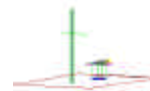


# PCTEST ENGINEERING LABORATORY, INC.

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<http://www.pctestlab.com> (email: [randy@pctestlab.com](mailto:randy@pctestlab.com))



## CERTIFICATE OF COMPLIANCE

### MANUFACTURER NAME & ADDRESS:

Lenovo (United States) Incorporated

New Orchard Rd,

Armonk, NY 10504

### DATE & LOCATION OF TESTING:

Date(s) of Tests: May 25, 2006

Test Report S/N: 0605260412-R2

Test Site: PCTEST Lab, Columbia, MD

### FCC ID:

S2L20030500CMR

### IC CERTIFICATION NUMBER:

5903D-T60H786U

### APPLICANT NAME:

Lenovo (United States) Incorporated

### SUMMARY:

#### Model No.:

T60H786-U

#### Equipment EUT Type:

Lenovo Laptop PC ThinkPad X30 Series Model: T60H786-U with 802.11b/g WLAN Adapter

#### Max. Output Power:

0.0526 W Conducted

#### Frequency Range:

2412 - 2462 MHz (DSSS/OFDM)

#### FCC Classification:

Digital Transmission System (DTS)

#### IC Classification:

Low Power Exempt Radiocommunication Device

#### FCC Rule Part(s):

Parts 15.247

#### IC Rule Part(s):

RSS-210 – Issue 6

#### Test Device Serial No.:

S/N: AA-GGFV8

#### Original Grant Date:

March 24, 2004

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4-2003.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

\* NOTE: This revised Test Report (S/N: 0605260412-R2) supercedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued report (S/N: 0605260412) and dispose of it accordingly.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortuno  
President



|                                  |                               |                                                                                                |
|----------------------------------|-------------------------------|------------------------------------------------------------------------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 | <b>Supplemental WLAN Data</b> | Reviewed by:<br>Quality Manager                                                                |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006   | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter |
|                                  | FCC ID:<br>S2L20030500CMR     | Page 1 of 10                                                                                   |

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

### **Radiated Measurements**

§15.247(b) / §15.205 & §15.209

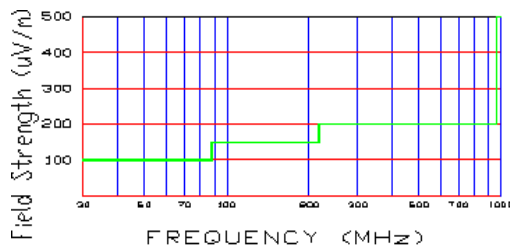
Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 01

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL | F/S (dBuV/m) | F/S (uV/m) | Margin (dB) |
|-----------------|-------------|-----------|-----|--------------|------------|-------------|
| 4824            | -97.2       | 40.6      | V   | 50.40        | 331.13     | -3.60       |
| 4236            | -110.7      | 45.8      | V   | 42.10        | 127.35     | -11.90      |
| 9648            | -135.0      | 49.6      | V   | 21.60        | 12.02      | -32.40      |
| 12060           | -135.0      | 52.1      | V   | 24.1         | 16.03      | -29.9       |

**Table A-1. Peak Radiated Measurements @ 3 meters**



**Figure A-1. Radiated limits at 3 meters.**

#### **NOTES:**

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new /fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                         |                                                                                     |                                                                                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| <b>PCTEST LAB TEST REPORT</b><br>15.247 |  | <b>Supplemental WLAN Data</b>                                                                         |  | Reviewed by:<br>Quality Manager |
| <b>Filename:</b><br>0605260412-R2       | <b>Test Dates:</b><br>May 25, 2006                                                  | <b>EUT Type:</b> Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | <b>FCC ID:</b><br>S2L20030500CMR                                                      | Page 2 of 10                    |

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

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

§15.247(b) / §15.205 & §15.209

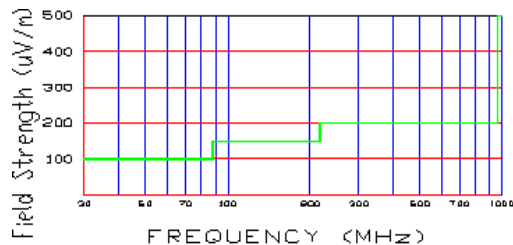
Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 06

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBuV/m) | F/S (uV/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|--------------|------------|-------------|
| 4874            | -98.1       | 40.5      | V         | 49.40        | 295.12     | -4.6        |
| 7311            | -110.9      | 47.3      | V         | 43.40        | 147.91     | -10.6       |
| 9748            | -135.0      | 50.05     | V         | 22.05        | 12.66      | -32.0       |
| 12185           | -135.0      | 52.5      | V         | 24.50        | 16.79      | -29.5       |

**Table A-2. Peak Radiated Measurements @ 3 meters**



**Figure A-2. Radiated limits at 3 meters.**

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new /fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                         |                                                                                     |                                                                                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| <b>PCTEST LAB TEST REPORT</b><br>15.247 |  | <b>Supplemental WLAN Data</b>                                                                         |  | Reviewed by:<br>Quality Manager |
| <b>Filename:</b><br>0605260412-R2       | <b>Test Dates:</b><br>May 25, 2006                                                  | <b>EUT Type:</b> Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | <b>FCC ID:</b><br>S2L20030500CMR                                                      | Page 3 of 10                    |

## EXHIBIT A – Test Results (Cont.)

### Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

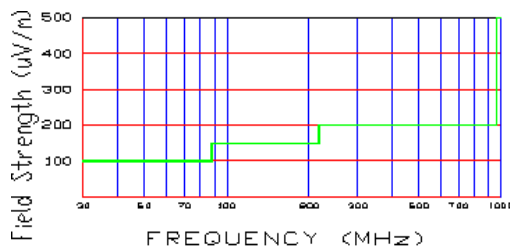
Transfer Rate: 1 Mbps

Distance of Measurements: 3 Meters

Channel: 11

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | F/S (dBuV/m) | F/S (uV/m) | Margin (dB) |
|-----------------|-------------|-----------|-----------|--------------|------------|-------------|
| 4924            | -98.7       | 40.95     | V         | 49.25        | 290.07     | -4.75       |
| 7386            | -110.7      | 46.25     | V         | 42.55        | 134.12     | -11.45      |
| 9848            | -135.0      | 49.9      | V         | 21.9         | 12.45      | -32.1       |
| 12310           | -135.0      | 52.1      | V         | 24.1         | 16.03      | -28.2       |

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



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

#### NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: \* = Restricted Band measured frequency)
2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz
3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.
5. The antenna is manipulated through typical positions, polarity and length during the tests.
6. The EUT is supplied with nominal AC voltage or/and a new /fully-recharged battery.
7. The spectrum is measured from 9kHz to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
8. < - 135 dBm are below the analyzer floor level.
9. Above 1 GHz, the limit is 500  $\mu$ V/m (54dB $\mu$ /m) at 3 meters radiated.

|                                  |                                                                                     |                                                                                                |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  | Supplemental WLAN Data                                                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006                                                         | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | FCC ID:<br>S2L20030500CMR                                                             | Page 4 of 10                    |

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

### **Radiated Restricted Band Measurements**

§15.205 / §15.209

Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operations. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurement was used, using RBW 1MHz – VBW 10Hz and linearly polarized horn antennas. All harmonics/spurs are at least 20dB below the highest emission in the authorized band using RBW = 100kHz. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table G-1 per Section 15.247.

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

**Table A-4. Restricted Band Limits**

#### **TEST MEASUREMENT EQUIPMENT**

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

|                                         |                                                                                     |                                                                                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| <b>PCTEST LAB TEST REPORT</b><br>15.247 |  | <b>Supplemental WLAN Data</b>                                                                         |  | Reviewed by:<br>Quality Manager |
| <b>Filename:</b><br>0605260412-R2       | <b>Test Dates:</b><br>May 25, 2006                                                  | <b>EUT Type:</b> Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | <b>FCC ID:</b><br>S2L20030500CMR                                                      | Page 5 of 10                    |

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

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

§15.205 / §15.209 courtesy

Operating Frequency: 2462 MHz

Distance of Measurements: 3 Meters

Data Rate: 6 Mbps

| FREQ<br>(MHz) | Level<br>(dBm) | AFCL<br>(dB/m) | POL<br>(H/V) | F/S<br>(dB $\mu$ V/m) | F/S<br>( $\mu$ V/M) | Margin<br>(dB) |
|---------------|----------------|----------------|--------------|-----------------------|---------------------|----------------|
| 2484.7        | -113.75        | 31.8           | V            | 25.05                 | 17.89               | -28.9          |
| 2486.3        | -112.37        | 31.8           | H            | 26.43                 | 20.97               | -27.6          |
| 2489.2        | -115.24        | 31.8           | V            | 23.56                 | 15.07               | -30.4          |
| 2490.2        | -114.82        | 31.8           | V            | 23.98                 | 15.81               | -30.0          |
| 2495.6        | -114.2         | 31.8           | V            | 24.6                  | 16.98               | -29.4          |
| 2497.8        | -115.16        | 31.8           | V            | 23.64                 | 15.21               | -30.3          |

**Table A-5. Radiated Restricted Band Measurements at 3-meters**

NOTES:

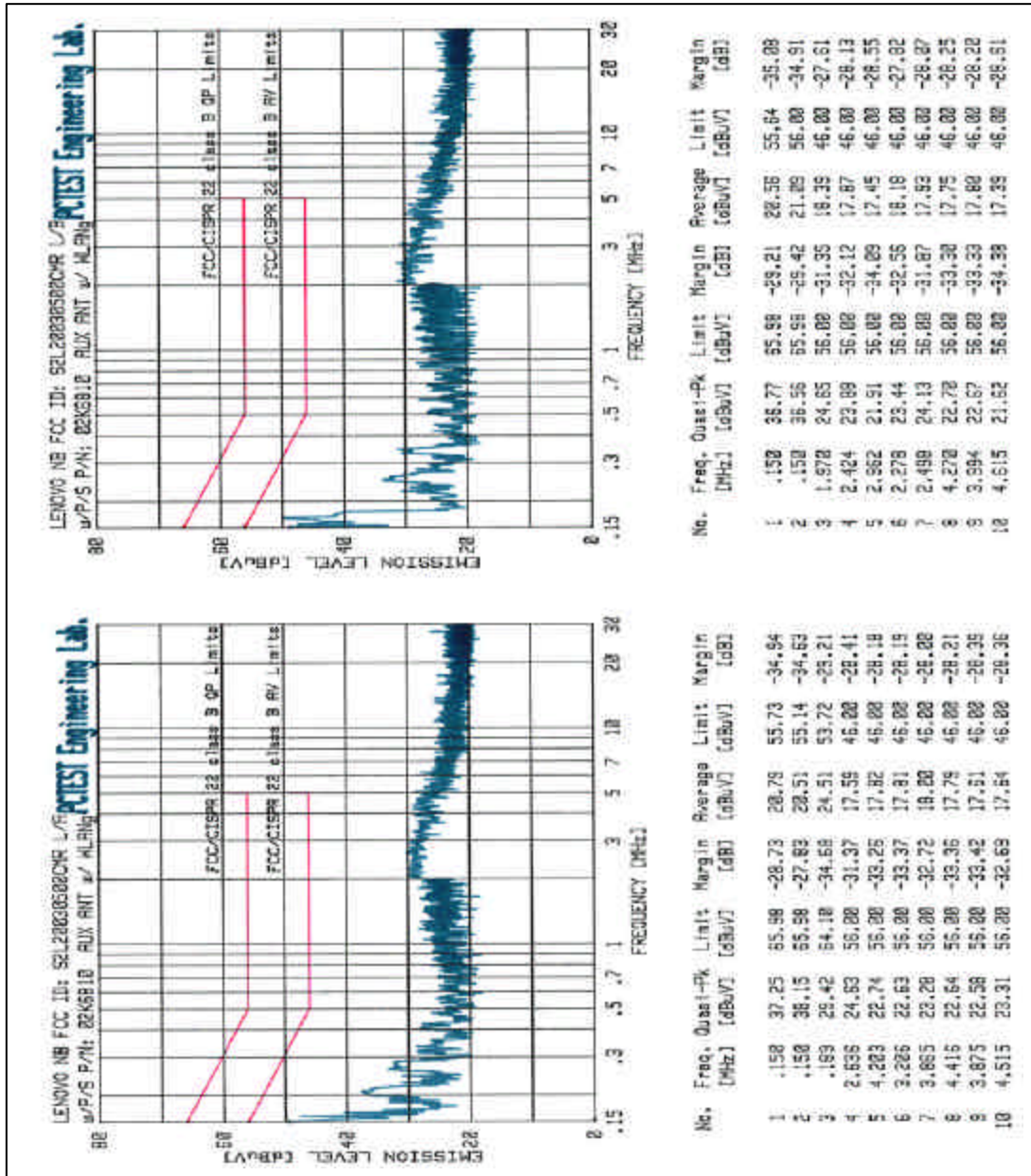
1. The antenna is manipulated through typical positions, polarity and length during the testing.
2. The EUT is supplied with the minimal AC voltage or /and a new / fully re-charged battery.
3. The spectrum is measured from 9kHz up to the 10<sup>th</sup> harmonic and the worst-case emissions are reported.
4. The conducted limits are shown on Figure A-14. Above 1 GHz the limit is 500 $\mu$ V/m.
5. < -135 dBm is below the analyzer measurement floor level.
6. The data in the table are Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz
7. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

|                                         |                                                                                     |                                                                                                       |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| <b>PCTEST LAB TEST REPORT</b><br>15.247 |  | <b>Supplemental WLAN Data</b>                                                                         |  | Reviewed by:<br>Quality Manager |
| <b>Filename:</b><br>0605260412-R2       | <b>Test Dates:</b><br>May 25, 2006                                                  | <b>EUT Type:</b> Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | <b>FCC ID:</b><br>S2L20030500CMR                                                      | Page 6 of 10                    |

## EXHIBIT A – Test Results (Cont.)

### Line-Conducted Test Data

§15.207



#### Notes:

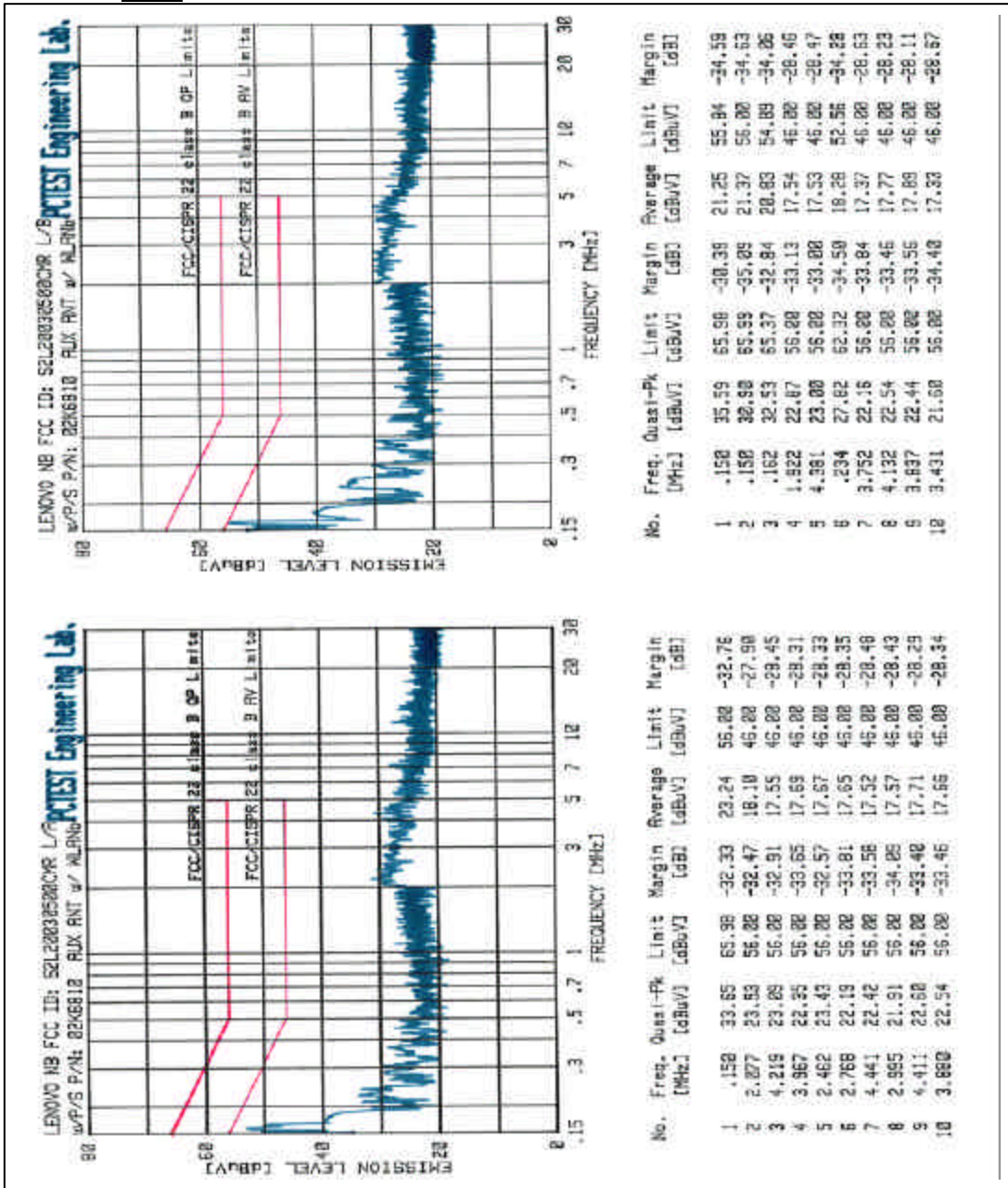
1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
3. Line A = Phase; Line B = Neutral
4. Deviations to the Specifications: *None*.

|                                  |                                                                                     |                                                                                                |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  | Supplemental WLAN Data                                                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006                                                         | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | FCC ID:<br>S2L20030500CMR                                                             | Page 7 of 10                    |

## EXHIBIT A – Test Results (Cont.)

### Line-Conducted Test Data

§15.207



#### Notes:

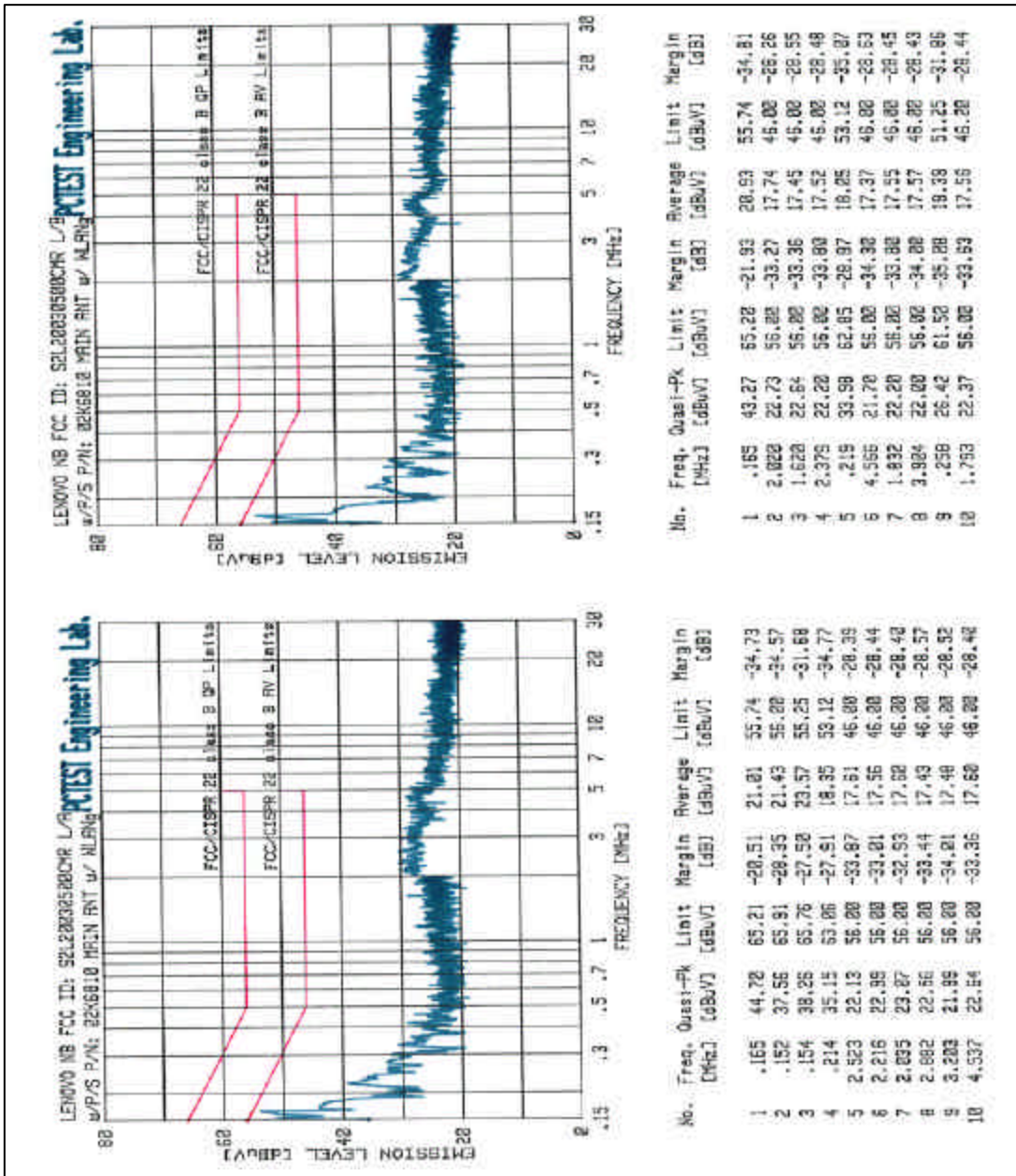
5. All Modes of operation were investigated and the worst-case emissions are reported.
6. The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
7. Line A = Phase; Line B = Neutral
8. Deviations to the Specifications: *None*.

|                                  |                                                                                     |                                                                                                |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  | Supplemental WLAN Data                                                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006                                                         | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | FCC ID:<br>S2L20030500CMR                                                             | Page 8 of 10                    |

## EXHIBIT A – Test Results (Cont.)

### Line-Conducted Test Data

\$15.207



#### Notes:

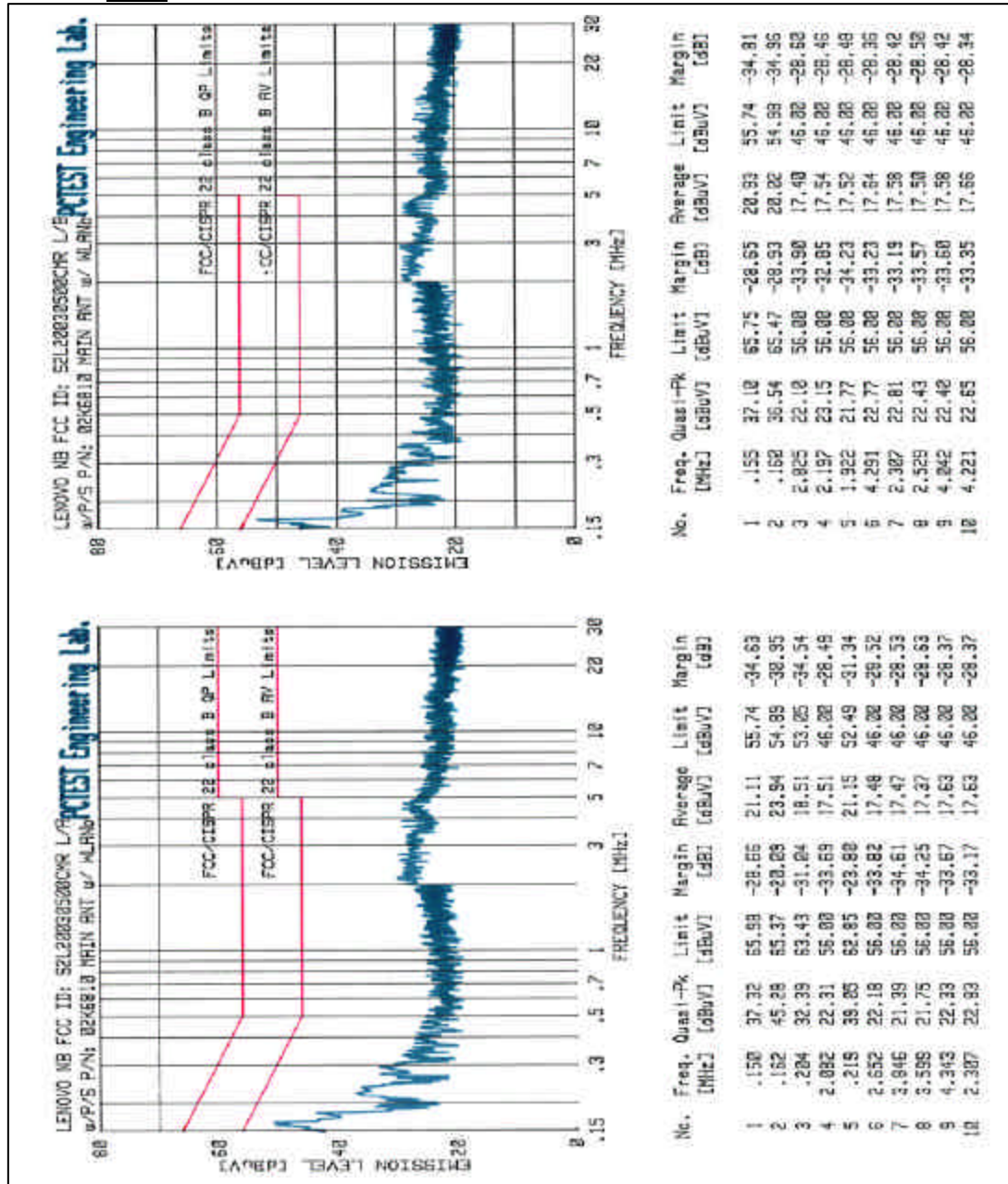
- All Modes of operation were investigated and the worst-case emissions are reported.
- The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
- Line A = Phase; Line B = Neutral
- Deviations to the Specifications: *None*.

|                                  |                                                                                     |                                                                                                |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  | Supplemental WLAN Data                                                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006                                                         | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | FCC ID:<br>S2L20030500CMR                                                             | Page 9 of 10                    |

## EXHIBIT A – Test Results (Cont.)

### Line-Conducted Test Data

§15.207



#### Notes:

- All Modes of operation were investigated and the worst-case emissions are reported.
- The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
- Line A = Phase; Line B = Neutral
- Deviations to the Specifications: *None*.

|                                  |                                                                                     |                                                                                                |                                                                                       |                                 |
|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST LAB TEST REPORT<br>15.247 |  | Supplemental WLAN Data                                                                         |  | Reviewed by:<br>Quality Manager |
| Filename:<br>0605260412-R2       | Test Dates:<br>May 25, 2006                                                         | EUT Type: Lenovo Laptop PC ThinkPad X30 Series Model:<br>T60H786-U with 802.11b/g WLAN Adapter | FCC ID:<br>S2L20030500CMR                                                             | Page 10 of 10                   |