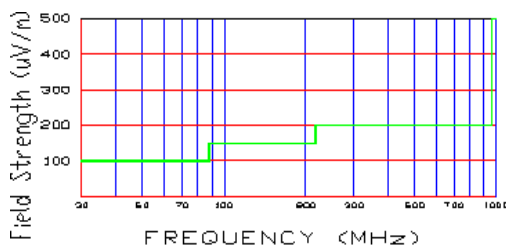
## **EXHIBIT A – Test Results (Cont.)** **Radiated Spurious Measurements**

§15.205 / §15.209

Distance of  
Measurements: 3 Meters

| FREQ<br>(MHz) | Level<br>(dBm) | AFCL<br>(dB/m) | POL<br>(H/V) | Height<br>(m) | Azimuth<br>(° angle) | F/S<br>(uV/M) | Margin<br>(dB) |
|---------------|----------------|----------------|--------------|---------------|----------------------|---------------|----------------|
| 125.0         | -84.3          | 11.9           | V            | 2.3           | 100                  | 53.8          | -8.9           |
| 250.0         | -90.0          | 18.8           | V            | 2.1           | 200                  | 61.7          | -10.2          |
| 345.0         | -90.0          | 22.2           | H            | 2.1           | 180                  | 91.3          | -6.8           |
| 420.0         | -91.2          | 24.2           | H            | 2             | 90                   | 100.1         | -6.0           |
| 474.1         | -95.6          | 25.5           | V            | 1.2           | 80                   | 70.0          | -9.1           |
| 505.8         | -95.1          | 26.2           | V            | 1.2           | 50                   | 80.4          | -3.8           |

**Table A-17. Radiated Measurements at 3-meters**



**Figure A-17. Radiated limits at 3 meters**

### **NOTES:**

1. All emissions were investigated and the worst-case emissions are reported.
2. For hand-held devices, the EUT is rotated through three orthogonal axes to determine which configuration produces the maximum emissions.
3. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.
4. The EUT was tested up to the 10<sup>th</sup> harmonic (25GHz) and no significant emission was found.
5. Above 1 GHz the limit is 500uV/m at 3 meters radiated.

|                                                |                                                             |                                              |                                 |
|------------------------------------------------|-------------------------------------------------------------|----------------------------------------------|---------------------------------|
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| Filename:<br>15.220520313.GU6                  | Test Dates:<br>May 21, 2002                                 | EUT Type: Wireless Scanner                   | FCC ID:<br>GU66037LMC352        |
|                                                |                                                             |                                              | Page 13 of 15                   |

## **EXHIBIT A – Test Results (Cont.)**

### **Radiated Restricted Band Measurements**

§15.205 / §15.209

Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operations. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurement was used, using RBW 1MHz – VBW 10Hz and linearly polarized horn antennas. All harmonics/spurs are at least 20dB below the highest emission in the authorized band using RBW = 100kHz. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table G-1 per Section 15.209.

| Frequency         | F/S (mV/m)    | Measured Distance (Meters) |
|-------------------|---------------|----------------------------|
| 0.009 – 0.490 MHz | 2400/F (kHz)  | 300                        |
| 0.490 – 1.705 MHz | 24000/F (kHz) | 30                         |
| 1.705 – 30.00 MHz | 30            | 30                         |
| 30.00 – 88.00 MHz | 100           | 3                          |
| 88.00 – 216.0 MHz | 150           | 3                          |
| 216.0 – 960.0 MHz | 200           | 3                          |
| Above 960.0 MHz   | 500           | 3                          |

**Table A-18. Restricted Band Limits**

### **TEST MEASUREMENT EQUIPMENT**

|                  |                                              |
|------------------|----------------------------------------------|
| Agilent E4448A   | PSA Spectrum Analyzer 3 Hz - 50GHz           |
| HP 8566B         | Spectrum Analyzer 100Hz – 22GHz              |
| HP 83017A        | Microwave Analyzer 40dB Gain (0.5 – 26.5GHz) |
| HP 3784A         | Digital Transmission Analyzer                |
| EMCO 3115        | Horn Antenna (1 – 18GHz)                     |
| HP 8495A         | 20dB Attenuator (DC-40GHz) 0 –70dB           |
| HP 8493B         | 10dB Attenuator                              |
| MicroCoax Cables | Low Loss Microwave Cables (1 – 26.5GHz)      |
| CDI Dipoles      | Dipole Antennas (30 – 1000MHz)               |
| EMCO 3116        | Horn Antenna (18 – 40GHz)                    |

|                                                |                                                                                                                                                                                                          |                                 |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>PCTEST LAB TEST REPORT</b><br><b>15.247</b> |  <b>FCC CERTIFICATION REPORT</b>  | Reviewed by:<br>Quality Manager |
| Filename:<br>15.220520313.GU6                  | Test Dates:<br>May 21, 2002                                                                                                                                                                              | EUT Type: Wireless Scanner      |
|                                                | FCC ID:<br>GU66037LMC352                                                                                                                                                                                 | Page 14 of 15                   |

## **EXHIBIT A – Test Results (Cont.)**

### **Radiated Restricted Band Measurements (Cont.)**

§15.205 /§15.209 courtesy

Operating Frequency: 2462 MHz  
Distance of  
Measurements: 3 Meters

| FREQ<br>(MHz) | Level<br>(dBm) | AFCL<br>(dB/m) | POL<br>(H/V) | F/S<br>(dBμV/m) | F/S<br>(uV/M) | Margin<br>(dB) |
|---------------|----------------|----------------|--------------|-----------------|---------------|----------------|
| 2483.7        | -98.4          | 33.0           | V            | 41.6            | 120.2         | 12.4           |
| 2484.2        | -98.5          | 33.0           | V            | 41.5            | 118.9         | 12.5           |
| 2484.4        | -96.0          | 33.1           | V            | 44.1            | 160.3         | 12.5           |
| 2486.0        | -93.9          | 33.1           | V            | 462.0           | 204.2         | 7.8            |
| 2490.0        | -99.0          | 33.2           | V            | 41.2            | 114.8         | 12.8           |
| 2490.2        | -97.5          | 33.2           | V            | 42.7            | 136.5         | 11.3           |

**Table A-19. Radiated Restricted Band Measurements at 3-meters**

#### NOTES:

1. The antenna is manipulated through typical positions, polarity and length during the testing.
2. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.
3. The spectrum is measured from 9kHz up to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
4. The conducted limits are shown on Figure A-14. Above 1 GHz the limit is 500μV/m.
5. < -135 dBm is below the analyzer measurement floor level.

|                                                |                                                                                     |                                                                                                                      |                                 |
|------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------|
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| Filename:<br>15.220520313.GU6                  | Test Dates:<br>May 21, 2002                                                         | EUT Type: Wireless Scanner                                                                                           | FCC ID:<br>GU66037LMC352        |
|                                                |                                                                                     |                                                                                                                      | Page 15 of 15                   |