



FCC TEST REPORT

REPORT NO.: RF921015R01

MODEL NO.: GL2454MP-1A

RECEIVED: Oct. 08, 2003

TESTED: Oct. 08 ~ Oct. 21, 2003

APPLICANT: GLOBAL SUN TECHNOLOGY INC.

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Jung Li City, Tao Yuan Hsien, Taiwan

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei,
Taiwan, R.O.C.

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0528
ILAC MRA



Lab Code: 200102-0



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1 CERTIFICATION

PRODUCT : 2.4GHz Wireless Mini PCI Adapter
MODEL NO. : GL2454MP-1A
BRAND: GLOBAL SUN
TEST ITEM: Engineering Sample
APPLICANT : GLOBAL SUN TECHNOLOGY INC.
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247),
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Oct. 08 ~ Oct. 21, 2003. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

PREPARED BY: Windy Chou, **DATE:** Oct. 22, 2003

Windy Chou

APPROVED BY: Ellis Wu, **DATE:** Oct. 22, 2003

Ellis Wu, Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: 47 CFR Part 15, Subpart C | | | |
|---|---|--------|--|
| Standard Section | Test Type and Limit | Result | REMARK |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit Minimum passing margin is -15.25dB at 0.170MHz |
| 15.247(a)(2) | Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz | PASS | Meet the requirement of limit |
| 15.247(b) | Maximum Peak Output Power Limit: max. 30dBm | PASS | Meet the requirement of limit |
| 15.247(c) | Transmitter Radiated Emissions Limit: Table 15.209 | PASS | Meet the requirement of limit Minimum passing margin is -2.05dB at 4874.00MHz |
| 15.247(d) | Power Spectral Density Limit: max. 8dBm | PASS | Meet the requirement of limit |
| 15.247(c) | Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency | PASS | Meet the requirement of limit |

NOTES: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|---------------------------|---------------------------------------|
| PRODUCT | 2.4GHz Wireless Mini PCI Adapter |
| MODEL NO. | GL2454MP-1A |
| BRAND | GLOBAL SUN |
| POWER SUPPLY | 3.3VDC from host equipment |
| MODULATION TYPE | BPSK, QPSK, CCK, 16QAM, 64QAM |
| RADIO TECHNOLOGY | DSSS, OFDM |
| TRANSFER RATE | Up to 54Mbps |
| FREQUENCY RANGE | 2412MHz ~ 2462MHz |
| NUMBER OF CHANNEL | 11 |
| OUTPUT POWER | 18.50dBm |
| ANTENNA TYPE | Dipole antenna with 3dBi antenna gain |
| DATA CABLE | NA |
| I/O PORTS | NA |
| ASSOCIATED DEVICES | NA |

NOTE:

1. Fully compatible with the 802.11g standard to provide a wireless data rate of up to 54Mbps.
2. The EUT complies with IEEE 802.11g draft standards, and backward compatible with IEEE 802.11b products.
3. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided to this EUT.

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 1 | 2412 MHz | 7 | 2442 MHz |
| 2 | 2417 MHz | 8 | 2447 MHz |
| 3 | 2422 MHz | 9 | 2452 MHz |
| 4 | 2427 MHz | 10 | 2457 MHz |
| 5 | 2432 MHz | 11 | 2462 MHz |
| 6 | 2437 MHz | | |

NOTE:

1. Below 1GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, the worst case, was chosen for final test.
2. Above 1GHz, the channel 1, 6, and 11 were tested individually.
3. Transfer rate, 11Mbps with CCK technique and 6Mbps with OFDM technique, the worst cases, were chosen for final test.
4. Two test results were presented in the following sections, the test result A was for CCK technique and the test result B was for OFDM technique.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a 2.4GHz Wireless Mini PCI Adapter. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C. (15.247)

ANSI C63.4 : 1992

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DESCRIPTION OF SUPPORT UNITS

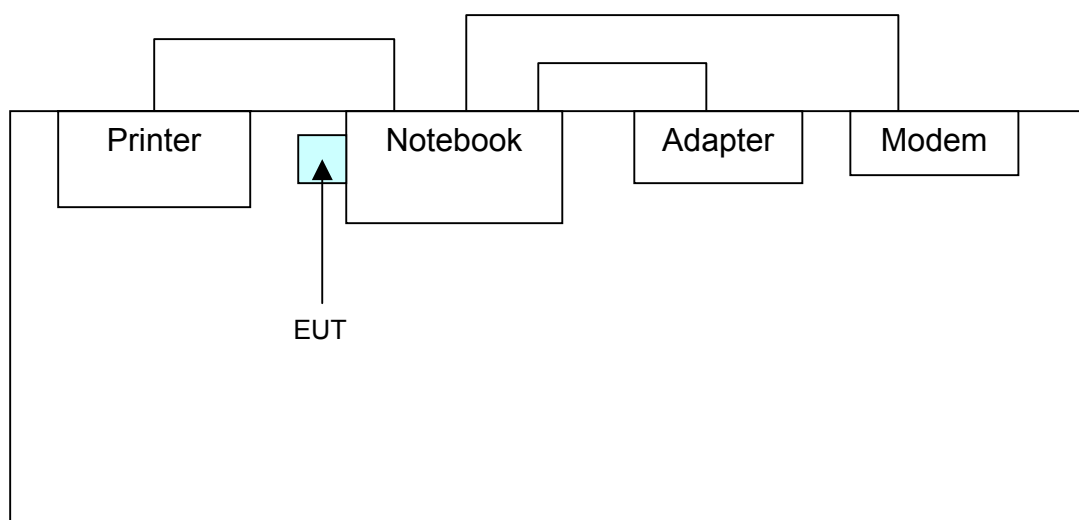
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|----------|-------|-----------|--------------------------|------------------|
| 1 | PRINTER | EPSON | LQ-300+ | DCGY017096 | FCC DoC Approved |
| 2 | NOTEBOOK | DELL | PP01L | TW-0791UH-12800-123-5423 | FCC DoC Approved |
| 3 | MODEM | ACEEX | 1414 | 980020503 | IFAXDM1414 |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1 | 1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core. |
| 2 | NA |
| 3 | 1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core. |

NOTE: All power cords of the above support units are non shielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB μ V) | |
|-----------------------------|------------------------------|----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 | 56 to 46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

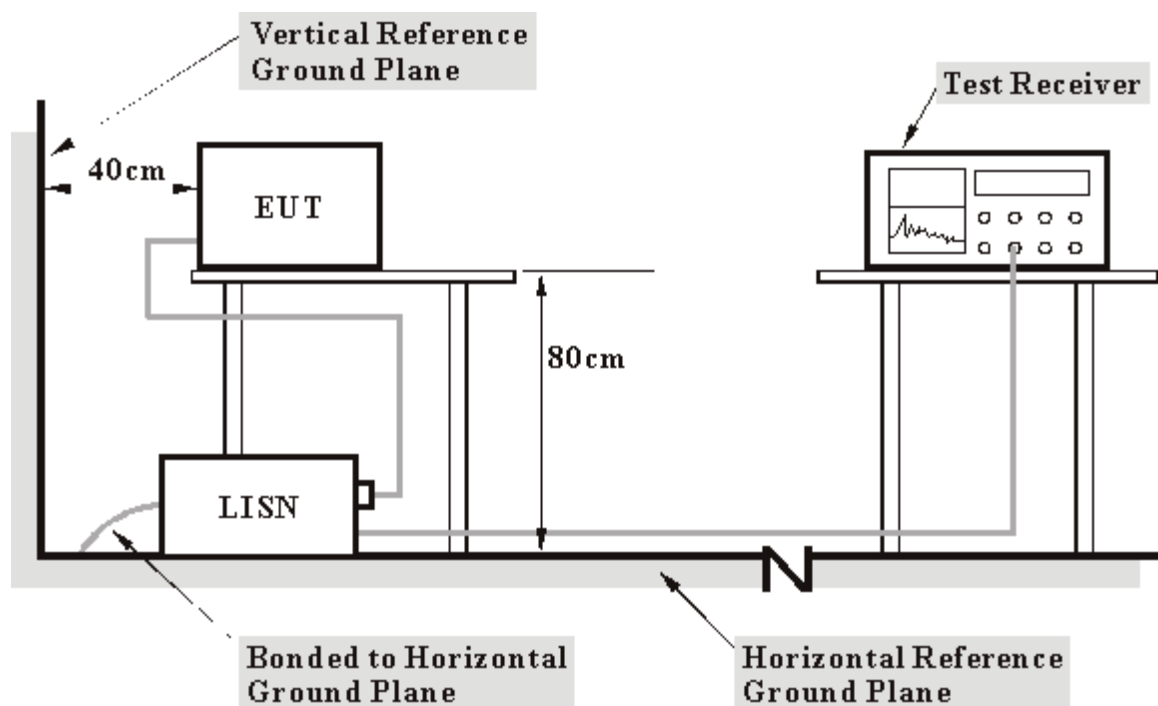
| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|--|-----------|--------------|------------------|
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 847793/022 | Mar. 10, 2004 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ESH2-Z5 | 828075/003 | July 08, 2004 |
| ROHDE & SCHWARZ 200-A Four-line V-Network | ENV4200 | 830326/018 | Oct. 02, 2004 |
| * ROHDE & SCHWARZ 4-wire ISN | ENY41 | 838119/028 | Nov. 29, 2003 |
| * ROHDE & SCHWARZ 2-wire ISN | ENY22 | 837497/018 | Nov. 29, 2003 |
| EMCO-L.I.S.N. (for peripheral) | 3825/2 | 9003-1627 | July 08, 2004 |
| Software | Cond-V2M3 | NA | NA |
| RF cable (JYEBAO) | 5D-FB | Cable-C05.01 | May 23, 2004 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-305 | Feb. 23, 2004 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-306 | Feb. 23, 2004 |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. “*”: These equipment are used for conducted telecom port test only (if tested).
 3. The test was performed in ADT Shielded Room No. 5.
 4. The VCCI Site Registration No. is C-1093.

4.1.3 TEST PROCEDURES

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



4.1.5 EUT OPERATING CONDITIONS

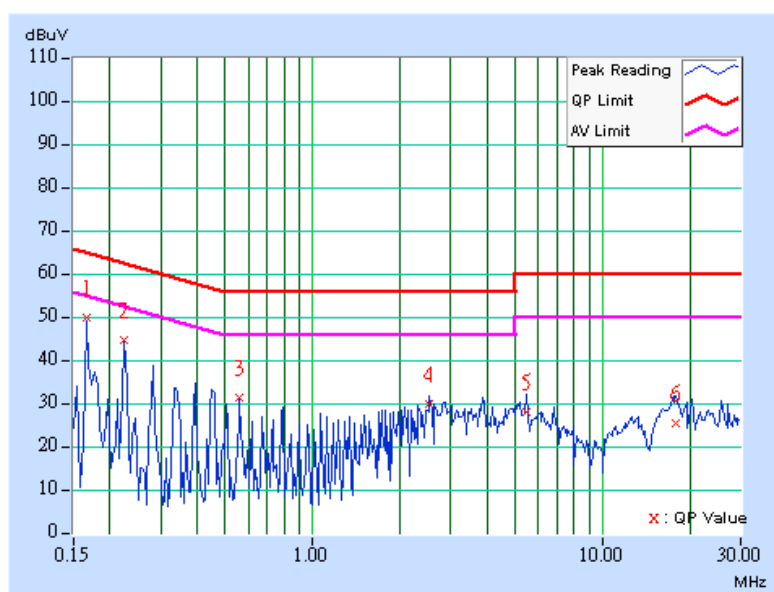
- a. Connected the EUT to a computer system placed on a testing table.
- b. The computer system ran a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- c. The computer system sent "H" messages to its screen.
- d. The computer system sent "H" messages to modem.
- e. The computer system sent "H" messages to printer, and the printer prints them on paper.

4.1.6 TEST RESULTS

| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 1 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Line (L) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.166 | 0.17 | 48.93 | - | 49.10 | - | 65.18 | 55.18 | -16.08 | - |
| 2 | 0.224 | 0.20 | 43.85 | - | 44.05 | - | 62.66 | 52.66 | -18.61 | - |
| 3 | 0.560 | 0.23 | 30.43 | - | 30.66 | - | 56.00 | 46.00 | -25.34 | - |
| 4 | 2.523 | 0.40 | 28.98 | - | 29.38 | - | 56.00 | 46.00 | -26.62 | - |
| 5 | 5.496 | 0.47 | 27.00 | - | 27.47 | - | 60.00 | 50.00 | -32.53 | - |
| 6 | 17.902 | 0.97 | 24.74 | - | 25.71 | - | 60.00 | 50.00 | -34.29 | - |

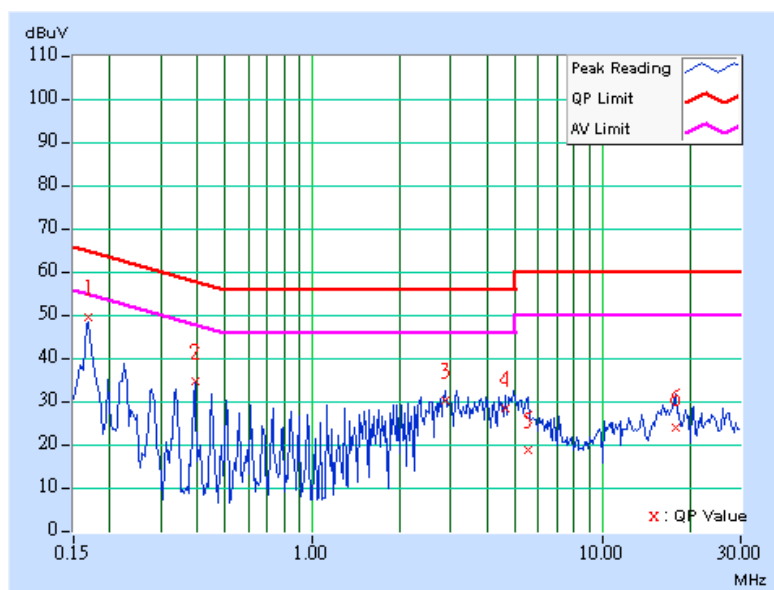
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 1 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Neutral (N) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.170 | 0.17 | 48.83 | - | 49.00 | - | 64.98 | 54.98 | -15.98 | - |
| 2 | 0.392 | 0.20 | 34.04 | - | 34.24 | - | 58.02 | 48.02 | -23.78 | - |
| 3 | 2.859 | 0.40 | 29.59 | - | 29.99 | - | 56.00 | 46.00 | -26.01 | - |
| 4 | 4.602 | 0.42 | 27.74 | - | 28.16 | - | 56.00 | 46.00 | -27.84 | - |
| 5 | 5.508 | 0.45 | 18.02 | - | 18.47 | - | 60.00 | 50.00 | -41.53 | - |
| 6 | 17.953 | 0.84 | 23.29 | - | 24.13 | - | 60.00 | 50.00 | -35.87 | - |

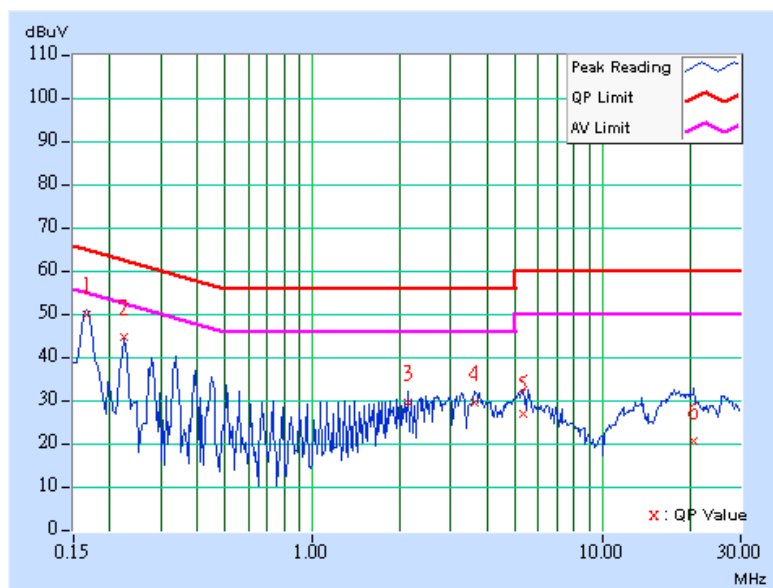
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 6 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Line (L) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.166 | 0.17 | 48.79 | - | 48.96 | - | 65.18 | 55.18 | -16.22 | - |
| 2 | 0.224 | 0.20 | 43.87 | - | 44.07 | - | 62.66 | 52.66 | -18.59 | - |
| 3 | 2.133 | 0.40 | 28.66 | - | 29.06 | - | 56.00 | 46.00 | -26.94 | - |
| 4 | 3.645 | 0.40 | 28.61 | - | 29.01 | - | 56.00 | 46.00 | -26.99 | - |
| 5 | 5.332 | 0.47 | 26.05 | - | 26.52 | - | 60.00 | 50.00 | -33.48 | - |
| 6 | 20.723 | 1.13 | 19.66 | - | 20.79 | - | 60.00 | 50.00 | -39.21 | - |

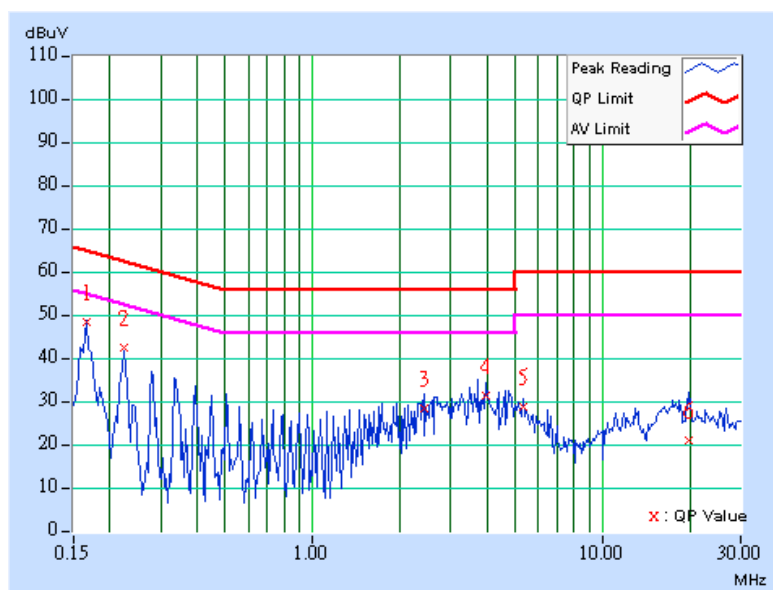
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 6 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Neutral (N) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.166 | 0.17 | 47.63 | - | 47.80 | - | 65.18 | 55.18 | -17.38 | - |
| 2 | 0.224 | 0.20 | 41.73 | - | 41.93 | - | 62.66 | 52.66 | -20.73 | - |
| 3 | 2.414 | 0.40 | 27.53 | - | 27.93 | - | 56.00 | 46.00 | -28.07 | - |
| 4 | 3.980 | 0.40 | 30.61 | - | 31.01 | - | 56.00 | 46.00 | -24.99 | - |
| 5 | 5.328 | 0.44 | 27.76 | - | 28.20 | - | 60.00 | 50.00 | -31.80 | - |
| 6 | 19.863 | 0.99 | 19.94 | - | 20.93 | - | 60.00 | 50.00 | -39.07 | - |

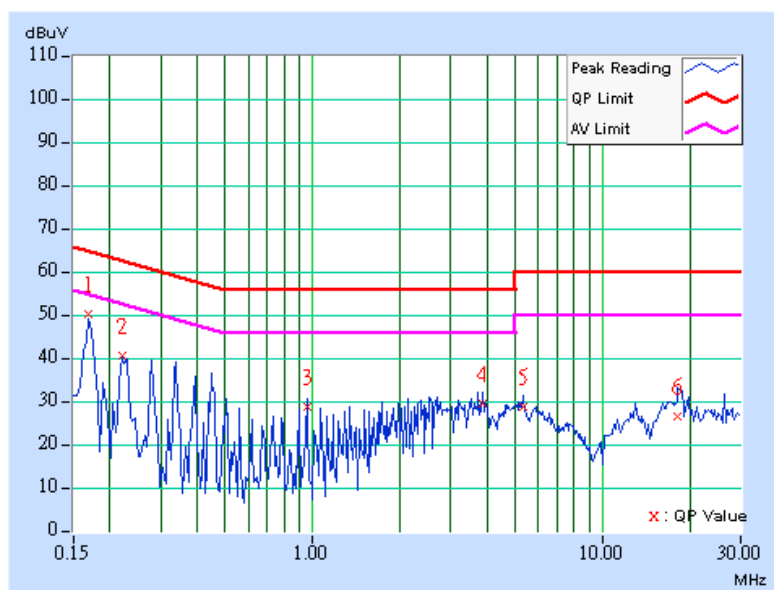
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 11 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Line (L) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.170 | 0.17 | 49.56 | - | 49.73 | - | 64.98 | 54.98 | -15.25 | - |
| 2 | 0.220 | 0.20 | 39.61 | - | 39.81 | - | 62.81 | 52.81 | -23.00 | - |
| 3 | 0.955 | 0.29 | 27.84 | - | 28.13 | - | 56.00 | 46.00 | -27.87 | - |
| 4 | 3.871 | 0.40 | 28.72 | - | 29.12 | - | 56.00 | 46.00 | -26.88 | - |
| 5 | 5.328 | 0.47 | 27.83 | - | 28.30 | - | 60.00 | 50.00 | -31.70 | - |
| 6 | 18.180 | 0.99 | 25.62 | - | 26.61 | - | 60.00 | 50.00 | -33.39 | - |

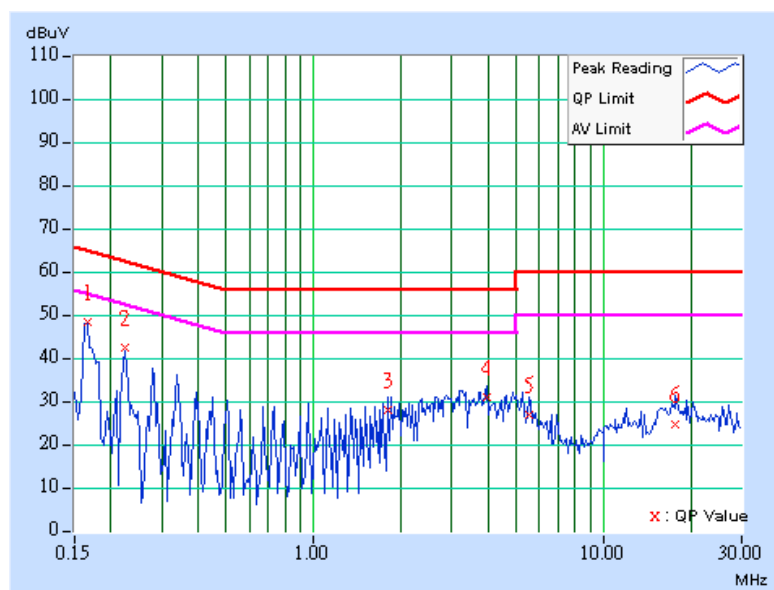
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
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 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
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 6. Emission Level = Correction Factor + Reading Value.



| | | | |
|---------------------------------|----------------------------------|--------------------------|-------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 11 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Netural (N) |
| ENVIRONMENTAL CONDITIONS | 25 deg. C, 50%RH, 991 hPa | TESTED BY: Jun Wu | |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.166 | 0.17 | 47.59 | - | 47.76 | - | 65.18 | 55.18 | -17.42 | - |
| 2 | 0.224 | 0.20 | 41.63 | - | 41.83 | - | 62.66 | 52.66 | -20.83 | - |
| 3 | 1.797 | 0.38 | 27.50 | - | 27.88 | - | 56.00 | 46.00 | -28.12 | - |
| 4 | 3.980 | 0.40 | 30.23 | - | 30.63 | - | 56.00 | 46.00 | -25.37 | - |
| 5 | 5.555 | 0.45 | 26.25 | - | 26.70 | - | 60.00 | 50.00 | -33.30 | - |
| 6 | 17.676 | 0.81 | 23.83 | - | 24.64 | - | 60.00 | 50.00 | -35.36 | - |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|------------------------------------|--------------------|--------------------------|------------------|
| * HP Spectrum Analyzer | 8590L | 3544A01176 | Jun. 10, 2004 |
| * HP Preamplifier | 8447D | 2944A08485 | May 01, 2004 |
| * HP Preamplifier | 8449B | 3008A01201 | Dec. 01, 2003 |
| * HP Preamplifier | 8449B | 3008A01292 | Aug. 13, 2004 |
| ROHDE & SCHWARZ TEST RECEIVER | ESI7 | 838496/016 | Feb. 23, 2004 |
| * ROHDE & SCHWARZ TEST RECEIVER | ESMI | 839013/007 839379/002 | Feb. 13, 2004 |
| SCHAFFNER Tunable Dipole Antenna | VHBA 9123 | 459 | Nov. 22, 2003 |
| SCHWARZBECK Tunable Dipole Antenna | UHA 9105 | 977 | |
| * CHASE BILOG Antenna | CBL6112A | 2221 | July 26, 2004 |
| * SCHWARZBECK Horn Antenna | BBHA9120-D1 | D130 | Jun. 30, 2004 |
| * EMCO Horn Antenna | 3115 | 9312-4192 | Mar. 23, 2004 |
| * EMCO Turn Table | 1060 | 1115 | NA |
| * CHANCE Tower | CM-AT40 | CM-A010 | NA |
| * Software | ADT_Radiated_V5.14 | NA | NA |
| * ANRITSU RF Switches | MP59B | M35046 | Jan. 05, 2004 |
| * TIMES RF cable | LMR-600 | CABLE-ST5-01 | Jan. 05, 2004 |

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

2. "*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. 5.
5. The VCCI Site Registration No. is R-1039.



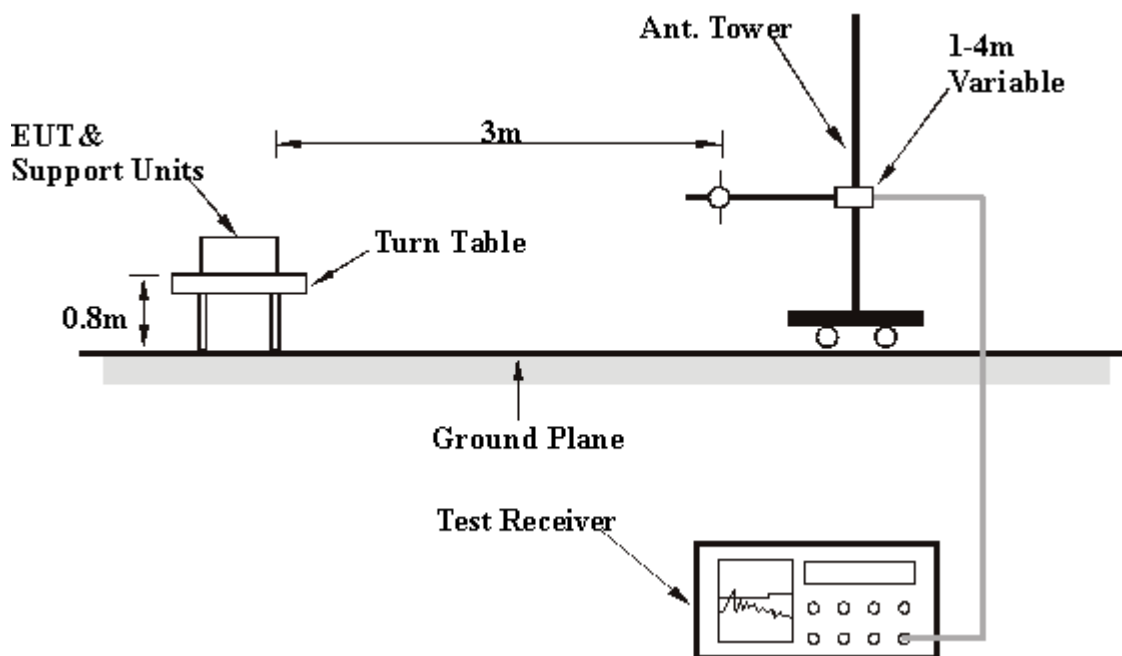
4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.5

4.2.6 TEST RESULTS

| | | | |
|---------------------------------|----------------------------------|--------------------------------|----------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 11 | FREQUENCY RANGE | Below 1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | TESTED BY: Hardaway Lee | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 167.41 | 35.11 QP | 43.50 | -8.39 | 2.31 H | 153 | 24.50 | 10.61 |
| 2 | 179.18 | 31.49 QP | 43.50 | -12.01 | 2.11 H | 53 | 21.01 | 10.48 |
| 3 | 198.75 | 33.27 QP | 43.50 | -10.23 | 1.58 H | 236 | 22.53 | 10.74 |
| 4 | 202.35 | 34.11 QP | 43.50 | -9.39 | 1.60 H | 124 | 23.22 | 10.89 |
| 5 | 212.20 | 35.46 QP | 43.50 | -8.04 | 1.42 H | 265 | 24.00 | 11.46 |
| 6 | 232.99 | 33.84 QP | 46.00 | -12.16 | 1.00 H | 326 | 21.20 | 12.64 |
| 7 | 261.31 | 33.55 QP | 46.00 | -12.45 | 1.00 H | 129 | 18.42 | 15.13 |
| 8 | 326.00 | 35.16 QP | 46.00 | -10.84 | 1.00 H | 326 | 19.12 | 16.04 |
| 9 | 457.00 | 35.22 QP | 46.00 | -10.78 | 1.27 H | 263 | 16.17 | 19.05 |
| 10 | 502.00 | 37.43 QP | 46.00 | -8.57 | 1.35 H | 124 | 17.27 | 20.16 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | 166.30 | 31.64 QP | 43.50 | -11.86 | 1.01 V | 342 | 21.02 | 10.62 |
| 2 | 179.55 | 33.48 QP | 43.50 | -10.02 | 1.01 V | 299 | 23.01 | 10.47 |
| 3 | 212.14 | 30.86 QP | 43.50 | -12.64 | 1.01 V | 68 | 19.41 | 11.45 |
| 4 | 225.08 | 35.27 QP | 46.00 | -10.73 | 1.01 V | 93 | 23.08 | 12.19 |
| 5 | 249.95 | 32.77 QP | 46.00 | -13.23 | 1.01 V | 321 | 19.16 | 13.61 |
| 6 | 275.15 | 30.97 QP | 46.00 | -15.03 | 1.01 V | 258 | 15.72 | 15.25 |
| 7 | 456.00 | 37.95 QP | 46.00 | -8.05 | 1.49 V | 309 | 18.93 | 19.02 |
| 8 | 501.00 | 31.04 QP | 46.00 | -14.96 | 1.97 V | 117 | 10.90 | 20.14 |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.

| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 1 | MODULATION TYPE | CCK |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 2390.00 | 48.48 PK | 74.00 | -25.52 | 1.15 H | 196 | 18.83 | 29.65 |
| 2 | *2412.00 | 100.68 PK | | | 1.15 H | 196 | 70.96 | 29.72 |
| 2 | *2412.00 | 97.72 AV | | | 1.15 H | 196 | 68.00 | 29.72 |
| 3 | 4824.00 | 47.85 PK | 74.00 | -26.15 | 1.06 H | 189 | 12.40 | 35.45 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 2390.00 | 53.99 PK | 74.00 | -20.01 | 1.00 V | 252 | 24.34 | 29.65 |
| 1 | 2390.00 | 50.97 AV | 54.00 | -3.03 | 1.00 V | 252 | 21.32 | 29.65 |
| 2 | *2412.00 | 106.19 PK | | | 1.00 V | 252 | 76.47 | 29.72 |
| 2 | *2412.00 | 103.17 AV | | | 1.00 V | 252 | 73.45 | 29.72 |
| 3 | 4824.00 | 54.24 PK | 74.00 | -19.76 | 1.39 V | 60 | 18.79 | 35.45 |
| 3 | 4824.00 | 51.47 AV | 54.00 | -2.53 | 1.39 V | 60 | 16.02 | 35.45 |
| 4 | 6120.00 | 47.81 PK | 74.00 | -26.19 | 1.32 V | 336 | 10.09 | 37.72 |

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ” : Fundamental frequency

| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 6 | MODULATION TYPE | CCK |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2437.00 | 98.29 PK | | | 1.00 H | 305 | 68.50 | 29.79 |
| 1 | *2437.00 | 95.67 AV | | | 1.00 H | 305 | 65.88 | 29.79 |
| 2 | 4874.00 | 47.23 PK | 74.00 | -26.77 | 1.66 H | 66 | 11.44 | 35.79 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|--|----------------|-------------------------|----------------|--------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2437.00 | 104.07 PK | | | 1.00 V | 252 | 74.28 | 29.79 |
| 1 | *2437.00 | 101.43 AV | | | 1.00 V | 252 | 71.64 | 29.79 |
| 2 | 4874.00 | 54.49 PK | 74.00 | -19.51 | 1.27 V | 245 | 18.70 | 35.79 |
| 2 | 4874.00 | 51.95 AV | 54.00 | -2.05 | 1.27 V | 245 | 16.16 | 35.79 |

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “ : Fundamental frequency



| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 11 | MODULATION TYPE | CCK |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2462.00 | 97.46 PK | | | 1.16 H | 204 | 67.61 | 29.85 |
| 1 | *2462.00 | 94.39 AV | | | 1.16 H | 204 | 64.54 | 29.85 |
| 2 | 2483.50 | 43.35 PK | 74.00 | -30.65 | 1.16 H | 204 | 13.44 | 29.91 |
| 3 | 4924.00 | 49.60 PK | 74.00 | -24.40 | 1.56 H | 145 | 13.51 | 36.09 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2462.00 | 105.44 PK | | | 1.00 V | 253 | 75.59 | 29.85 |
| 1 | *2462.00 | 102.55 AV | | | 1.00 V | 253 | 72.70 | 29.85 |
| 2 | 2483.50 | 51.33 PK | 74.00 | -22.67 | 1.00 V | 253 | 21.42 | 29.91 |
| 2 | 2483.50 | 48.44 AV | 54.00 | -5.56 | 1.00 V | 253 | 18.53 | 29.91 |
| 3 | 4924.00 | 54.07 PK | 74.00 | -19.93 | 1.30 V | 253 | 17.98 | 36.09 |
| 3 | 4924.00 | 51.10 AV | 54.00 | -2.90 | 1.30 V | 253 | 15.01 | 36.09 |
| 4 | 9848.00 | 54.96 PK | 74.00 | -19.04 | 1.61 V | 124 | 10.86 | 44.10 |
| 4 | 9848.00 | 42.57 AV | 54.00 | -11.43 | 1.61 V | 124 | -1.53 | 44.10 |

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ” : Fundamental frequency



| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 1 | MODULATION TYPE | OFDM |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 2390.00 | 53.78 PK | 74.00 | -20.22 | 1.24 H | 135 | 24.19 | 29.59 |
| 1 | 2390.00 | 44.45 AV | 54.00 | -9.55 | 1.24 H | 135 | 14.86 | 29.59 |
| 2 | *2412.00 | 100.31 PK | | | 1.24 H | 135 | 70.65 | 29.66 |
| 2 | *2412.00 | 90.98 AV | | | 1.24 H | 135 | 61.32 | 29.66 |
| 3 | 4824.00 | 46.47 PK | 74.00 | -27.53 | 1.54 H | 226 | 11.21 | 35.25 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 2390.00 | 62.18 PK | 74.00 | -11.82 | 1.00 V | 196 | 32.59 | 29.59 |
| 1 | 2390.00 | 51.13 AV | 54.00 | -2.87 | 1.00 V | 196 | 21.54 | 29.59 |
| 2 | *2412.00 | 108.71 PK | | | 1.00 V | 196 | 79.05 | 29.66 |
| 2 | *2412.00 | 97.66 AV | | | 1.00 V | 196 | 68.00 | 29.66 |
| 3 | 4824.00 | 50.61 PK | 74.00 | -23.39 | 1.49 V | 158 | 15.35 | 35.25 |
| 3 | 4824.00 | 37.37 AV | 54.00 | -16.63 | 1.49 V | 158 | 2.11 | 35.25 |

REMARKS:

- 1.Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
- 2.Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3.The other emission levels were very low against the limit.
- 4.Margin value = Emission level – Limit value.
- 5.“ * “ : Fundamental frequency



| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 6 | MODULATION TYPE | OFDM |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2437.00 | 102.19 PK | | | 1.00 H | 304 | 72.40 | 29.79 |
| 1 | *2437.00 | 92.62 AV | | | 1.00 H | 304 | 62.83 | 29.79 |
| 2 | 4874.00 | 47.22 PK | 74.00 | -26.78 | 1.42 H | 226 | 11.43 | 35.79 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | *2437.00 | 73.44 PK | | | 1.16 V | 196 | 43.65 | 29.79 |
| 1 | *2437.00 | 63.53 AV | | | 1.16 V | 196 | 33.74 | 29.79 |
| 2 | 4874.00 | 52.83 PK | 74.00 | -21.17 | 1.24 V | 342 | 17.04 | 35.79 |
| 2 | 4874.00 | 39.26 AV | 54.00 | -14.74 | 1.24 V | 342 | 3.47 | 35.79 |

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ” : Fundamental frequency



| | | | |
|---------------------------------|----------------------------------|--------------------------|--------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| MODE | Channel 11 | MODULATION TYPE | OFDM |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60 % RH, 991 hPa | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| TESTED BY: Hardaway Lee | | | |

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | *2462.00 | 99.32 PK | | | 1.13 H | 209 | 69.49 | 29.83 |
| 1 | *2462.00 | 89.42 AV | | | 1.13 H | 209 | 59.59 | 29.83 |
| 2 | 2483.50 | 53.15 PK | 74.00 | -20.85 | 1.13 H | 209 | 23.25 | 29.90 |
| 2 | 2483.50 | 43.25 AV | 54.00 | -10.75 | 1.13 H | 209 | 13.35 | 29.90 |
| 3 | 4924.00 | 46.18 PK | 74.00 | -27.82 | 1.47 H | 325 | 10.51 | 35.67 |

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1 | *2462.00 | 107.23 PK | | | 1.02 V | 254 | 77.40 | 29.83 |
| 1 | *2462.00 | 97.40 AV | | | 1.02 V | 254 | 67.57 | 29.83 |
| 2 | 2483.50 | 61.60 PK | 74.00 | -12.40 | 1.02 V | 254 | 31.70 | 29.90 |
| 2 | 2483.50 | 51.23 AV | 54.00 | -2.77 | 1.02 V | 254 | 21.33 | 29.90 |
| 3 | 4924.00 | 47.81 PK | 74.00 | -26.19 | 1.57 V | 23 | 12.14 | 35.67 |

REMARKS:

- 1.Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
- 2.Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3.The other emission levels were very low against the limit.
- 4.Margin value = Emission level – Limit value.
- 5.“ * “ : Fundamental frequency

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2004 |

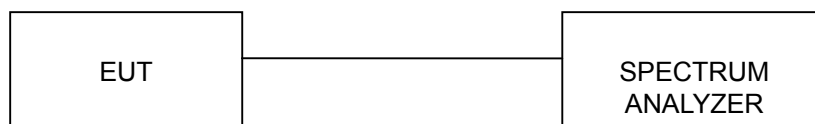
NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

4.3.4 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.3.5 EUT OPERATING CONDITIONS

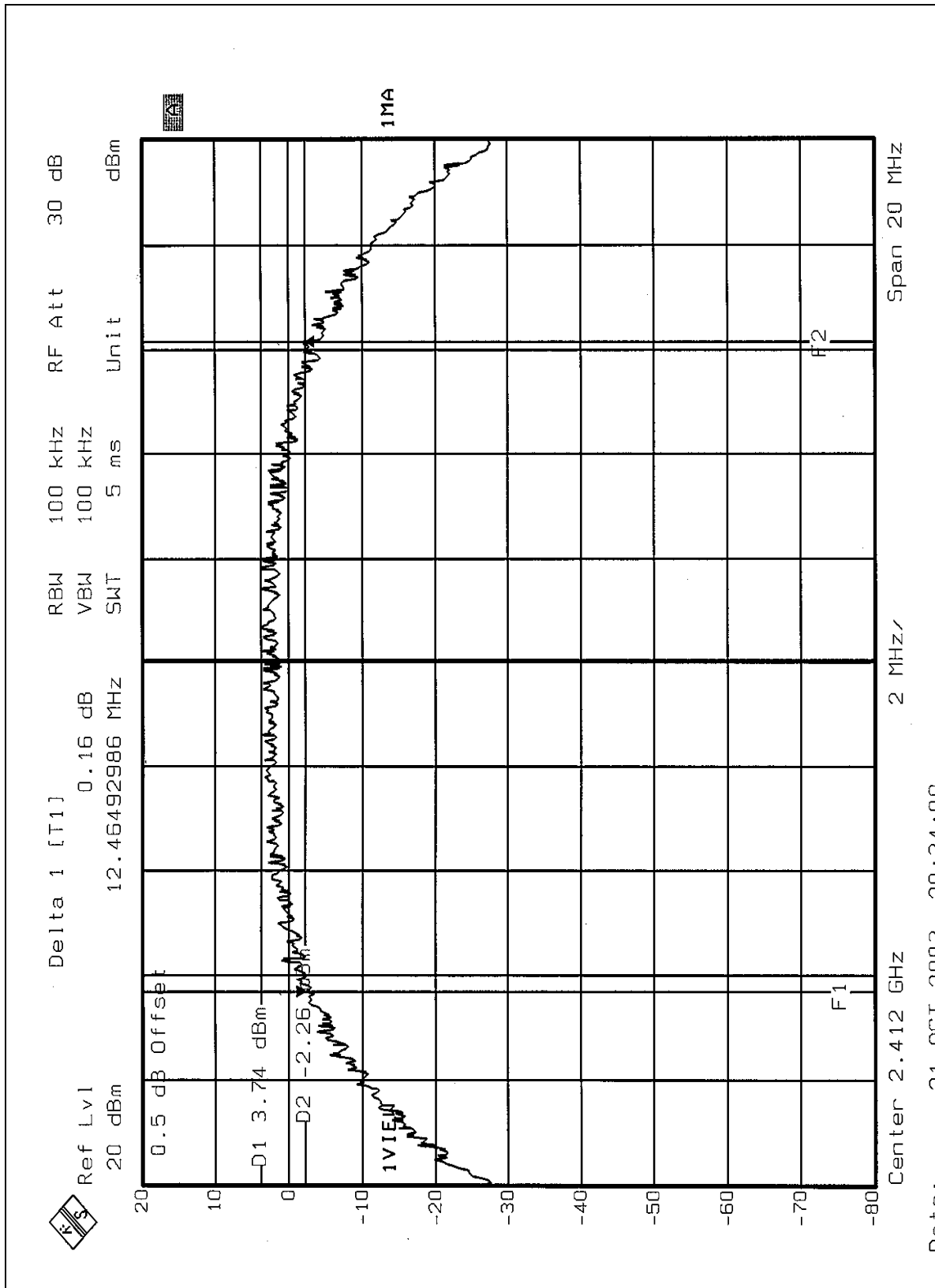
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.6 TEST RESULTS (A)

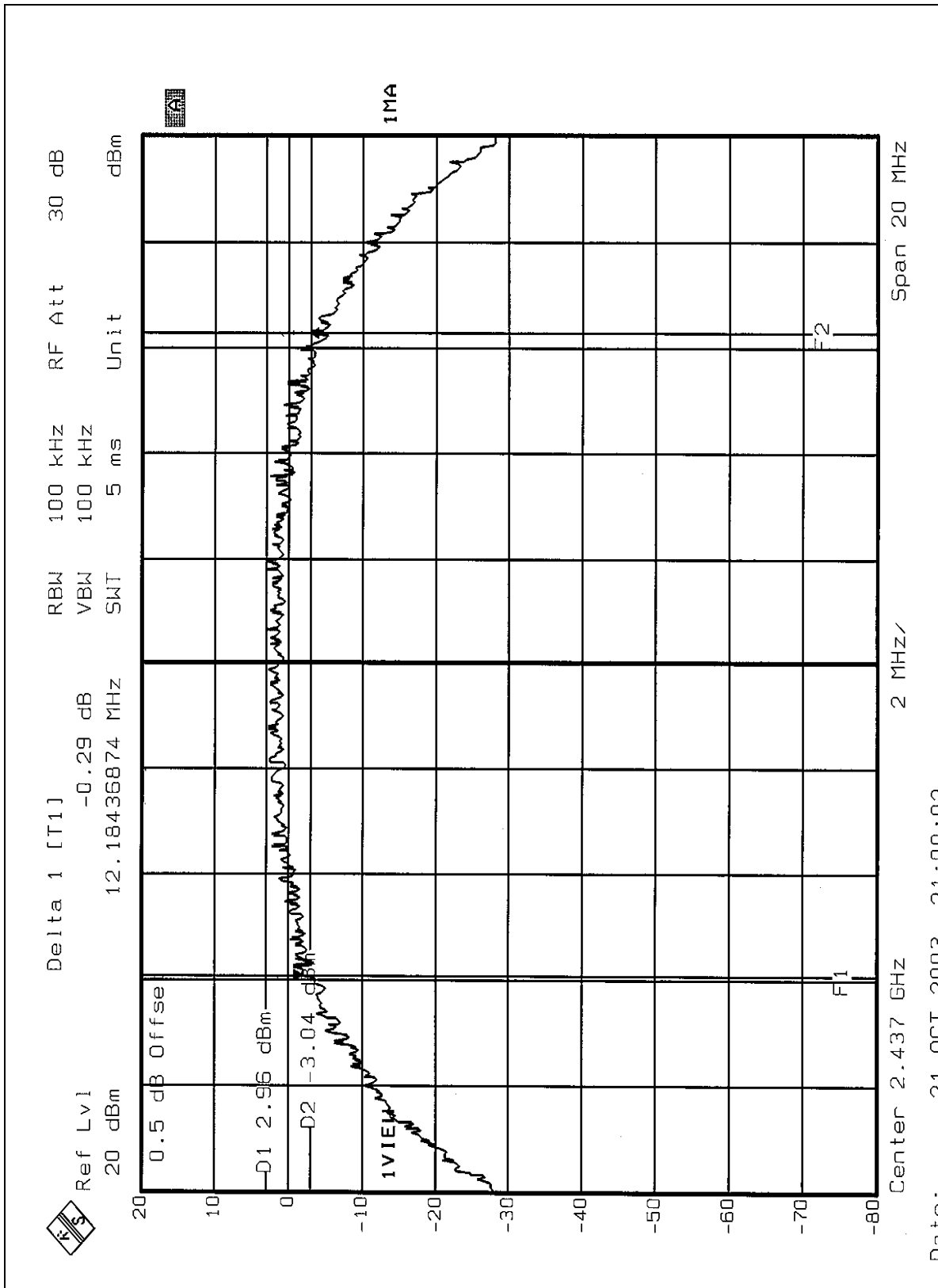
| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6 dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS/FAIL |
|----------------|--------------------------------|-----------------------------|----------------------------|------------------|
| 1 | 2412 | 12.46 | 0.5 | PASS |
| 6 | 2437 | 12.18 | 0.5 | PASS |
| 11 | 2462 | 12.79 | 0.5 | PASS |

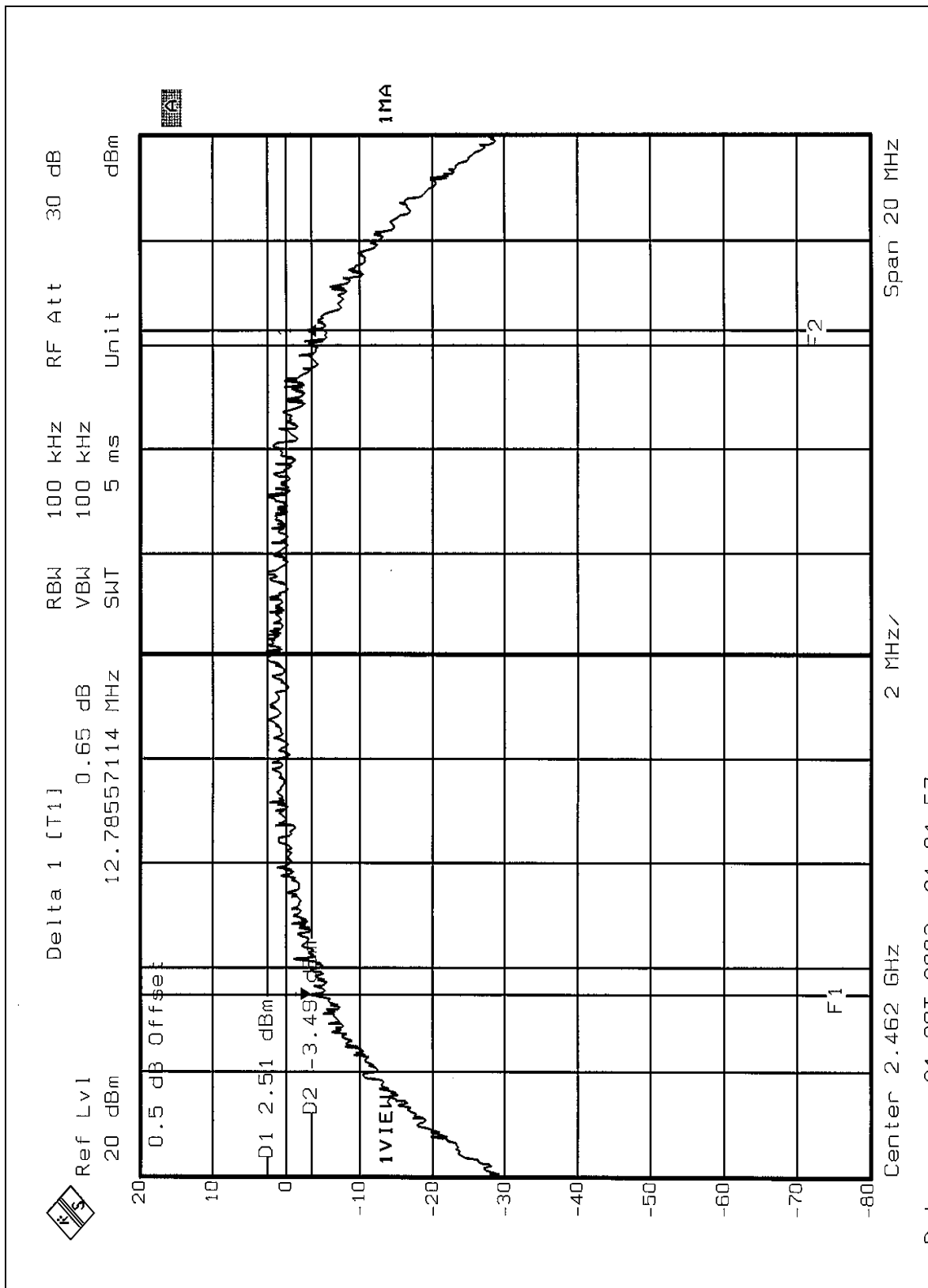
CH1



CH6



CH11



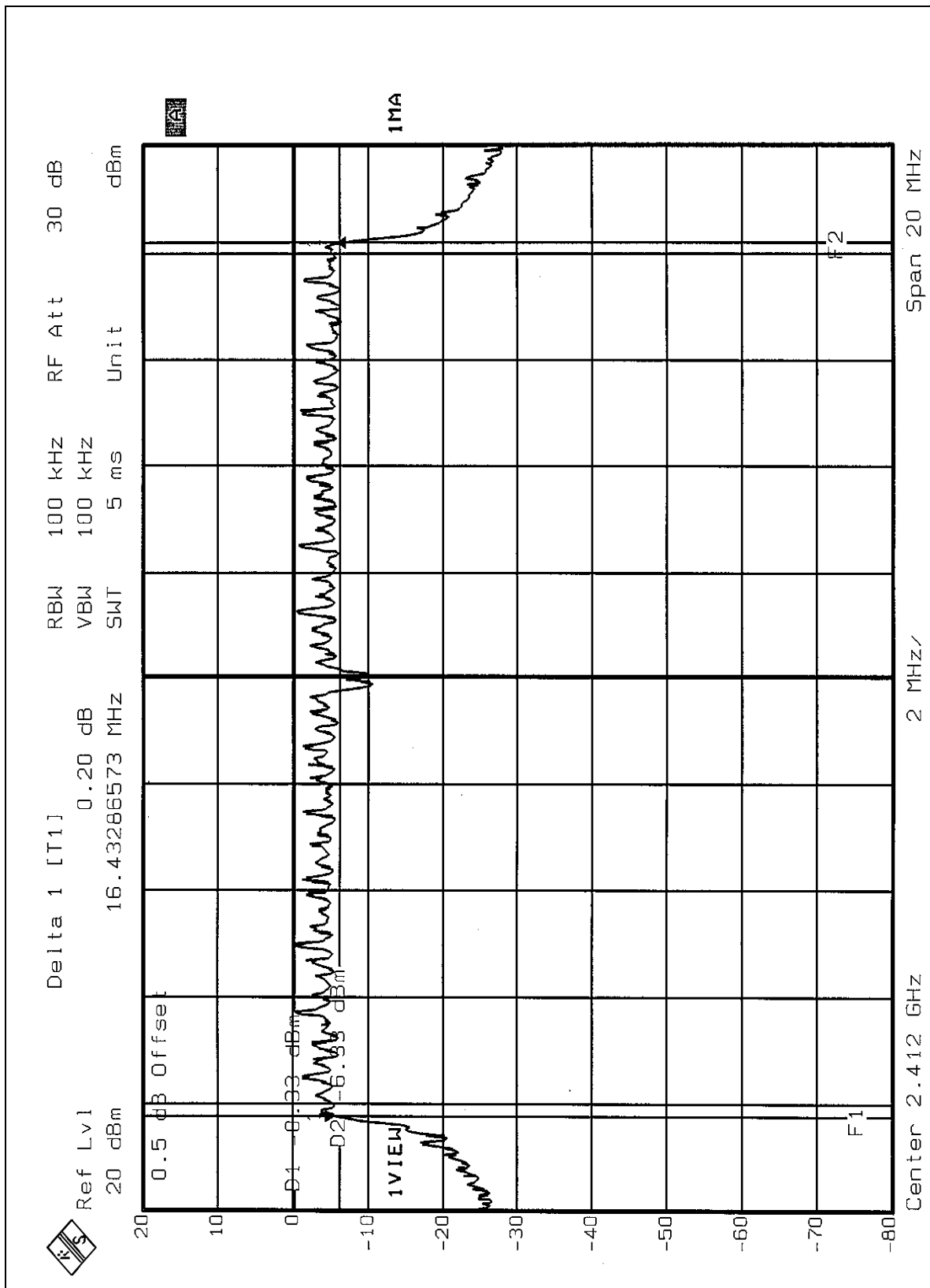


4.3.7 TEST RESULTS (B)

| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6 dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS/FAIL |
|----------------|--------------------------------|-----------------------------|----------------------------|------------------|
| 1 | 2412 | 16.43 | 0.5 | PASS |
| 6 | 2437 | 16.39 | 0.5 | PASS |
| 11 | 2462 | 16.39 | 0.5 | PASS |

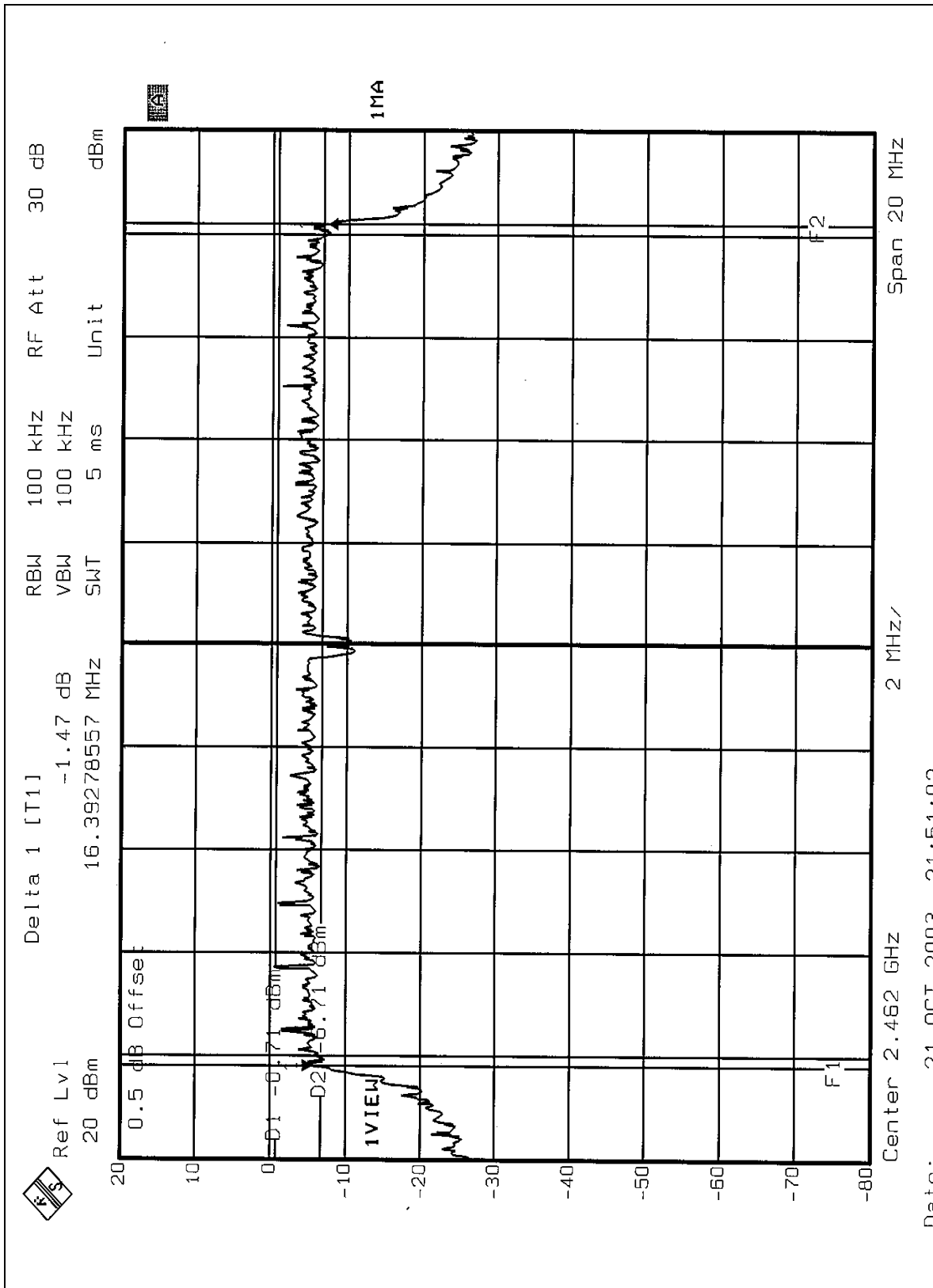
CH1



Delta 1 [T1]
 Ref Lvl 20 dBm
 0.5 dB Offset
 16.39278557 MHz
 1.96 dB
 RBW 100 kHz
 VBW 100 kHz
 SWT 5 ms
 RF Att 30 dB
 Unit dBm
 Span 20 MHz
 Center 2.437 GHz
 2 MHz

1V1EM
 1MA
 D1 2.52 dBm
 D2 -3.48 dBm
 F1
 F2

CH11



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2004 |
| R&S SIGNAL GENERATOR | SMP04 | 100011 | May 28, 2004 |
| TEKTRONIX OSCILLOSCOPE | TDS 220 | B048470 | Mar. 05, 2004 |
| NARDA DETECTOR | 4503A | FSCM99899 | NA |

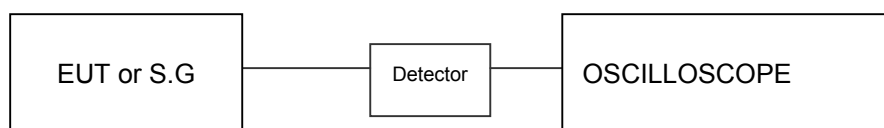
NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator . The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITIONS

Same as Item 4.3.5

4.4.6 TEST RESULTS (A)

| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|----------------|--------------------------------|--------------------------------|-------------------------------|------------------|
| 1 | 2412 | 15.50 | 30 | PASS |
| 6 | 2437 | 14.54 | 30 | PASS |
| 11 | 2462 | 15.00 | 30 | PASS |

4.4.7 TEST RESULTS (B)

| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|----------------|--------------------------------|--------------------------------|-------------------------------|------------------|
| 1 | 2412 | 15.50 | 30 | PASS |
| 6 | 2437 | 18.50 | 30 | PASS |
| 11 | 2462 | 16.00 | 30 | PASS |

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2004 |

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as 4.3.5

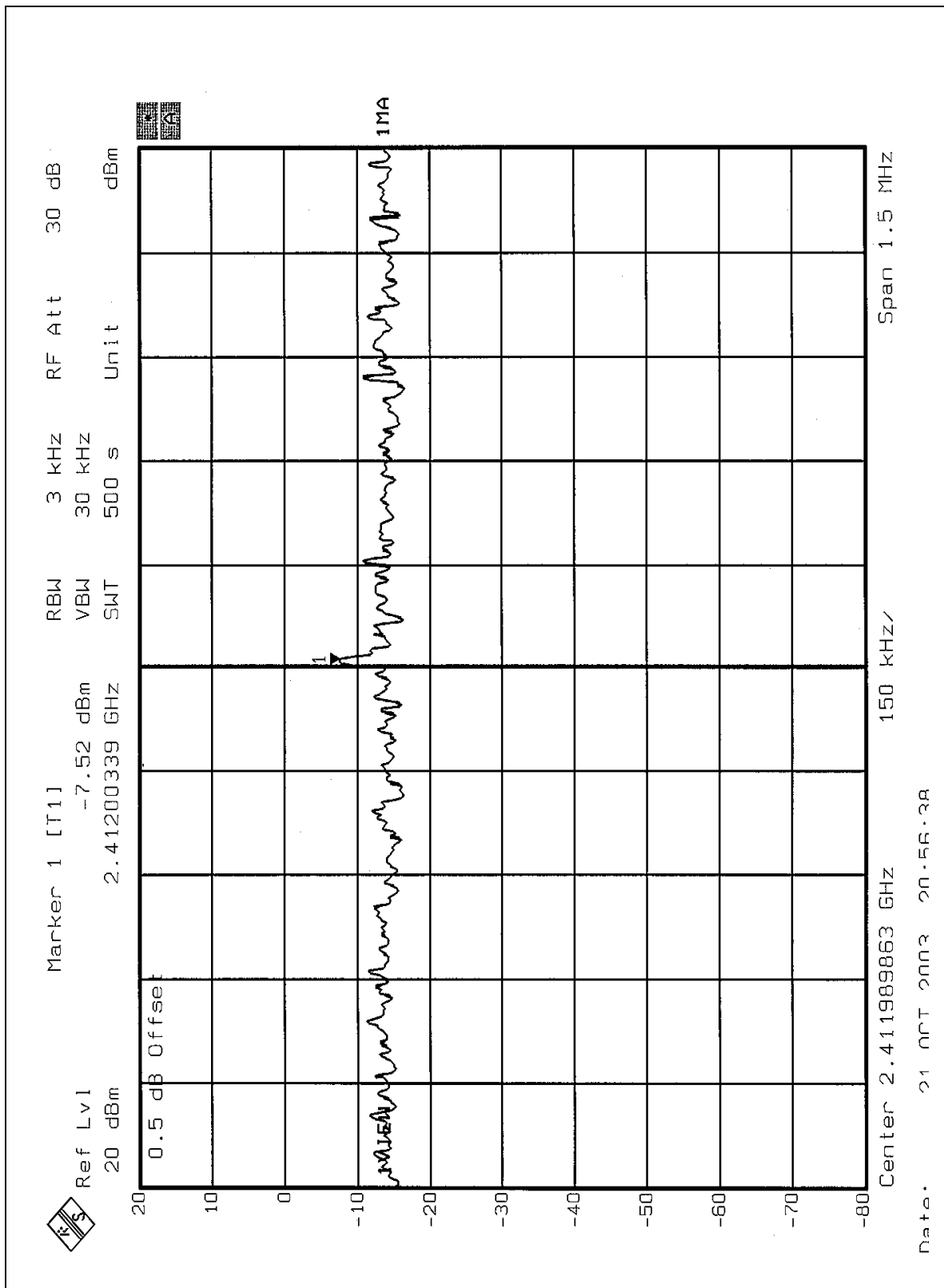
4.5.6 TEST RESULTS (A)

| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

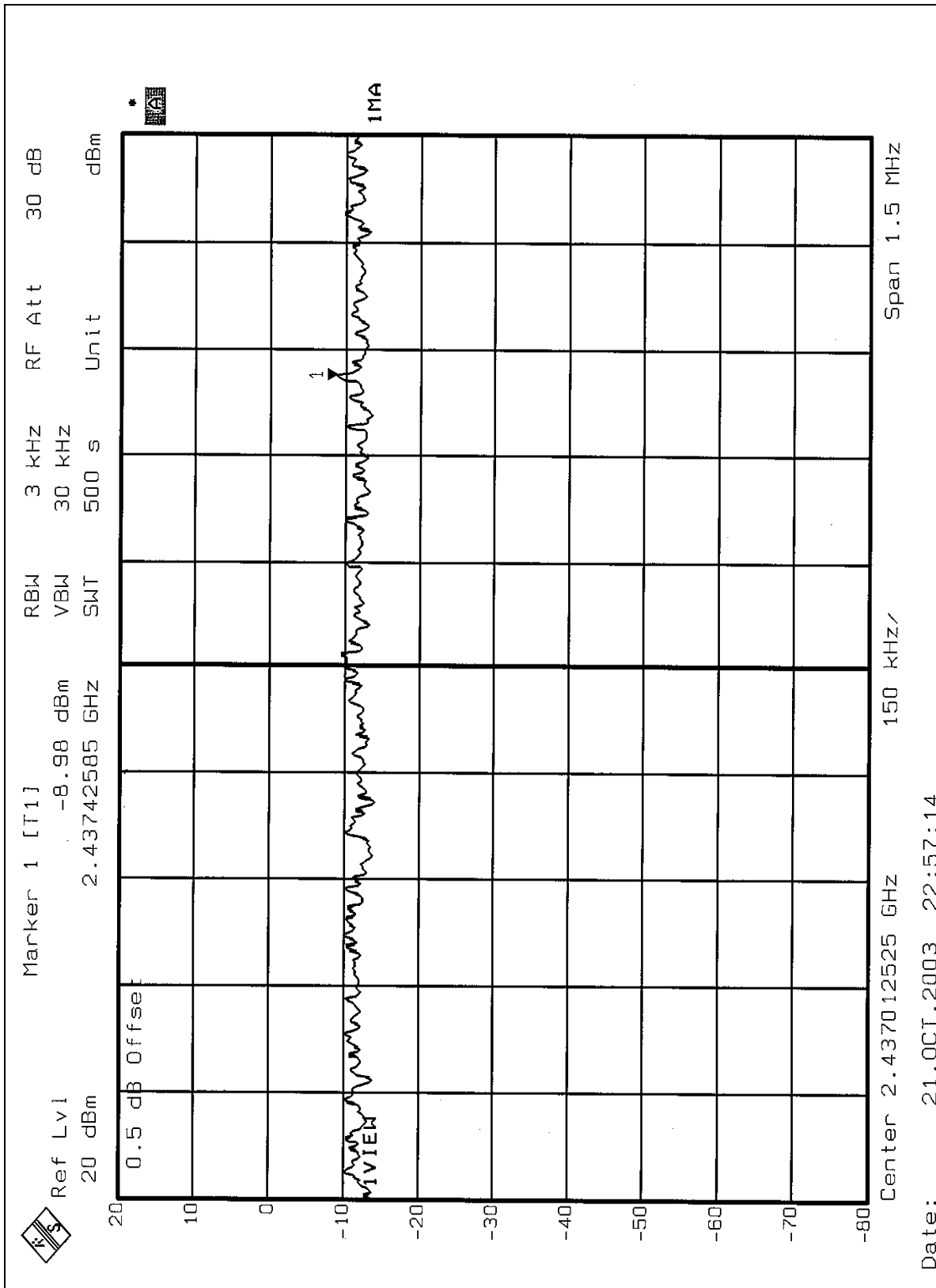
| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz) | RF POWER LEVEL IN 3 KHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|-----------------------|---------------------------------|---|----------------------------|------------------|
| 1 | 2412 | -7.52 | 8 | PASS |
| 6 | 2437 | -8.98 | 8 | PASS |
| 11 | 2462 | -7.57 | 8 | PASS |



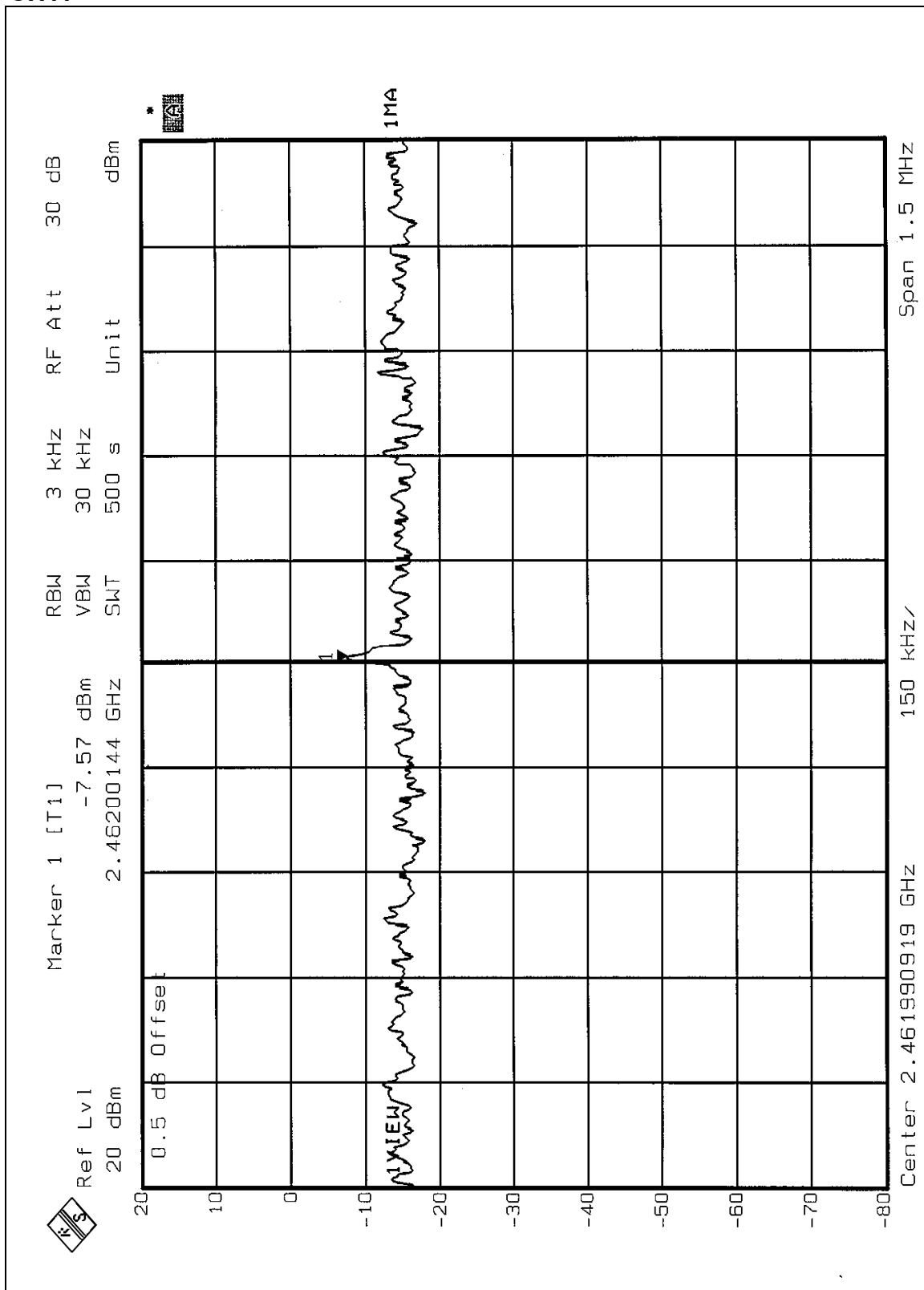
CH1



CH6



CH11

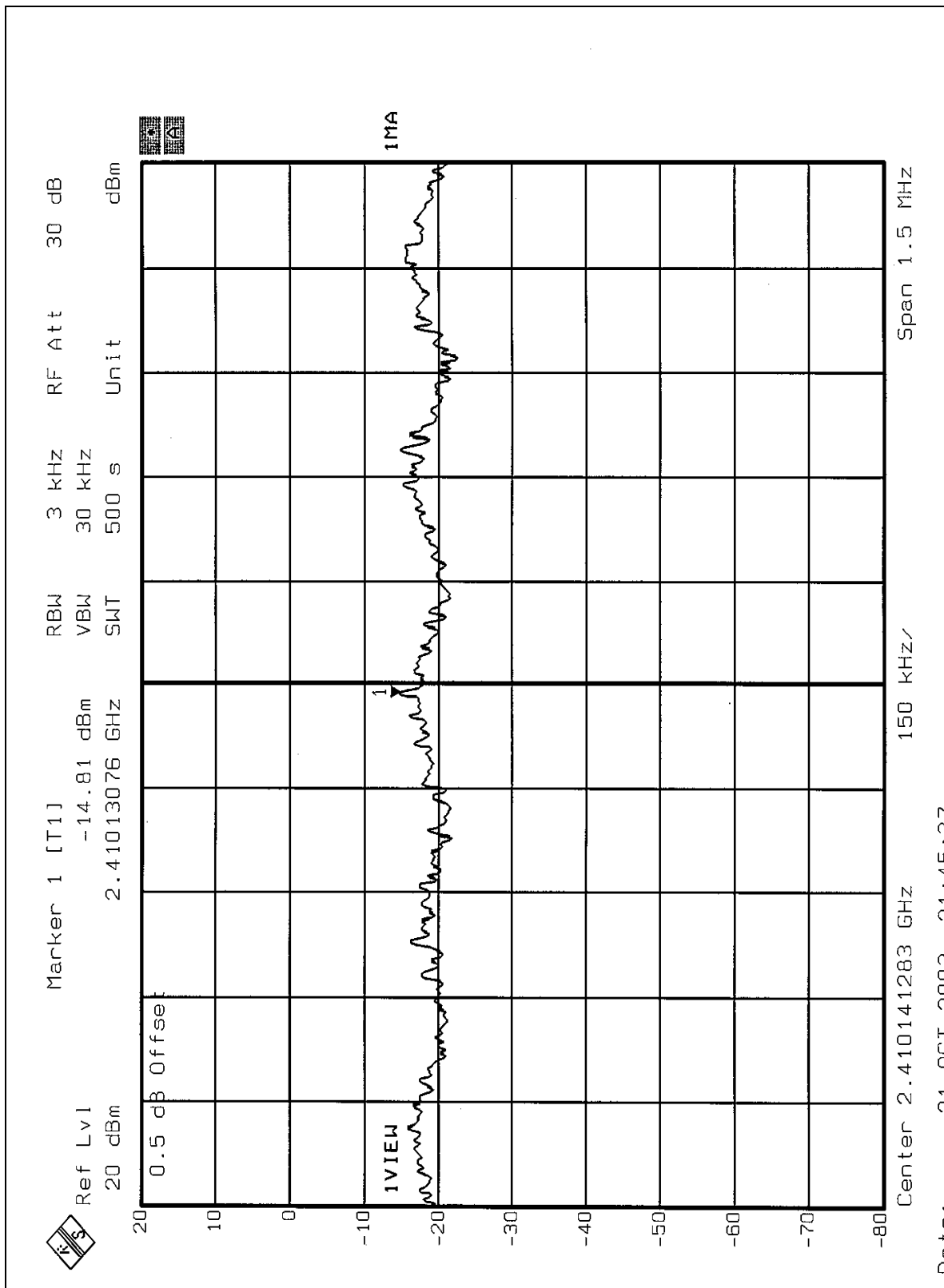


4.5.7 TEST RESULTS (B)

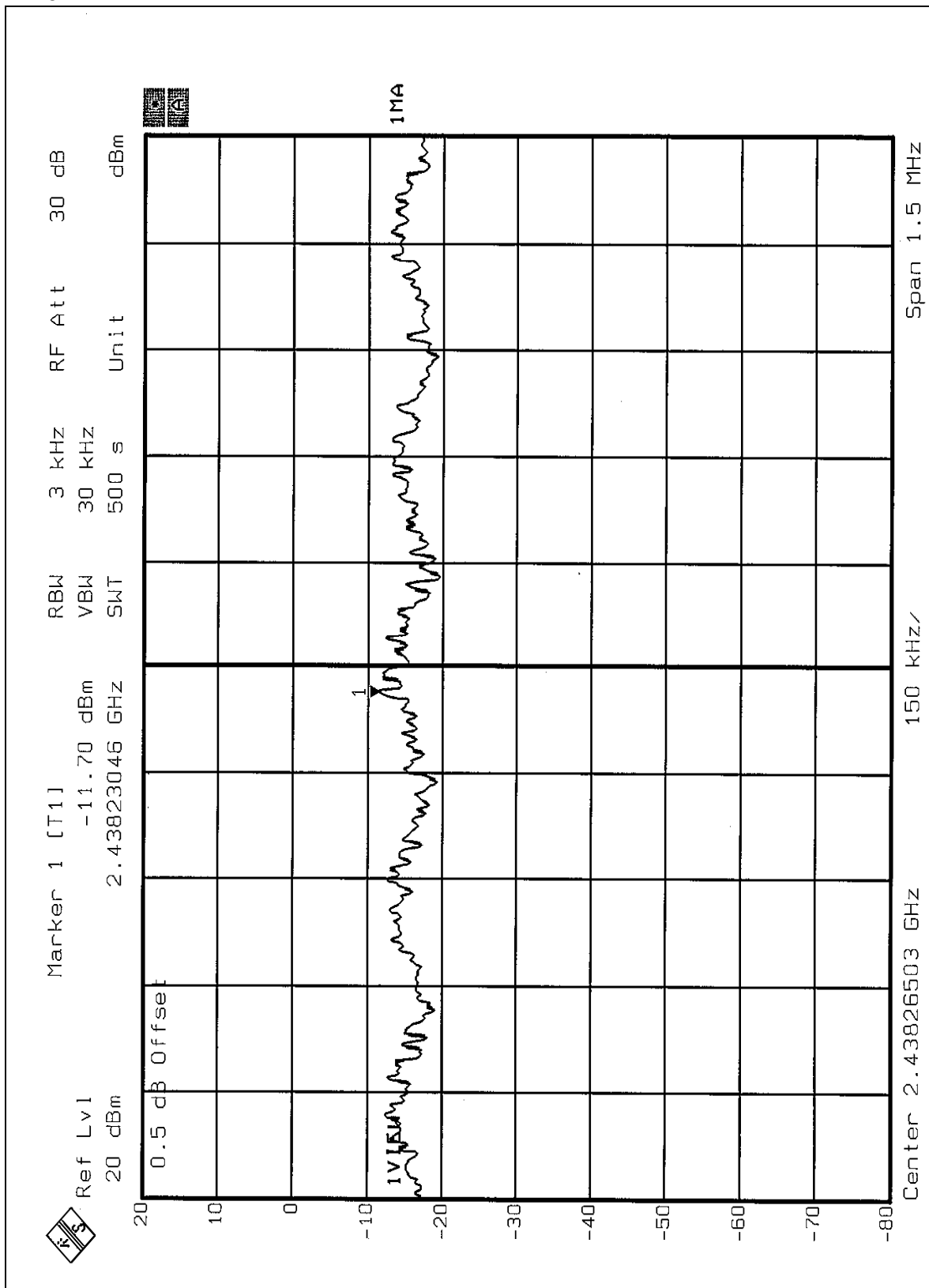
| | | | |
|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| EUT | 2.4GHz Wireless Mini PCI Adapter | MODEL | GL2454MP-1A |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | ENVIRONMENTAL CONDITIONS | 24 deg. C, 63%RH, 991 hPa |
| TESTED BY: Ansen Lei | | | |

| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz) | RF POWER LEVEL IN 3 KHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|-----------------------|---------------------------------|---|----------------------------|------------------|
| 1 | 2412 | -14.81 | 8 | PASS |
| 6 | 2437 | -11.70 | 8 | PASS |
| 11 | 2462 | -14.06 | 8 | PASS |

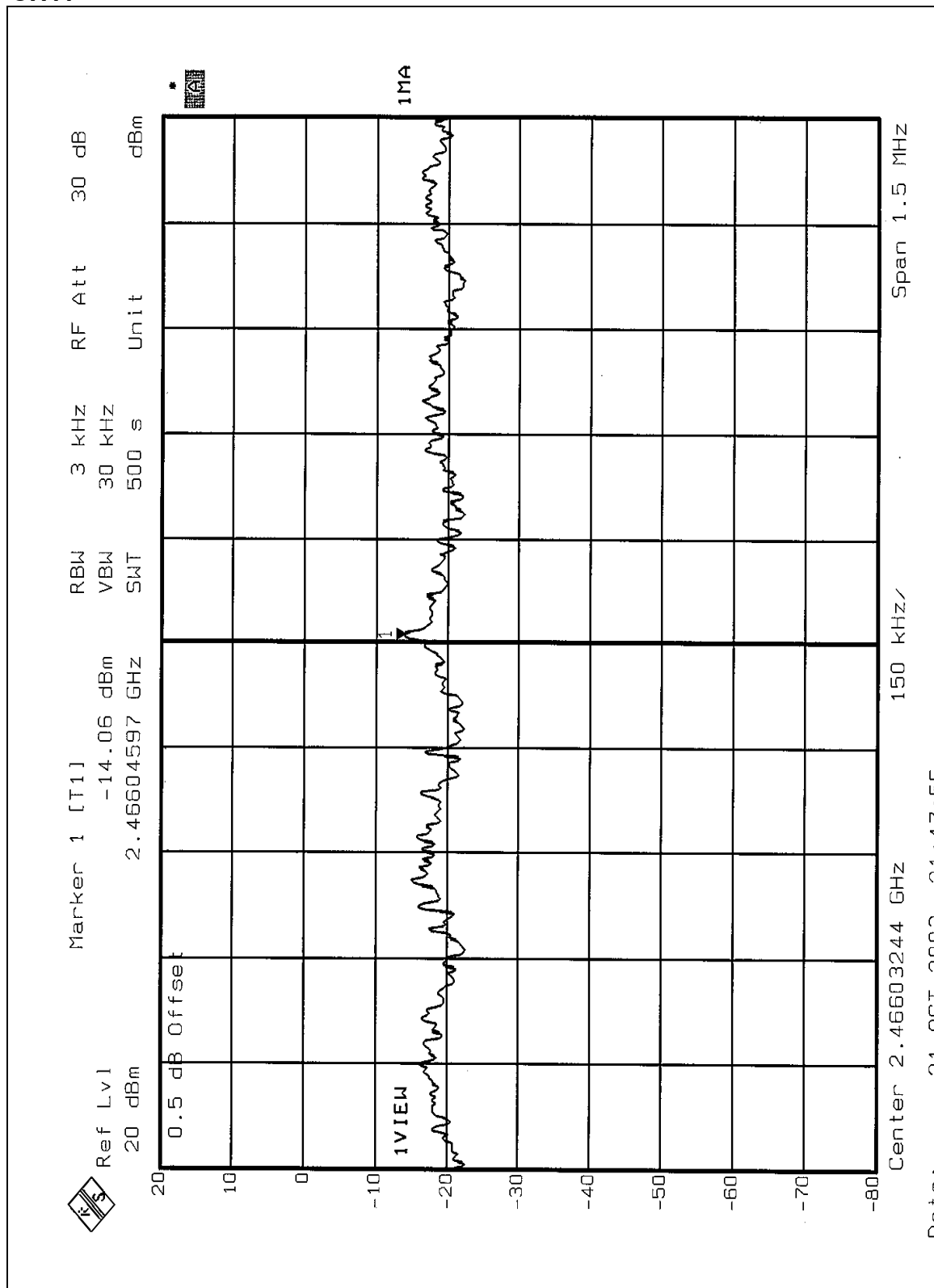
CH1



CH6



CH11



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER | FSEK30 | 100049 | Aug. 12, 2004 |

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.4 EUT OPERATING CONDITION

Same as Item 4.3.5

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6



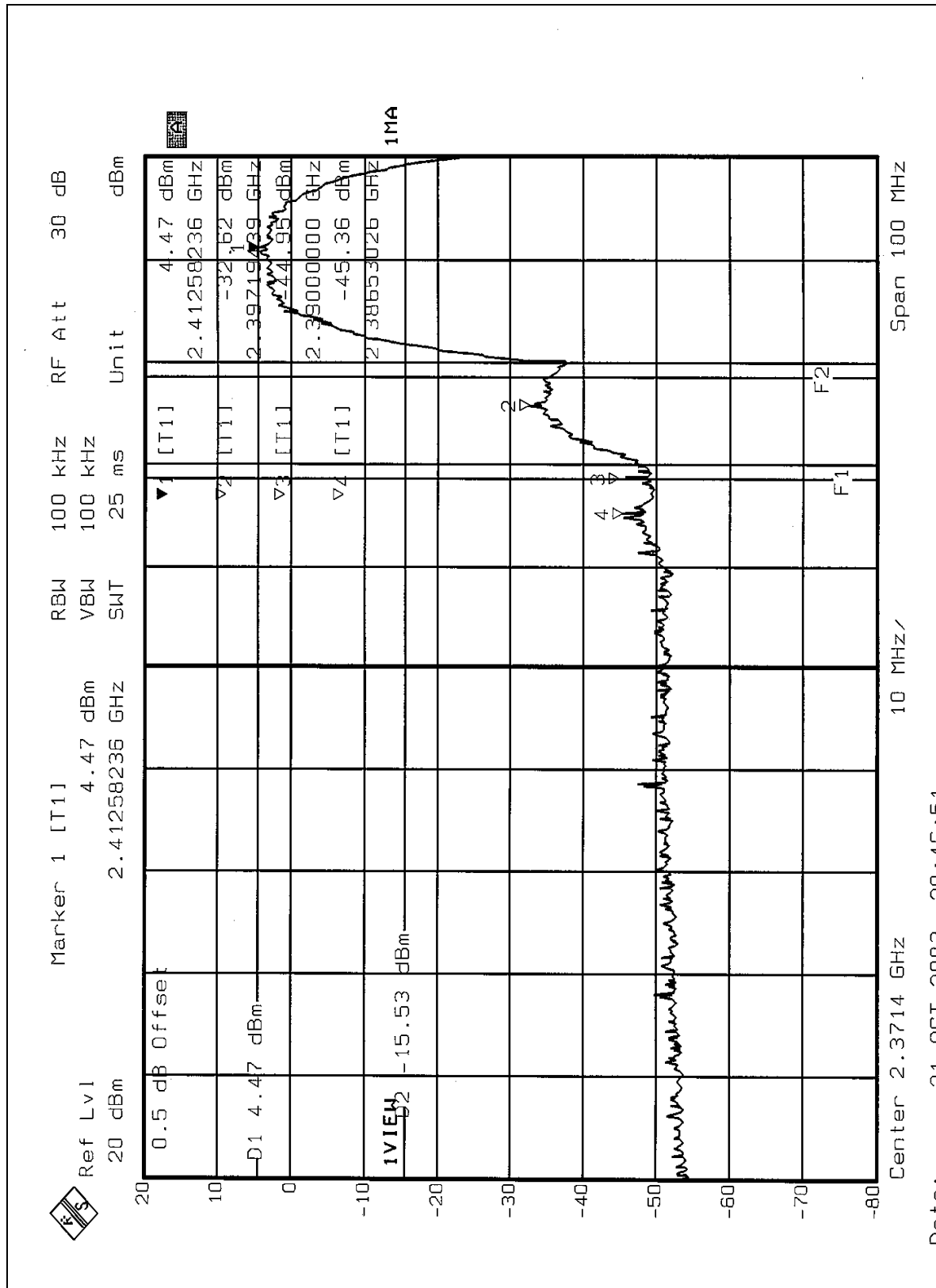
4.6.6 TEST RESULTS (A)

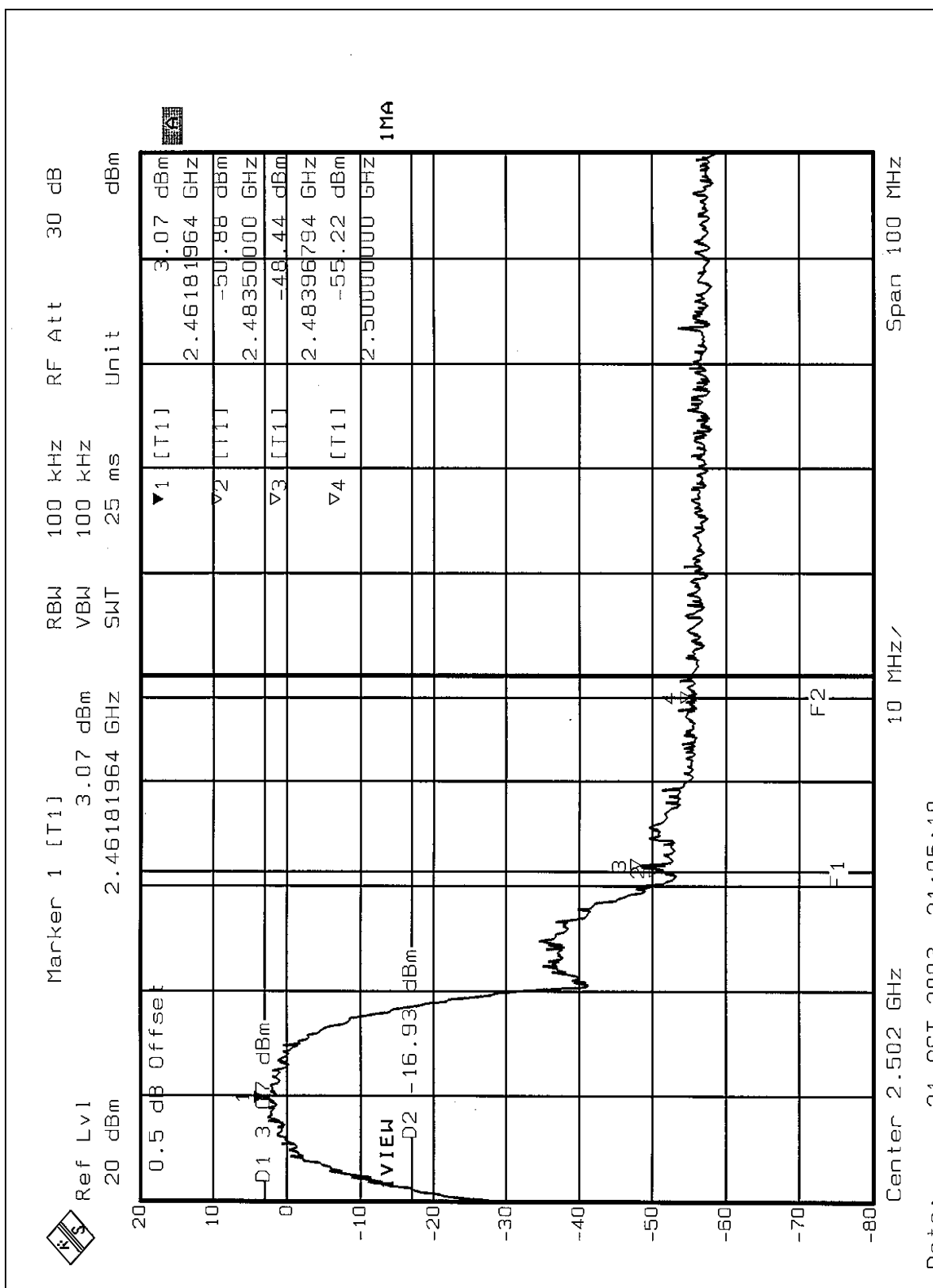
The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

NOTE:

The band edge emission plot on the following first pages shows 49.42dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.6 is 103.17dBuV/m, so the maximum field strength in restrict band is $103.17 - 49.42 = 53.75$ dBuV/m which is under 54 dBuV/m limit.

The band edge emission plot on the following second pages shows 51.51dB delta between carrier maximum power and local maximum emission in restrict band (2.48397GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.6 is 102.55dBuV/m, so the maximum field strength in restrict band is $102.55 - 51.51 = 51.04$ dBuV/m which is under 54 dBuV/m limit.







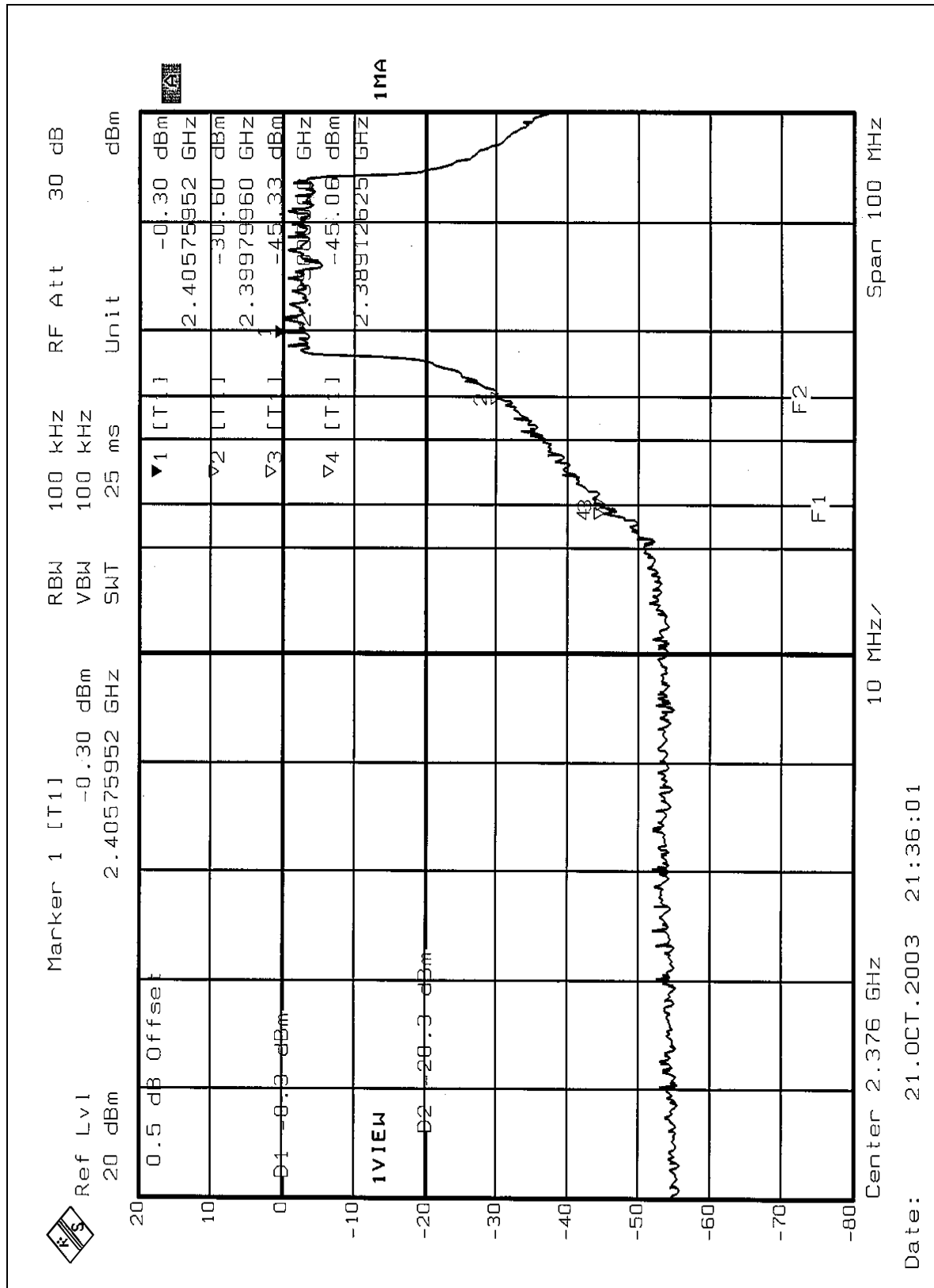
4.6.7 TEST RESULTS (B)

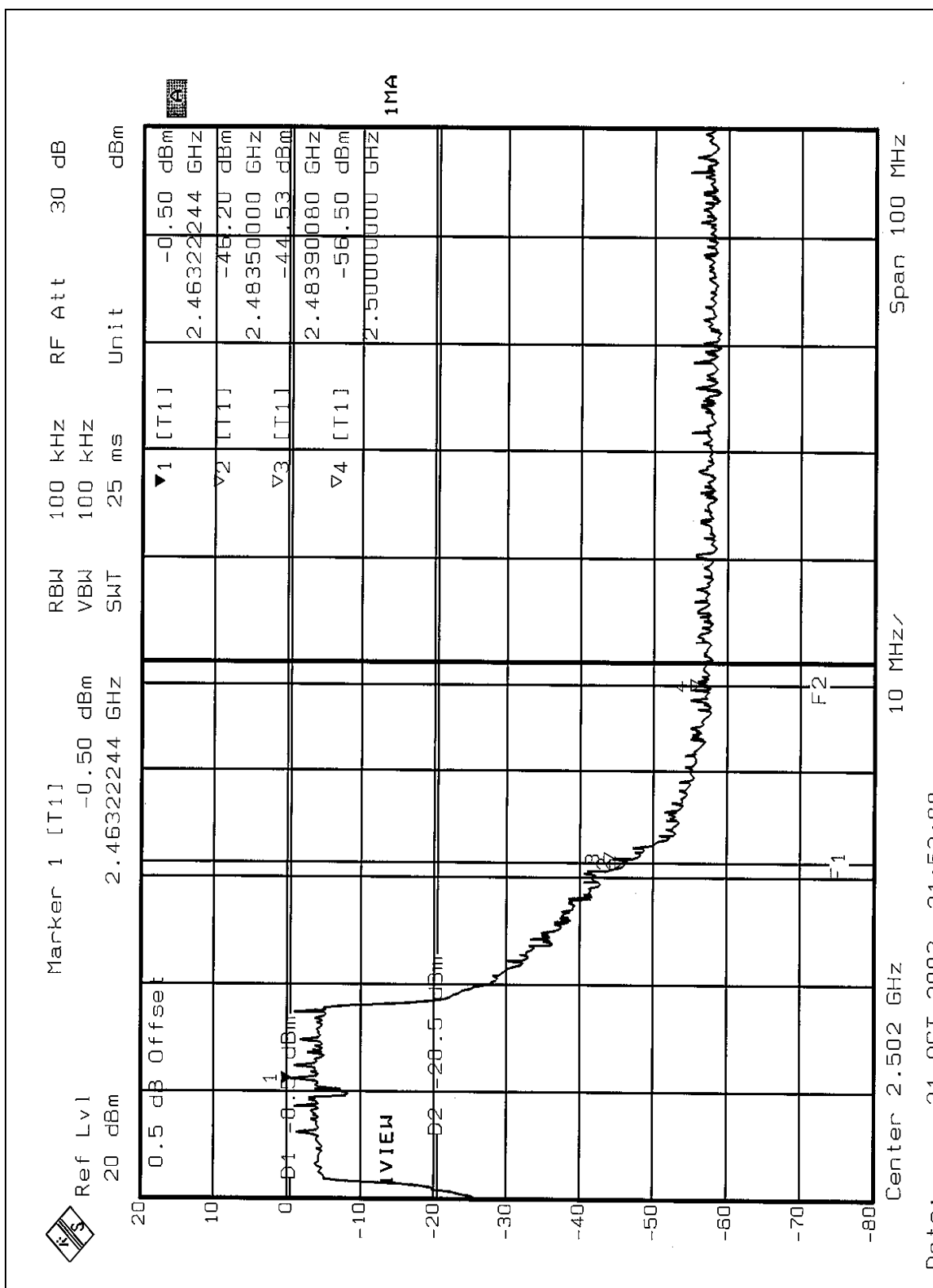
The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

NOTE:

The band edge emission plot on the following first pages shows 44.76dB delta between carrier maximum power and local maximum emission in restrict band (2.3891GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 97.66dBuV/m, so the maximum field strength in restrict band is $97.66 - 44.76 = 52.90$ dBuV/m which is under 54 dBuV/m limit.

The band edge emission plot on the following second pages shows 44.03dB delta between carrier maximum power and local maximum emission in restrict band (2.4839GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 97.40dBuV/m, so the maximum field strength in restrict band is $97.40 - 44.03 = 53.37$ dBuV/m which is under 54 dBuV/m limit.







4.7 ANTENNA REQUIREMENT

4.7.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

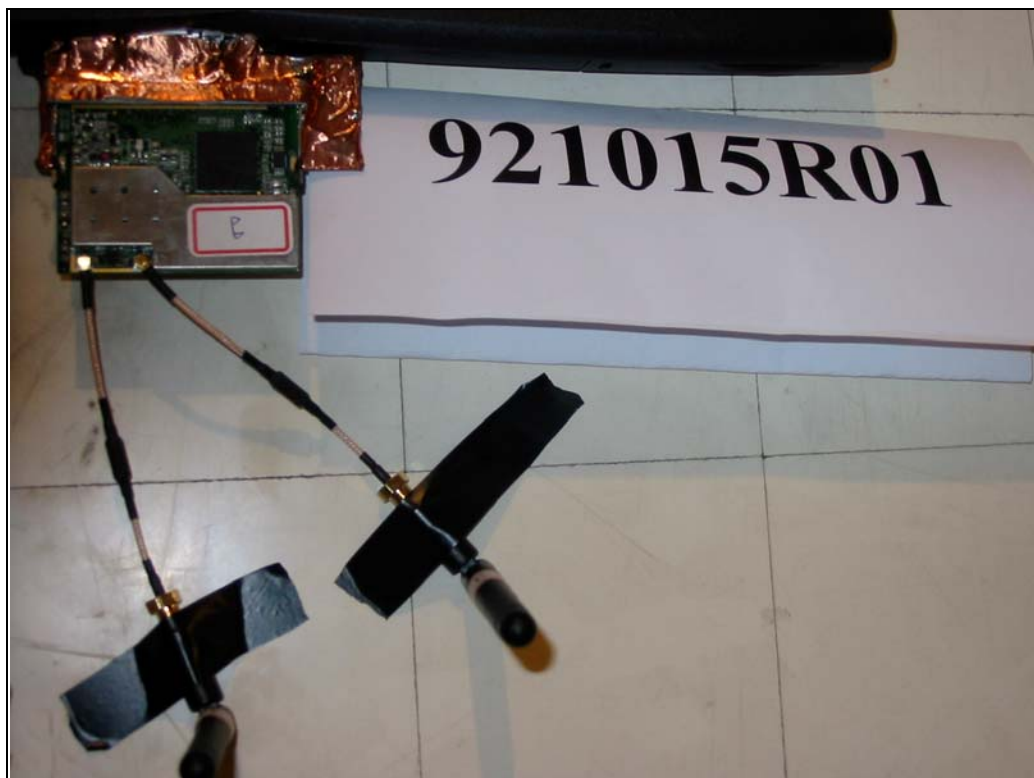
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Dipole antenna with MMCX antenna connector. And the maximum Gain of this antenna is 3dBi.

CONDUCTED EMISSION TEST





RADIATED EMISSION TEST







6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

| | |
|--------------------|-----------------|
| USA | FCC, NVLAP |
| Germany | TUV Rheinland |
| Japan | VCCI |
| New Zealand | MoC |
| Norway | NEMKO |
| R.O.C. | BSMI, DGT, CNLA |

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26052943

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Fax: 886-35-935342

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The address and road map of all our labs can be found in our web site also.