



FCC TEST REPORT

REPORT NO.: RF930626H03

MODEL NO.: C-UN10b

RECEIVED: Jun. 04, 2004

TESTED: Jun. 10 to 15, 2004

APPLICANT: LOGITECH INC.

ADDRESS: 6505 Kaiser Drive Fremont, CA 94555-3615

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien, Taiwan, R.O.C.

This test report consists of 29 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, A2LA or any government agencies. The test results in the report only apply to the tested sample. The test results in this report are traceable to the national or international standards.



0536
ILAC MRA



No. 2177-01



TABLE OF CONTENTS

| | | |
|-------|--|----|
| 1 | CERTIFICATION..... | 3 |
| 2 | SUMMARY OF TEST RESULTS..... | 4 |
| 3 | GENERAL INFORMATION | 5 |
| 3.1 | GENERAL DESCRIPTION OF EUT..... | 5 |
| 3.2 | DESCRIPTION OF TEST MODES..... | 6 |
| 3.3 | GENERAL DESCRIPTION OF APPLIED STANDARDS | 6 |
| 3.4 | DESCRIPTION OF SUPPORT UNITS..... | 7 |
| 3.5 | CONFIGURATION OF SYSTEM UNDER TEST | 7 |
| 4 | TEST PROCEDURES AND RESULTS | 8 |
| 4.1 | CONDUCTED EMISSION MEASUREMENT | 8 |
| 4.2 | TEST INSTRUMENTS..... | 8 |
| 4.3 | TEST PROCEDURE..... | 9 |
| 4.4 | DEVIATION FROM TEST STANDARD | 9 |
| 4.5 | TEST SETUP..... | 9 |
| 4.6 | EUT OPERATING CONDITIONS..... | 10 |
| 4.7 | TEST RESULTS | 11 |
| 4.8 | RADIATED EMISSION MEASUREMENT | 13 |
| 4.8.1 | LIMITS OF RADIATED EMISSION MEASUREMENT..... | 13 |
| 4.8.2 | TEST INSTRUMENTS..... | 14 |
| 4.8.3 | TEST PROCEDURES | 15 |
| 4.8.4 | DEVIATION FROM TEST STANDARD | 15 |
| 4.8.5 | TEST SETUP..... | 16 |
| 4.8.6 | TEST RESULTS | 17 |
| 4.8.7 | TEST RESULTS | 18 |
| 4.9 | BAND EDGES MEASUREMENT..... | 21 |
| 4.9.1 | LIMITS OF BAND EDGES MEASUREMENT | 21 |
| 4.9.2 | TEST INSTRUMENTS..... | 21 |
| 4.9.3 | TEST PROCEDURE..... | 21 |
| 4.9.4 | DEVIATION FROM TEST STANDARD | 21 |
| 4.9.5 | EUT OPERATING CONDITION..... | 22 |
| 4.9.6 | TEST RESULTS | 22 |
| 5 | PHOTOGRAPHS OF THE TEST CONFIGURATION..... | 27 |
| 6 | INFORMATION ON THE TESTING LABORATORIES | 29 |



1 CERTIFICATION

PRODUCT : Logitech Freedom 2.4 Cordless Joystick
BRAND NAME : Logitech
MODEL NO : C-UN10b
TESTED: Jun. 10 to 15, 2004
APPLICANT : LOGITECH INC.
TEST ITEM: ENGINEERING SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.249),
 ANSI C63.4-2001

The above equipment (Model: C-UN10b) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Midoli Peng , **DATE:** Jul. 24, 2004
 (Midoli Peng)

TECHNICAL ACCEPTANCE : Hank Chung , **DATE:** Jul. 24, 2004
 Responsible for RF (Hank Chung)

APPROVED BY : Eric Lin , **DATE:** Jul. 24, 2004
 (Eric Lin, 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 Paragraph | Test Type | Result | Remark |
| 15.207 | Conducted Emission Test | PASS | Minimum passing margin is -15.49dB at 0.173MHz |
| 15.249 | Radiated Emission Test | PASS | Minimum passing margin is -8.0dB at 2373.40MHz |
| 15.249 | Band Edge Measurement | PASS | Meet the requirement of limit |

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



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|--|--|
| PRODUCT | Logitech Freedom 2.4 Cordless Joystick |
| MODEL NO. | C-UN10b |
| POWER SUPPLY | 5.0VDC from host equipment |
| MODULATION TYPE | FSK |
| MODULATION TECHNOLOGY | FHSS |
| CARRIER FREQUENCY OF EACH CHANNEL | 2402MHz ~ 2480MHz |
| BANDWIDTH OF EACH CHANNEL | 1MHz |
| NUMBER OF CHANNEL | 79 |
| ANTENNA TYPE | Sheet metal inverted-F antenna. |
| DATA CABLE | USB Cable (Unshielded, 1.2m) |
| I/O PORTS | NA |
| ASSOCIATED DEVICES | NA |

NOTE:

1. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



3.2 DESCRIPTION OF TEST MODES

Seventy-eight channels are provided to this EUT.

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2431 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | | |

NOTE:

1. Below 1 GHz, the channel 0, 39, and 78 were pre-tested in chamber. The channel 78, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 39, and 78 were tested individually.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Logitech Freedom 2.4 Cordless Joystick. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C. (15.249)
ANSI C63.4 : 2001

All tests 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 47 CFR Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



3.4 DESCRIPTION OF SUPPORT UNITS

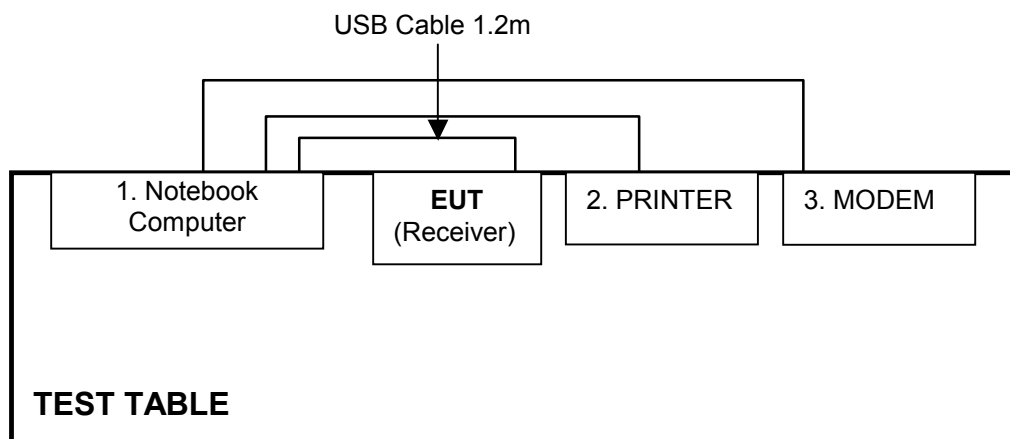
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|-------------------|-------|-----------|------------------------------|------------|
| 1 | Notebook Computer | DELL | PP01L | TW-09C748-1280 0-1A3-1999 | FCC DoC |
| 2 | PRINTER | HP | C2642A | MY79F1C3MZ | B94C2642X |
| 3 | MODEM | ACEEX | 1414 | 0206026776 | IFAXDM1414 |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|--|
| 1 | NA |
| 2 | 1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core |
| 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



NOTE: 1. Please refer to the photos of test configuration in Item 5 also.

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|-----------------|----------------|---------|----------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 73 | 60 | 56 | 46 |
| 5.0 - 30.0 | 73 | 60 | 60 | 50 |

- NOTES:**
- (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.

4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|-----------------------------------|-----------|-------------|------------------|
| ROHDE & SCHWARZ Test Receiver | ESCS 30 | 847124/029 | Dec. 04, 2004 |
| ROHDE & SCHWARZ LISN (for EUT) | ESHS-Z5 | 848773/004 | Nov. 04, 2004 |
| KYORITSU LISN (for peripheral) | KNW-407 | 8/1395/12 | Jul. 27, 2004 |
| RF Cable (JETBAO) | RG233/U | Cable_CA_01 | Jul. 02, 2005 |
| Terminator(for KYORITSU) | 50 | 3 | May 10, 2005 |
| Software | Cond-V2e | NA | NA |

- 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. The test was performed in ADT Shielded Room No. A.
 3. The VCCI Con A Registration No. is C-817.

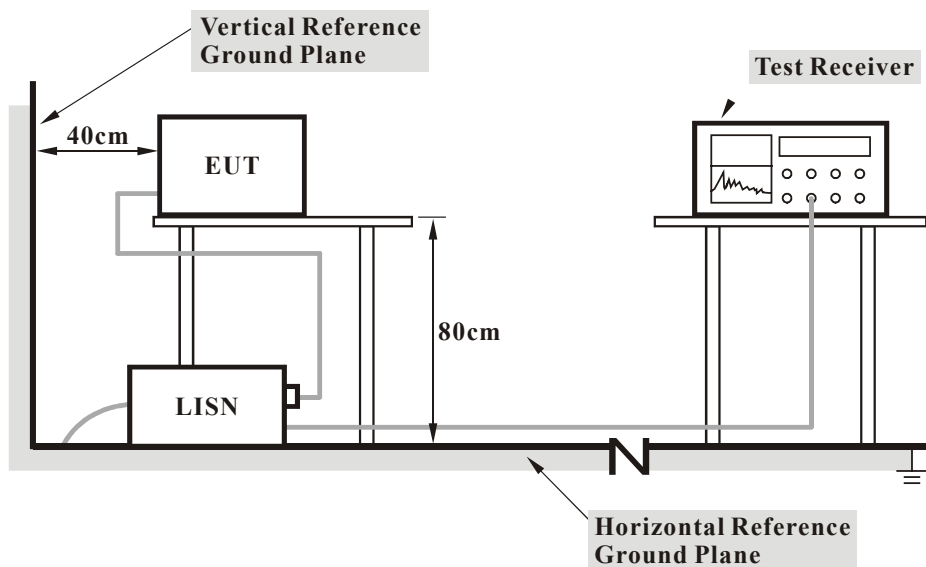
4.3 TEST PROCEDURE

- a. 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.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 20dB under the prescribed limits could not be reported.

4.4 DEVIATION FROM TEST STANDARD

No deviation

4.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at 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.



4.6 EUT OPERATING CONDITIONS

- a. Connect the EUT with support unit 1 (Notebook computer) which placed on a testing table.
- b. The support unit 1 (Notebook computer) ran a test program to enable EUT under transmission condition continuously at specific channel frequency.
- c. Notebook computer sends "H" messages to modem.
- d. Notebook computer sends "H" messages to printer, and the printer prints them on paper.

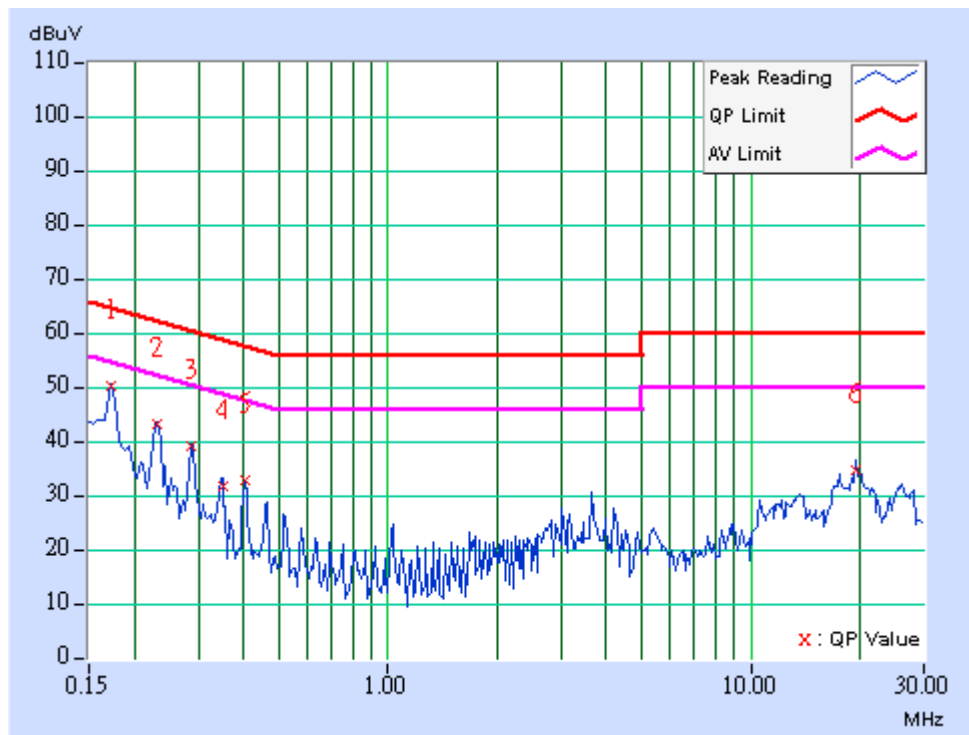


4.7 TEST RESULTS

| | | | |
|---------------------------------|--|----------------------|-----------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 78 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Line (L) |
| ENVIRONMENTAL CONDITIONS | 27 deg. C, 59%RH, 975 hPa | TESTED BY | Tony Chen |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|----|-------------|-------------------|-------------------------|-----|--------------------------|-----|-----------------|-------|-------------|-----|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.173 | 0.25 | 49.06 | - | 49.31 | - | 64.79 | 54.79 | -15.49 | - |
| 2 | 0.232 | 0.28 | 41.85 | - | 42.13 | - | 62.38 | 52.38 | -20.24 | - |
| 3 | 0.287 | 0.26 | 37.90 | - | 38.16 | - | 60.62 | 50.62 | -22.46 | - |
| 4 | 0.349 | 0.23 | 30.47 | - | 30.70 | - | 58.98 | 48.98 | -28.29 | - |
| 5 | 0.404 | 0.20 | 31.42 | - | 31.62 | - | 57.77 | 47.77 | -26.15 | - |
| 6 | 19.543 | 1.38 | 33.29 | - | 34.67 | - | 60.00 | 50.00 | -25.33 | - |

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

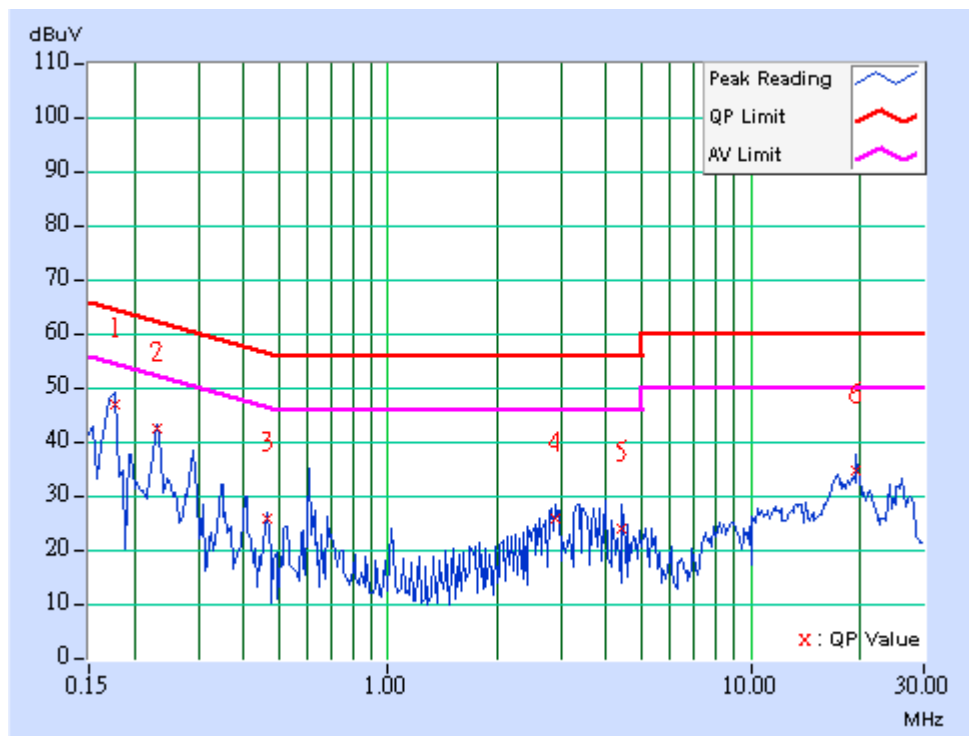




| | | | |
|---------------------------------|--|----------------------|-------------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 78 | 6dB BANDWIDTH | 9 kHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | PHASE | Neurral (N) |
| ENVIRONMENTAL CONDITIONS | 27 deg. C, 59%RH, 975 hPa | TESTED BY | Tony Chen |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|----|-------------|-------------------|-------------------------|-----|--------------------------|-----|-----------------|-------|-------------|-----|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.177 | 0.25 | 45.70 | - | 45.95 | - | 64.61 | 54.61 | -18.65 | - |
| 2 | 0.232 | 0.28 | 41.58 | - | 41.86 | - | 62.38 | 52.38 | -20.51 | - |
| 3 | 0.466 | 0.21 | 24.90 | - | 25.11 | - | 56.58 | 46.58 | -31.47 | - |
| 4 | 2.896 | 0.34 | 24.88 | - | 25.22 | - | 56.00 | 46.00 | -30.78 | - |
| 5 | 4.402 | 0.42 | 22.76 | - | 23.18 | - | 56.00 | 46.00 | -32.82 | - |
| 6 | 19.543 | 1.19 | 33.62 | - | 34.81 | - | 60.00 | 50.00 | -25.19 | - |

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





4.8 RADIATED EMISSION MEASUREMENT

4.8.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.249 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (dBuV/m) | |
|-----------------------------|--|---------|
| | Peak | Average |
| 2400 ~ 2483.5 | 114 | 94 |

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 |

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.



4.8.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|---------------------------------------|-----------|-------------------------|------------------|
| HP Spectrum Analyzer | 8594ER | 3829U04676 | Aug. 30, 2004 |
| ADVANTEST Spectrum Analyzer | R3271A | 85060311 | Jun. 16, 2005 |
| CHASE RF Pre_Amplifier | CPA9232 | 1057 | May. 10, 2005 |
| HP Pre_Amplifier | 8449B | 3008A01922 | Oct. 13, 2004 |
| ROHDE & SCHWARZ Test Receiver | ESVS 10 | 849231 /019 | Sep. 30, 2004 |
| CHASE Broadband Antenna | CBL6111c | 2730 | Jul. 30, 2004 |
| Schwarzbeck Horn_Antenna | 3115 | 5619 | Jul. 16, 2005 |
| Schwarzbeck Horn_Antenna | BBHA 9170 | BBHA9170192 | Feb. 16, 2005 |
| SCHWARZBECK Tunable Dipole Antenna | UHAP | 897 | Mar. 07, 2005 |
| SCHWARZBECK Tunable Dipole Antenna | VHAP | 880 | Mar. 07, 2005 |
| RF Switches (ARNITSU) | CS-201 | 1565157 | Dec. 01, 2004 |
| RF CABLE (Chaintek) 1GHz-20GHz | SF102 | 22054-2 | Feb. 10, 2005 |
| RF Cable(RICHTEC) | 9913-30M | STCCAB-30M-1GH z-021 | Dec. 01, 2004 |
| Software | AS60P8 | NA | NA |
| CHANCE MOST Antenna Tower | AT-100 | 0203 | NA |
| CHANCE MOST Turn Table | TT-100 | 0203 | NA |

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Tunable Dipole Antenna) 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. C.
5. The FCC Site Registration No. is 656396.
6. The VCCI Site Registration No. is R-1626.
7. The CANADA Site Registration No. is IC 4824-3.



4.8.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 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.

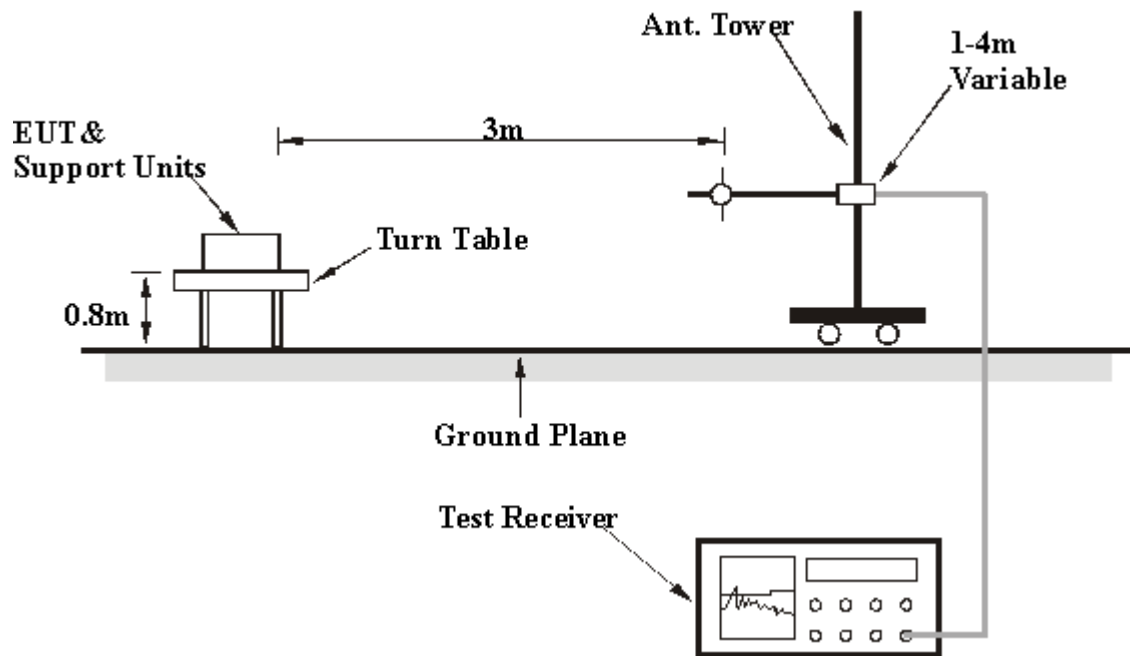
NOTE:

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 10 Hz for Average detection (AV) at frequency above 1GHz.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



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

4.8.6 TEST RESULTS

| | | | |
|---------------------------------|---|--|--------------------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 78 | FREQUENCY RANGE | 30 ~1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION & BANDWIDTH | Quasi-Peak, 120kHz |
| ENVIRONMENTAL CONDITIONS | 27 deg. C, 59%RH, 975 hPa | TESTED BY | Tony Chen |

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 | 67.25 | 15.50 QP | 40.00 | -24.50 | 1.07 H | 23 | 9.50 | 6.00 |
| 2 | 73.11 | 25.70 QP | 40.00 | -14.30 | 1.71 H | 195 | 18.70 | 7.00 |
| 3 | 114.42 | 17.00 QP | 43.50 | -26.50 | 1.68 H | 184 | 4.90 | 12.10 |
| 4 | 144.02 | 21.10 QP | 43.50 | -22.40 | 2.06 H | 272 | 8.60 | 12.50 |
| 5 | 158.03 | 16.90 QP | 43.50 | -26.60 | 2.08 H | 297 | 5.30 | 11.60 |
| 6 | 209.77 | 18.90 QP | 43.50 | -24.60 | 1.97 H | 199 | 8.90 | 10.00 |
| 7 | 233.04 | 23.50 QP | 46.00 | -22.50 | 2.21 H | 10 | 11.50 | 12.00 |
| 8 | 240.02 | 25.40 QP | 46.00 | -20.60 | 1.74 H | 23 | 12.40 | 12.90 |
| 9 | 245.76 | 26.60 QP | 46.00 | -19.40 | 1.60 H | 347 | 12.90 | 13.70 |
| 10 | 258.05 | 27.50 QP | 46.00 | -18.50 | 1.15 H | 78 | 12.20 | 15.30 |
| 11 | 304.72 | 26.20 QP | 46.00 | -19.80 | 1.21 H | 17 | 10.60 | 15.60 |
| 12 | 336.04 | 28.30 QP | 46.00 | -17.70 | 1.40 H | 241 | 11.80 | 16.50 |
| 13 | 344.06 | 29.90 QP | 46.00 | -16.10 | 1.19 H | 207 | 13.10 | 16.80 |
| 14 | 914.17 | 34.20 QP | 46.00 | -11.80 | 1.30 H | 292 | 5.40 | 28.80 |

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 | 67.52 | 21.80 QP | 40.00 | -18.20 | 1.10 V | 238 | 15.70 | 6.00 |
| 2 | 144.02 | 17.80 QP | 43.50 | -25.70 | 1.80 V | 66 | 5.30 | 12.50 |
| 3 | 158.02 | 18.00 QP | 43.50 | -25.50 | 1.79 V | 122 | 6.40 | 11.60 |
| 4 | 210.00 | 20.00 QP | 43.50 | -23.50 | 1.72 V | 235 | 10.00 | 10.00 |
| 5 | 233.49 | 20.40 QP | 46.00 | -25.60 | 1.61 V | 103 | 8.30 | 12.10 |
| 6 | 240.03 | 20.40 QP | 46.00 | -25.60 | 1.61 V | 237 | 7.50 | 12.90 |
| 7 | 257.72 | 20.50 QP | 46.00 | -25.50 | 1.72 V | 86 | 5.30 | 15.20 |
| 8 | 337.50 | 23.60 QP | 46.00 | -22.40 | 1.37 V | 126 | 7.10 | 16.60 |
| 9 | 344.06 | 24.90 QP | 46.00 | -21.10 | 1.55 V | 70 | 8.10 | 16.80 |
| 10 | 379.62 | 30.80 QP | 46.00 | -15.20 | 1.02 V | 195 | 12.80 | 18.00 |
| 11 | 914.17 | 35.00 QP | 46.00 | -11.00 | 1.37 V | 42 | 6.20 | 28.80 |

- 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.

4.8.7 TEST RESULTS

| | | | |
|---------------------------------|---|--|------------------------------------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 0 | FREQUENCY RANGE | 1000~25000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION & BANDWIDTH | Peak (PK) Average (AV) 1 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60%RH, 975 hPa | TESTED BY | Sky Liao |

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 | 2319.90 | 63.70 PK | 74.00 | -10.30 | 1.30 H | 95 | 33.30 | 30.40 |
| 1 | 2319.90 | 38.10 AV | 54.00 | -15.90 | 1.30 H | 95 | 7.70 | 30.40 |
| 2 | 2373.40 | 66.00 PK | 74.00 | -8.00 | 1.68 H | 100 | 35.30 | 30.70 |
| 2 | 2373.40 | 40.40 AV | 54.00 | -13.60 | 1.68 H | 100 | 9.70 | 30.70 |
| 3 | *2402.00 | 95.30 PK | | | 1.62 H | 104 | 65.40 | 29.90 |
| 3 | *2402.00 | 69.70 AV | | | 1.62 H | 104 | 39.80 | 29.90 |
| 4 | 4804.00 | 62.20 PK | 74.00 | -11.80 | 1.00 H | 120 | 26.10 | 36.10 |
| 4 | 4804.00 | 36.60 AV | 54.00 | -17.40 | 1.00 H | 120 | 0.50 | 36.10 |
| 5 | 7206.00 | 56.90 PK | 74.00 | -17.10 | 1.92 H | 9 | 15.20 | 41.60 |
| 5 | 7206.00 | 31.30 AV | 54.00 | -22.70 | 1.92 H | 9 | -10.30 | 41.60 |
| 6 | 9608.00 | 54.50 PK | 74.00 | -19.50 | 1.84 H | 106 | 9.50 | 45.00 |
| 6 | 9608.00 | 28.90 AV | 54.00 | -25.10 | 1.84 H | 106 | -16.10 | 45.00 |

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 | 2319.70 | 60.80 PK | 74.00 | -13.20 | 1.15 V | 71 | 30.40 | 30.40 |
| 1 | 2319.70 | 35.80 AV | 54.00 | -18.20 | 1.15 V | 71 | 5.40 | 30.40 |
| 2 | 2373.30 | 63.00 PK | 74.00 | -11.00 | 1.43 V | 65 | 32.30 | 30.70 |
| 2 | 2373.30 | 37.40 AV | 54.00 | -16.60 | 1.43 V | 65 | 6.70 | 30.70 |
| 3 | *2402.00 | 89.20 PK | | | 1.74 V | 358 | 59.30 | 29.90 |
| 3 | *2402.00 | 63.60 AV | | | 1.74 V | 358 | 33.70 | 29.90 |
| 4 | 4804.00 | 63.60 PK | 74.00 | -10.40 | 1.72 V | 84 | 27.50 | 36.10 |
| 4 | 4804.00 | 38.00 AV | 54.00 | -16.00 | 1.72 V | 84 | 1.90 | 36.10 |
| 5 | 7206.00 | 56.00 PK | 74.00 | -18.00 | 1.88 V | 99 | 14.30 | 41.60 |
| 5 | 7206.00 | 30.40 AV | 54.00 | -23.60 | 1.88 V | 99 | -11.30 | 41.60 |
| 6 | 9608.00 | 53.60 PK | 74.00 | -20.40 | 1.96 V | 96 | 8.60 | 45.00 |
| 6 | 9608.00 | 28.00 AV | 54.00 | -26.00 | 1.96 V | 96 | -17.00 | 45.00 |

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. Margin value = Emission level - Limit value
4. “ * “ : Fundamental frequency
5. The other emission levels were very low against the limit.



| | | | |
|---------------------------------|--|--|------------------------------------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 39 | FREQUENCY RANGE | 1000~25000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION & BANDWIDTH | Peak (PK) Average (AV) 1 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60%RH, 975 hPa | TESTED BY | Sky Liao |

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 | *2441.00 | 94.90 PK | | | 1.59 H | 103 | 64.90 | 30.00 |
| 1 | *2441.00 | 69.30 AV | | | 1.59 H | 103 | 39.30 | 30.00 |
| 2 | 2487.40 | 52.40 PK | 74.00 | -21.60 | 1.24 H | 339 | 22.30 | 30.10 |
| 2 | 2487.40 | 26.80 AV | 54.00 | -27.20 | 1.24 H | 339 | -3.30 | 30.10 |
| 3 | 2552.40 | 61.20 PK | 74.00 | -12.80 | 1.38 H | 108 | 30.60 | 30.60 |
| 3 | 2552.40 | 35.60 AV | 54.00 | -18.40 | 1.38 H | 108 | 5.00 | 30.60 |
| 4 | 4882.00 | 63.40 PK | 74.00 | -10.60 | 1.00 H | 108 | 26.90 | 36.50 |
| 4 | 4882.00 | 37.80 AV | 54.00 | -16.20 | 1.00 H | 108 | 1.30 | 36.50 |
| 5 | 7323.00 | 58.30 PK | 74.00 | -15.70 | 1.90 H | 180 | 16.50 | 41.80 |
| 5 | 7323.00 | 32.70 AV | 54.00 | -21.30 | 1.90 H | 180 | -9.10 | 41.80 |
| 6 | 9764.00 | 52.40 PK | 74.00 | -21.60 | 1.46 H | 319 | 7.80 | 44.60 |
| 6 | 9764.00 | 26.80 AV | 54.00 | -27.20 | 1.46 H | 319 | -17.80 | 44.60 |

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 | *2441.00 | 89.80 PK | | | 1.46 V | 241 | 59.80 | 30.00 |
| 1 | *2441.00 | 63.20 AV | | | 1.46 V | 241 | 33.20 | 30.00 |
| 2 | 2487.40 | 50.30 PK | 74.00 | -23.70 | 1.35 V | 73 | 20.20 | 30.10 |
| 3 | 2552.40 | 56.00 PK | 74.00 | -18.00 | 1.01 V | 66 | 25.30 | 30.60 |
| 3 | 2552.40 | 30.40 AV | 54.00 | -23.60 | 1.01 V | 66 | -0.30 | 30.60 |
| 4 | 4882.00 | 60.10 PK | 74.00 | -13.90 | 1.76 V | 246 | 23.60 | 36.50 |
| 4 | 4882.00 | 34.50 AV | 54.00 | -19.50 | 1.76 V | 246 | -2.00 | 36.50 |
| 5 | 7323.00 | 59.70 PK | 74.00 | -14.30 | 1.23 V | 317 | 17.90 | 41.80 |
| 5 | 7323.00 | 34.70 AV | 54.00 | -19.30 | 1.23 V | 317 | -7.10 | 41.80 |
| 6 | 9764.00 | 54.40 PK | 74.00 | -19.60 | 1.01 V | 305 | 9.80 | 44.60 |
| 6 | 9764.00 | 28.80 AV | 54.00 | -25.20 | 1.01 V | 305 | -15.80 | 44.60 |

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. Margin value = Emission level - Limit value
4. “ * “ : Fundamental frequency
5. The other emission levels were very low against the limit.



| | | | |
|---------------------------------|--|--|------------------------------------|
| EUT | Logitech Freedom 2.4 Cordless Joystick | MODEL | C-UN10b |
| MODE | Channel 78 | FREQUENCY RANGE | 1000~25000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION & BANDWIDTH | Peak (PK) Average (AV) 1 MHz |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 60%RH, 975 hPa | TESTED BY | Sky Liao |

| 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 | *2480.00 | 93.50 PK | | | 1.48 H | 107 | 63.40 | 30.10 |
| 1 | *2480.00 | 67.90 AV | | | 1.48 H | 107 | 37.80 | 30.10 |
| 2 | 2490.00 | 57.00 PK | 74.00 | -17.00 | 1.30 H | 346 | 20.90 | 36.20 |
| 2 | 2490.00 | 31.40 AV | 54.00 | -22.60 | 1.30 H | 346 | -4.70 | 36.20 |
| 3 | 2552.00 | 60.60 PK | 74.00 | -13.40 | 1.36 H | 132 | 30.00 | 30.60 |
| 3 | 2552.00 | 32.00 AV | 54.00 | -22.00 | 1.36 H | 132 | 1.40 | 30.60 |
| 4 | 4960.00 | 63.70 PK | 74.00 | -10.30 | 1.00 H | 128 | 26.90 | 36.80 |
| 4 | 4960.00 | 38.10 AV | 54.00 | -15.90 | 1.00 H | 128 | 1.30 | 36.80 |
| 5 | 7440.00 | 60.00 PK | 74.00 | -14.00 | 1.92 H | 24 | 18.10 | 41.90 |
| 5 | 7440.00 | 34.40 AV | 54.00 | -19.60 | 1.92 H | 24 | -7.50 | 41.90 |
| 6 | 9920.00 | 52.40 PK | 74.00 | -21.60 | 1.61 H | 214 | 8.20 | 44.20 |
| 6 | 9920.00 | 26.80 AV | 54.00 | -27.20 | 1.61 H | 214 | -17.40 | 44.20 |

| 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 | *2480.00 | 90.10 PK | | | 1.37 V | 105 | 60.00 | 30.10 |
| 1 | *2480.00 | 64.50 AV | | | 1.37 V | 105 | 34.40 | 30.10 |
| 2 | 2490.00 | 57.00 PK | 74.00 | -17.00 | 1.30 V | 346 | 20.90 | 36.20 |
| 2 | 2490.00 | 31.40 AV | 54.00 | -22.60 | 1.30 V | 346 | -4.70 | 36.20 |
| 3 | 2552.00 | 56.60 PK | 74.00 | -17.40 | 1.57 V | 72 | 25.90 | 30.60 |
| 3 | 2552.00 | 31.00 AV | 54.00 | -23.00 | 1.57 V | 72 | 0.30 | 30.60 |
| 4 | 4960.00 | 61.00 PK | 74.00 | -13.00 | 1.08 V | 222 | 24.20 | 36.80 |
| 4 | 4960.00 | 35.40 AV | 54.00 | -18.60 | 1.08 V | 222 | -1.40 | 36.80 |
| 5 | 7440.00 | 59.00 PK | 74.00 | -15.00 | 1.52 V | 332 | 17.10 | 41.90 |
| 5 | 7440.00 | 33.40 AV | 54.00 | -20.60 | 1.52 V | 332 | -8.50 | 41.90 |
| 6 | 9920.00 | 54.00 PK | 74.00 | -20.00 | 1.90 V | 283 | 9.80 | 44.20 |
| 6 | 9920.00 | 28.40 AV | 54.00 | -25.60 | 1.90 V | 283 | -15.80 | 44.20 |

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. Margin value = Emission level - Limit value
4. “ * “ : Fundamental frequency
5. The other emission levels were very low against the limit.

4.9 BAND EDGES MEASUREMENT

4.9.1 LIMITS OF BAND EDGES MEASUREMENT

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

4.9.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSP40 | 100036 | Nov. 27, 2004 |

NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.9.3 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.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation



4.9.5 EUT OPERATING CONDITION

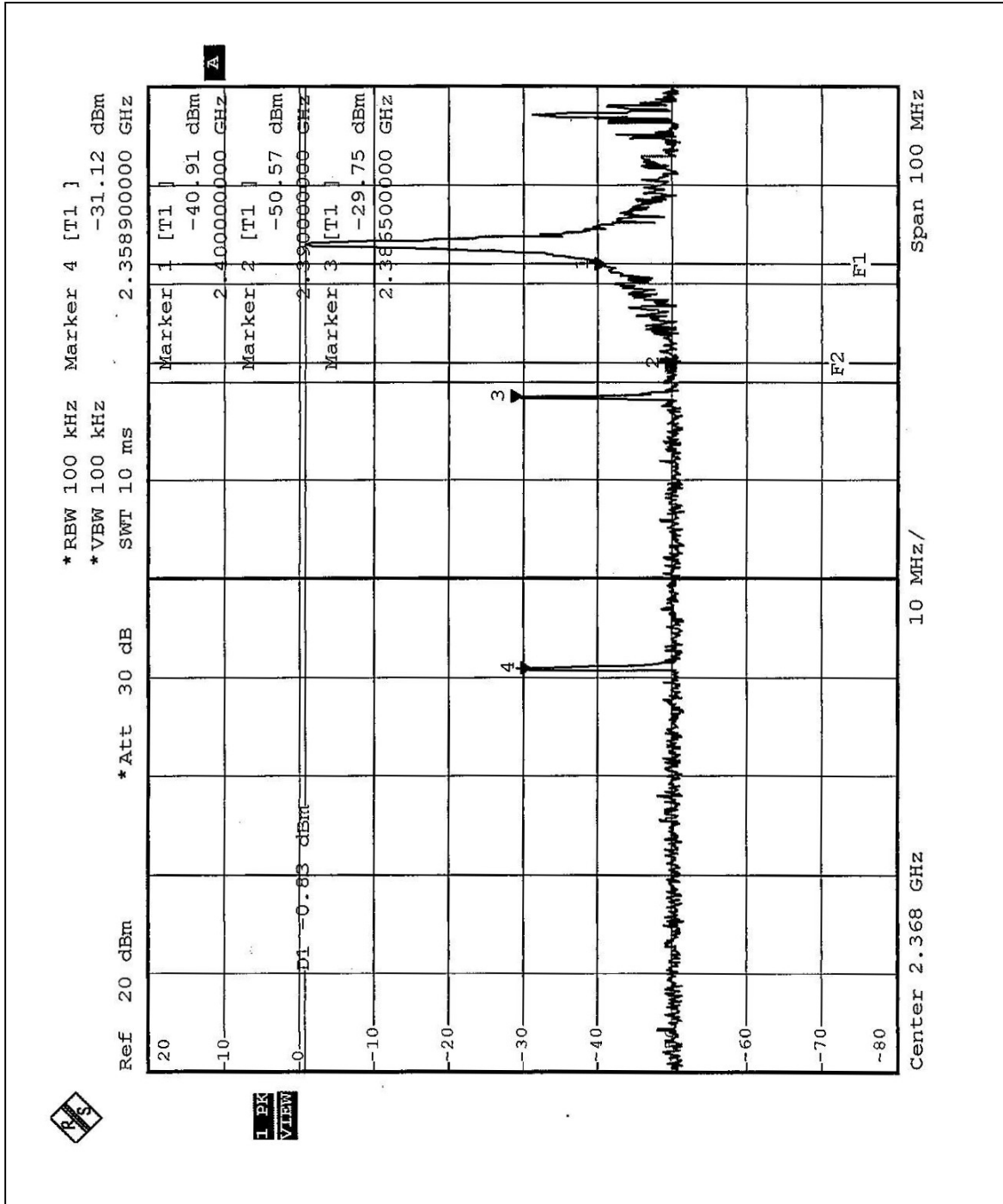
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.9.6 TEST RESULTS

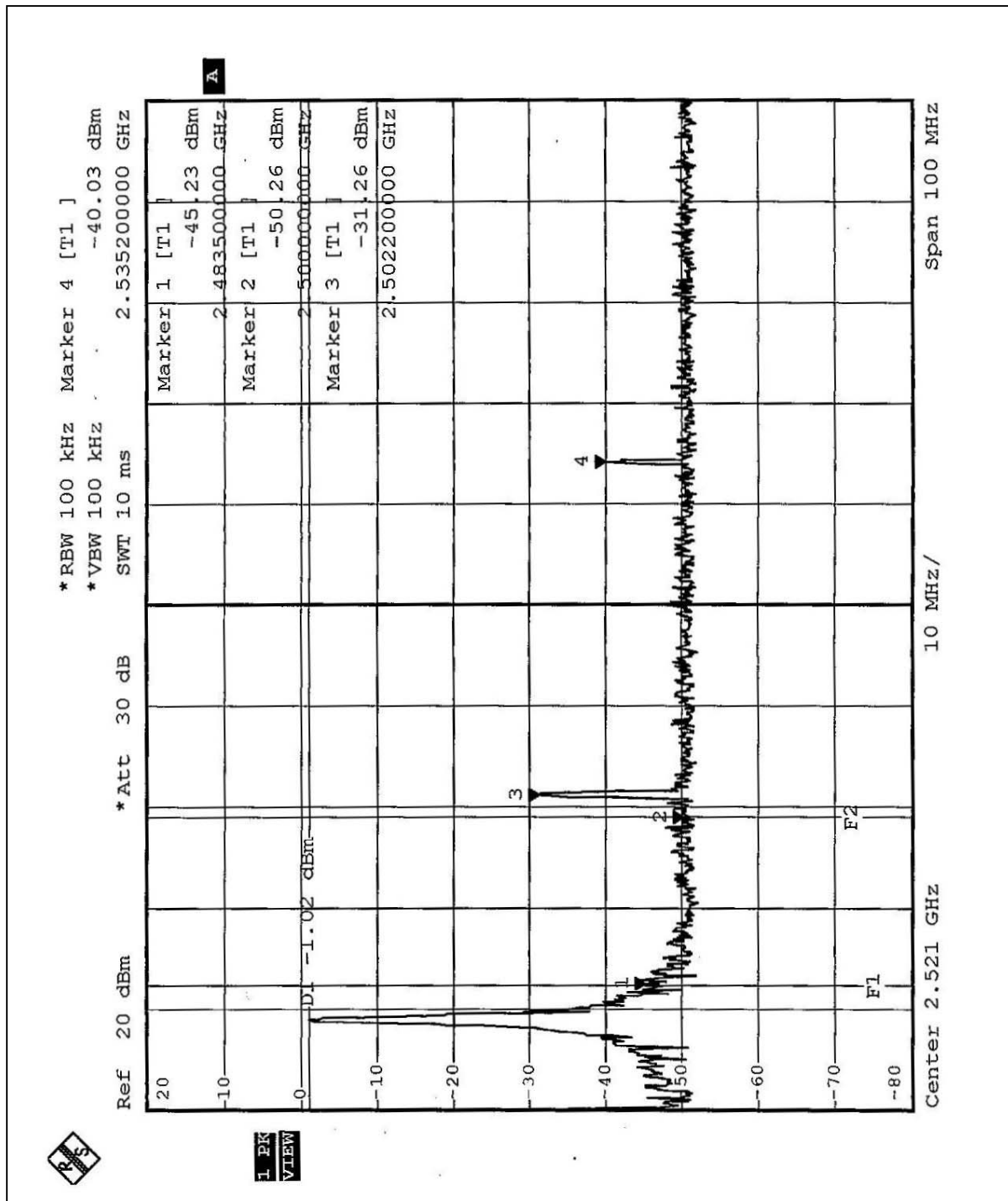
Emissions radiated outside of the specified frequency bands, please refer pages form 13 to 21 for met the requirement of the general radiated emission limits in § 15.209.



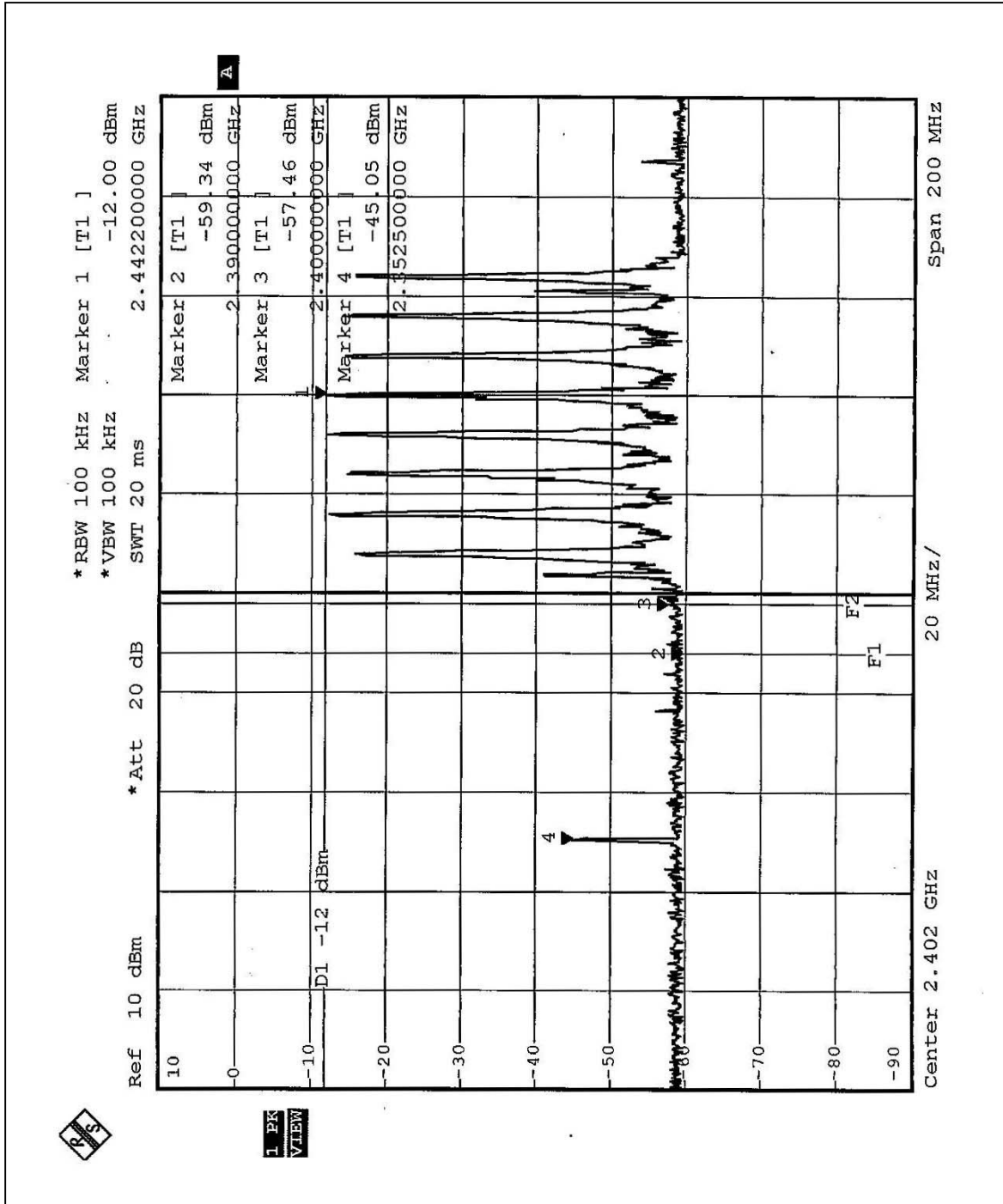
Static-CH 0



Static-CH 78



Dynamic-CH 0



5 PHOTOGRAPHS OF THE TEST CONFIGURATION 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, Radio, Telecom 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, UL |
| Germany | TUV Rheinland |
| Japan | VCCI |
| Norway | NEMKO |
| Canada | INDUSTRY CANADA , CSA |
| R.O.C. | CNLA, BSMI, DGT |
| Netherlands | Telefication |
| Singapore | PSB , GOST-ASIA(MOU) |
| Russia | CERTIS(MOU) |

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:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Linko RF Lab.
Tel: 886-3-3270910
Fax: 886-3-3270892

Email: service@mail.adt.com.tw

Web Site: www.adt.com.tw

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