

4.7 RADIATED EMISSION MEASUREMENT

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field Strength of Fundamental | |
|----------------------|-------------------------------|--------|
| | uV/m | dBuV/m |
| 30-88 | 100 | 40.0 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

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.

4.7.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|------------------------------------|---|--------------------------|------------------|
| * HP Spectrum Analyzer | 8590L | 3544A01176 | May 7, 2002 |
| * HP Preamplifier | 8447D | 2944A08485 | May 7, 2002 |
| * HP Preamplifier | 8449B | 3008A01201 | Dec. 06, 2002 |
| * HP Preamplifier | 8449B | 3008A01292 | Aug. 21, 2002 |
| * ROHDE & SCHWARZ TEST RECEIVER | ESMI | 839013/007 839379/002 | Jan. 27, 2003 |
| SCHWARZBECK Tunable Dipole Antenna | VHA 9103 UHA 9105 | E101051 E101055 | Nov. 23, 2002 |
| * CHASE BILOG Antenna | CBL6112A | 2221 | Aug. 2, 2002 |
| * SCHWARZBECK Horn Antenna | BBHA9120-D1 | D130 | July 6, 2002 |
| * EMCO Horn Antenna | 3115 | 9312-4192 | April 15, 2002 |
| * EMCO Turn Table | 1060 | 1115 | NA |
| * SHOSHIN Tower | AP-4701 | A6Y005 | NA |
| * Software | AS61D4 | NA | NA |
| * ANRITSU RF Switches | MP59B | M35046 | Aug. 2, 2002 |
| * TIMES RF cable | LMR-600 | CABLE-ST5-01 | Aug. 2, 2002 |
| Open Field Test Site | Site 5 | ADT-R05 | July 28, 2002 |
| Site Registration No. | FCC: 90422 Canada IC: IC 3789 VCCI : R-1039 | | |

NOTE:

1. The measurement uncertainty is less than +/- 3.0dB, 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.
3. "*" = These equipment are used for the final measurement.



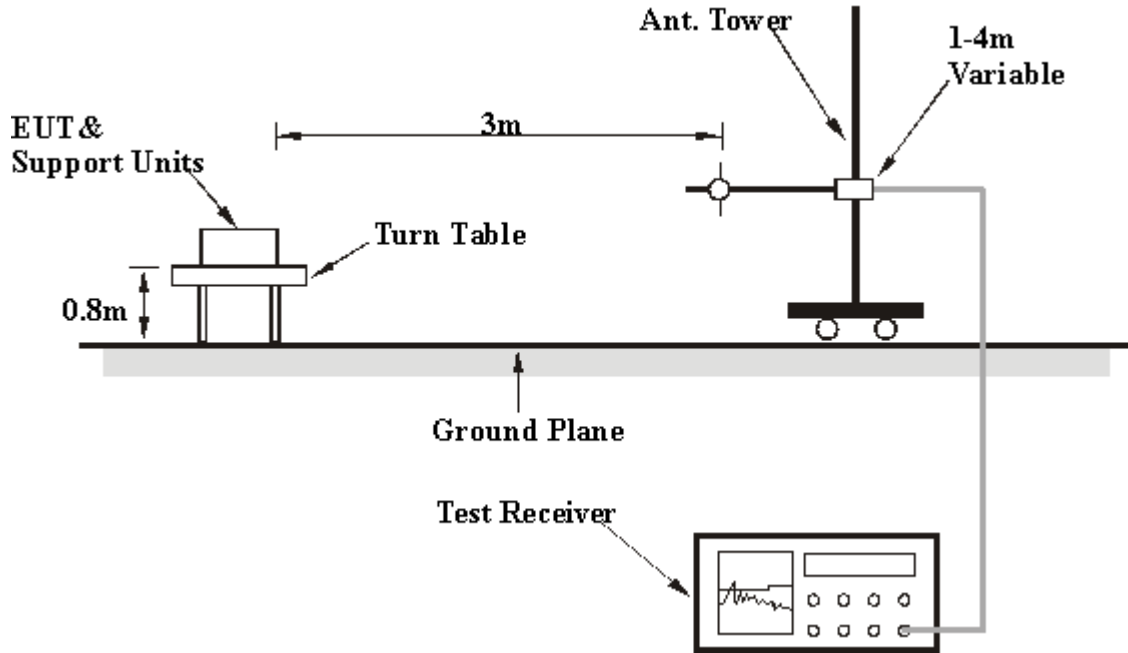
4.7.3 TEST PROCEDURES

- 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.

4.7.4 TEST SETUP



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

4.7.5 TEST RESULTS

Digital Portion:

| | | | |
|---------------------------------|-------------------------------|-------------------------------|-------------|
| EUT | Bluetooth USB Dongle | MODEL | BT-0030H |
| MODE | Channel 78 | FREQUENCY RANGE | 30-1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 20 deg. C, 70%RH, 1050 hPa | TESTED BY: Bruce Shaiu | |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | 83.93 | 31.5 QP | 40.00 | -8.50 | 2.90H | 235 | 23.01 | 7.63 | 0.87 | 0.00 | -8.50 |
| 2 | 96.00 | 28.4 QP | 43.50 | -15.10 | 3.14H | 359 | 17.92 | 9.52 | 0.93 | 0.00 | -10.45 |
| 3 | 108.00 | 32.0 QP | 43.50 | -11.50 | 3.20H | 354 | 20.13 | 10.87 | 1.01 | 0.00 | -11.88 |
| 4 | 120.00 | 39.9 QP | 43.50 | -3.60 | 2.54H | 178 | 27.20 | 11.65 | 1.08 | 0.00 | -12.74 |
| 5 | 132.00 | 35.0 QP | 43.50 | -8.50 | 2.16H | 184 | 22.71 | 11.16 | 1.13 | 0.00 | -12.30 |
| 6 | 167.45 | 27.8 QP | 43.50 | -15.70 | 1.91H | 98 | 17.14 | 9.35 | 1.30 | 0.00 | -10.66 |
| 7 | 288.04 | 30.9 QP | 46.00 | -15.10 | 1.45H | 88 | 16.21 | 12.88 | 1.81 | 0.00 | -14.70 |
| 8 | 336.04 | 32.4 QP | 46.00 | -13.60 | 1.33H | 80 | 16.49 | 13.92 | 1.99 | 0.00 | -15.92 |
| 9 | 360.80 | 32.8 QP | 46.00 | -13.20 | 1.19H | 3 | 16.14 | 14.58 | 2.08 | 0.00 | -16.66 |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | 108.00 | 32.4 QP | 43.50 | -11.10 | 1.60V | 302 | 20.52 | 10.87 | 1.01 | 0.00 | -11.88 |
| 2 | 144.00 | 27.4 QP | 43.50 | -16.10 | 1.99V | 40 | 15.64 | 10.58 | 1.18 | 0.00 | -11.77 |
| 3 | 240.00 | 28.0 QP | 46.00 | -18.00 | 1.86V | 330 | 14.97 | 11.41 | 1.62 | 0.00 | -13.03 |
| 4 | 336.03 | 31.9 QP | 46.00 | -14.10 | 2.18V | 355 | 15.99 | 13.92 | 1.99 | 0.00 | -15.91 |
| 5 | 362.00 | 35.0 QP | 46.00 | -11.00 | 1.91V | 20 | 18.24 | 14.67 | 2.09 | 0.00 | -16.76 |
| 6 | 858.00 | 32.0 QP | 46.00 | -14.00 | 2.15V | 9 | 7.96 | 20.52 | 3.51 | 0.00 | -24.05 |

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. The other emission levels were very low against the limit.

4.7.6 TEST RESULTS

RF Portion :

| | | | |
|---------------------------------|-------------------------------|-------------------------------|--------------------------|
| EUT | Bluetooth USB Dongle | MODEL | BT-0030H |
| MODE | Channel 0 | FREQUENCY RANGE | Above 1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 20 deg. C, 70%RH, 1050 hPa | TESTED BY: Bruce Shiau | |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2402.00 | 103.9 PK | - | - | 1.25H | 348 | 71.80 | 28.31 | 3.80 | 0.00 | -32.11 |
| 2 | *2402.00 | 85.9 AV | - | - | 1.25H | 0 | 53.80 | 28.31 | 3.80 | 0.00 | -32.11 |
| 3 | 4804.00 | 47.7 PK | 74.00 | -26.30 | 1.27H | 3 | 43.70 | 32.99 | 5.80 | 34.77 | -4.02 |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2402.00 | 101.9 PK | - | - | 1.30V | 14 | 69.80 | 28.31 | 3.80 | 0.00 | -32.11 |
| 2 | *2402.00 | 84.6 AV | - | - | 1.30V | 3 | 52.50 | 28.31 | 3.80 | 0.00 | -32.11 |
| 3 | 4804.00 | 48.7 PK | 74.00 | -25.30 | 1.35V | 336 | 44.70 | 32.99 | 5.80 | 34.77 | -4.02 |

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. “ * “ : Fundamental frequency
5. The other emission levels were very low against the limit.

| | | | |
|---------------------------------|-------------------------------|-------------------------------|--------------------------|
| EUT | Bluetooth USB Dongle | MODEL | BT-0030H |
| MODE | Channel 39 | FREQUENCY RANGE | Above 1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 20 deg. C, 70%RH, 1050 hPa | TESTED BY: Bruce Shiau | |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2441.00 | 106.7 PK | - | - | 1.26H | 82 | 74.50 | 28.39 | 3.85 | 0.00 | -32.24 |
| 2 | *2441.00 | 87.8 AV | - | - | 1.26H | 337 | 55.60 | 28.39 | 3.85 | 0.00 | -32.24 |
| 3 | 4882.00 | 46.7 PK | 74.00 | -27.30 | 1.44H | 357 | 42.60 | 33.06 | 5.81 | 34.75 | -4.12 |
| 4 | 4882.00 | 35.6 AV | 54.00 | -18.40 | 1.44H | 3 | 31.50 | 33.06 | 5.81 | 34.75 | -4.12 |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2441.00 | 104.4 PK | - | - | 1.32V | 3 | 72.20 | 28.39 | 3.85 | 0.00 | -32.24 |
| 2 | *2441.00 | 86.1 AV | - | - | 1.32V | 5 | 53.90 | 28.39 | 3.85 | 0.00 | -32.24 |
| 3 | 4882.00 | 48.6 PK | 74.00 | -25.40 | 1.19V | 5 | 44.50 | 33.06 | 5.81 | 34.75 | -4.12 |

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. “ * “ : Fundamental frequency
5. The other emission levels were very low against the limit.

| | | | |
|---------------------------------|-------------------------------|-------------------------------|--------------------------|
| EUT | Bluetooth USB Dongle | MODEL | BT-0030H |
| MODE | Channel 78 | FREQUENCY RANGE | Above 1000 MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak(PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 20 deg. C, 70%RH, 1050 hPa | TESTED BY: Bruce Shiau | |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2480.00 | 104.4 PK | - | - | 1.22H | 3 | 72.00 | 28.48 | 3.90 | 0.00 | -32.37 |
| 2 | *2480.00 | 85.5 AV | - | - | 1.22H | 3 | 53.10 | 28.48 | 3.90 | 0.00 | -32.37 |
| 3 | 2496.00 | 44.5 PK | 74.00 | -29.50 | 1.19H | 357 | 47.50 | 28.48 | 3.90 | 35.40 | 3.03 |
| 4 | 2496.00 | 33.1 AV | 54.00 | -20.90 | 1.19H | 3 | 36.10 | 28.48 | 3.90 | 35.40 | 3.03 |
| 5 | 4960.00 | 49.1 PK | 74.00 | -24.90 | 1.31H | 358 | 44.80 | 33.21 | 5.83 | 34.72 | -4.32 |
| 6 | 7440.00 | 54.9 PK | 74.00 | -19.10 | 1.27H | 313 | 45.60 | 36.51 | 7.61 | 34.79 | -9.33 |
| 7 | 7440.00 | 41.8 AV | 54.00 | -12.20 | 1.27H | 149 | 32.50 | 36.51 | 7.61 | 34.79 | -9.33 |

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) | Antenna Factor (dB) | Cable Factor (dB) | Pre-Amp. Factor (dB) | Correction Factor (dB) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 1 | *2480.00 | 102.1 PK | - | - | 1.36V | 7 | 69.70 | 28.48 | 3.90 | 0.00 | -32.37 |
| 2 | *2480.00 | 84.7 AV | - | - | 1.36V | 48 | 52.30 | 28.48 | 3.90 | 0.00 | -32.38 |
| 3 | 2495.00 | 48.6 PK | 74.00 | -25.40 | 1.37V | 36 | 51.60 | 28.48 | 3.90 | 35.40 | 3.03 |
| 4 | 4960.00 | 47.5 PK | 74.00 | -26.50 | 1.22V | 353 | 43.20 | 33.21 | 5.83 | 34.72 | -4.32 |

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. Margin value = Emission level - Limit value
4. " * " : Fundamental frequency
5. The other emission levels were very low against the limit.

4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| SPECTRUM ANALYZER | FSEK30 | 100049 | July 17, 2002 |

Notes:

- 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.

4.8.3 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 kHz bandwidth from band edge. The band edges was measured and recorded.

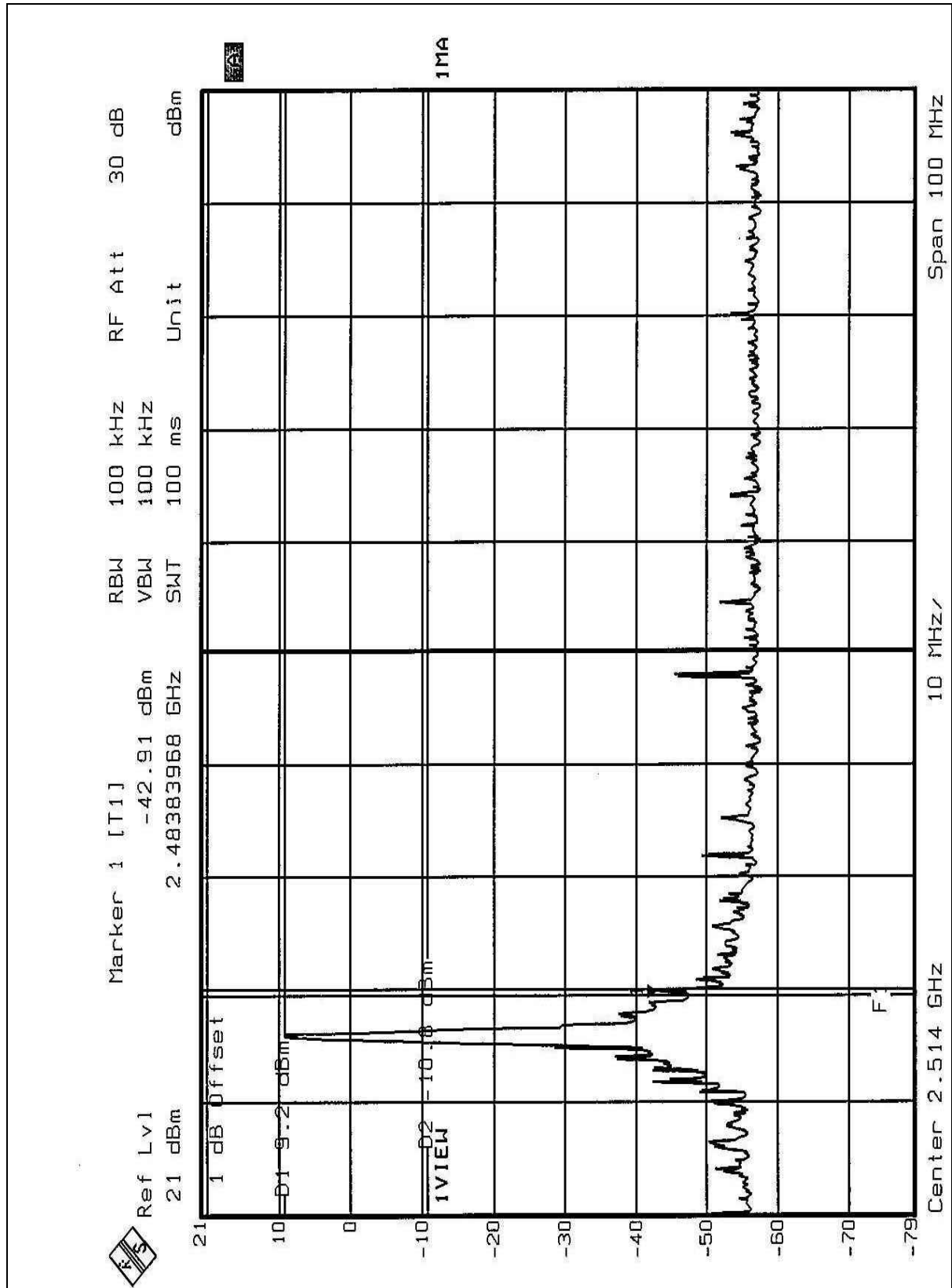
4.8.4 EUT OPERATING CONDITION

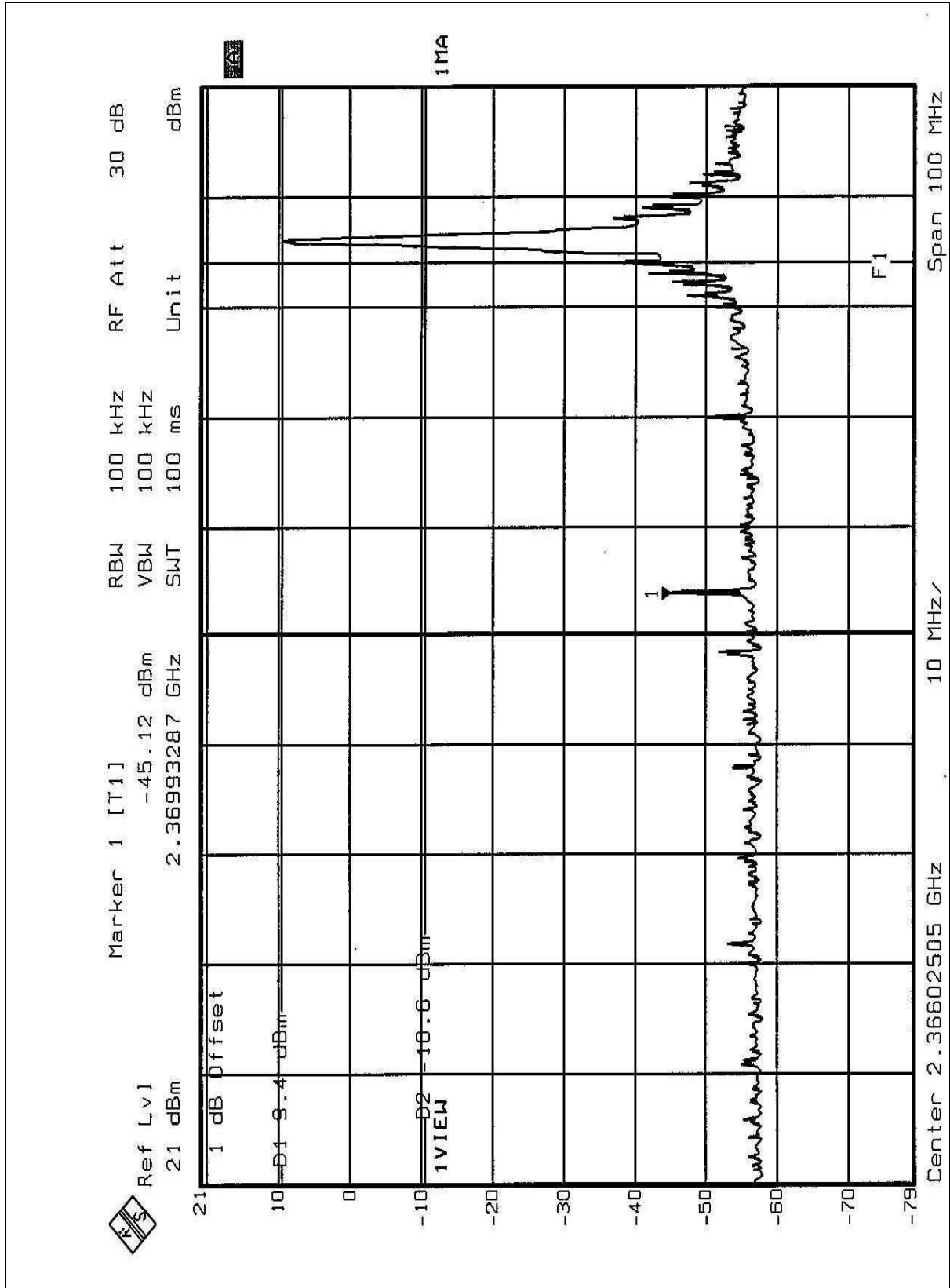
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.5 TEST RESULTS

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 2 pages shows 52.11dB delta between carrier maximum power and local maximum emission in restrict band (2.4838GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.7.6 (Page 51) is 85.5dBuV/m, so the maximum field strength in restrict band is $85.5 - 52.11 = 33.39$ dBuV/m which is under 54 dBuV/m limit.







4.9 ANTENNA REQUIREMENT

4.9.1 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.

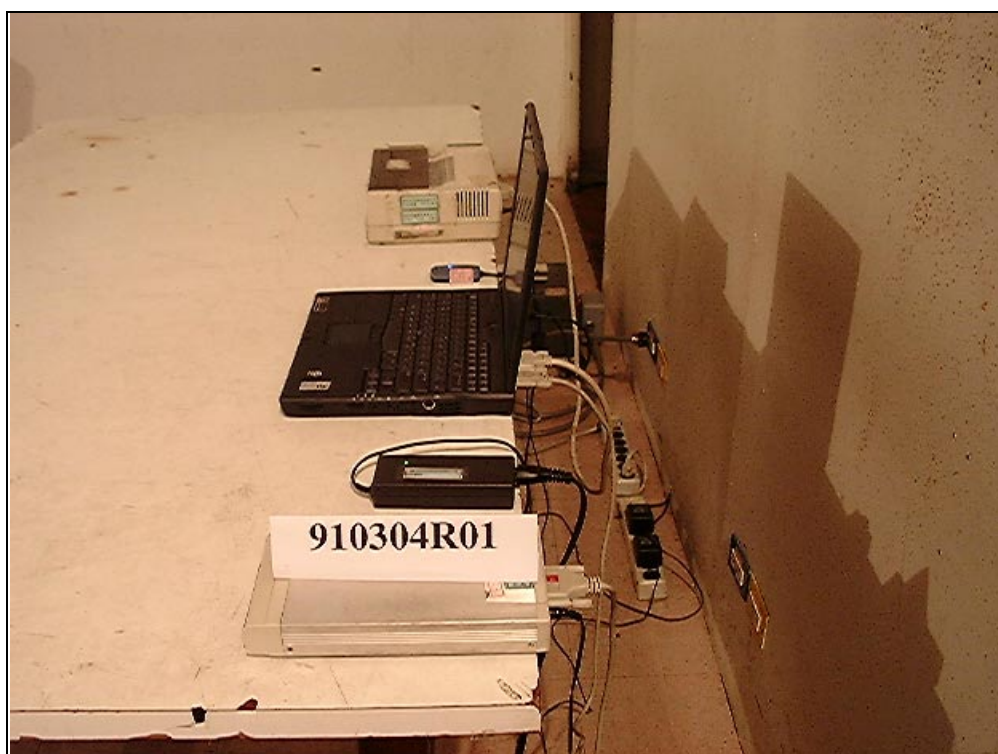
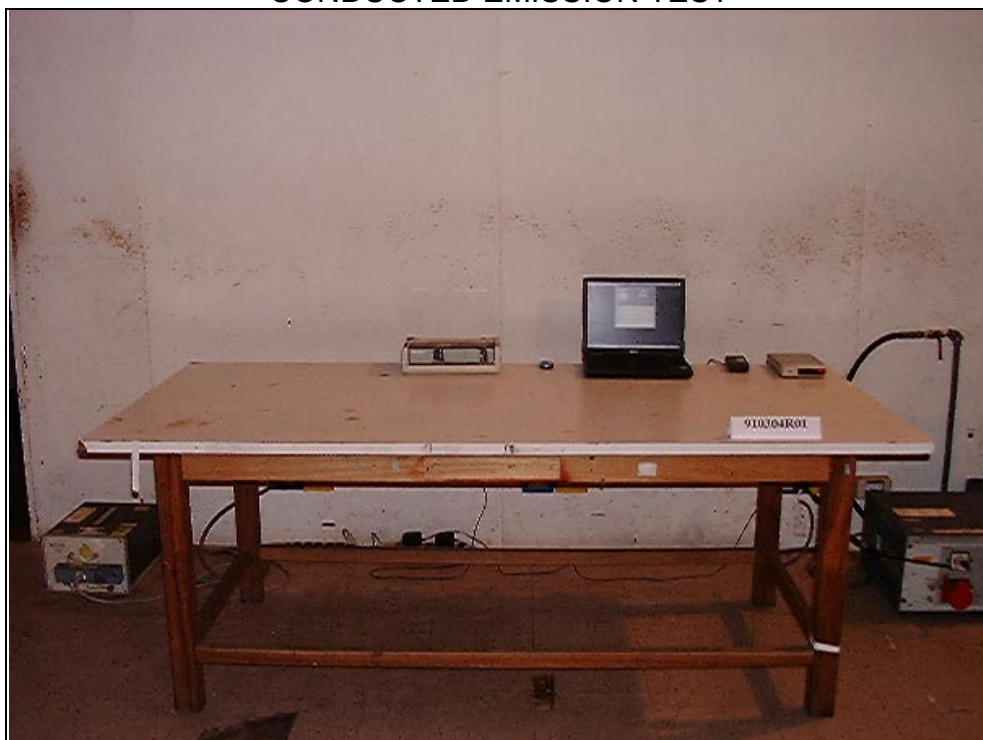
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.9.2 ANTENNA CONNECTED CONSTRUCTION

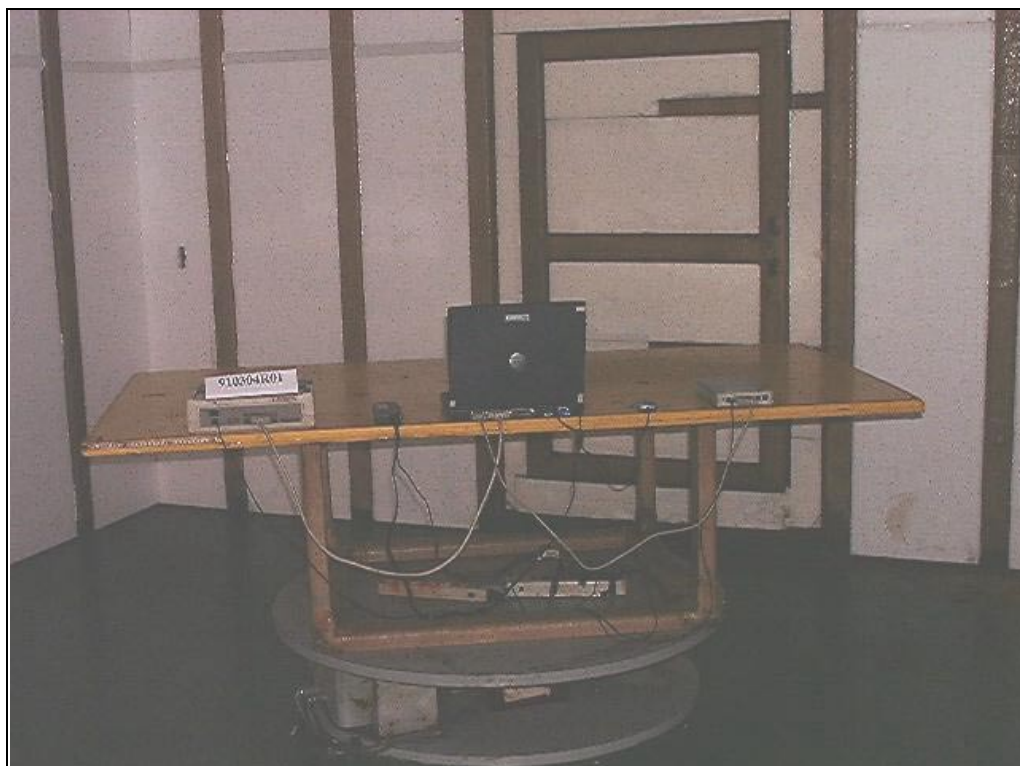
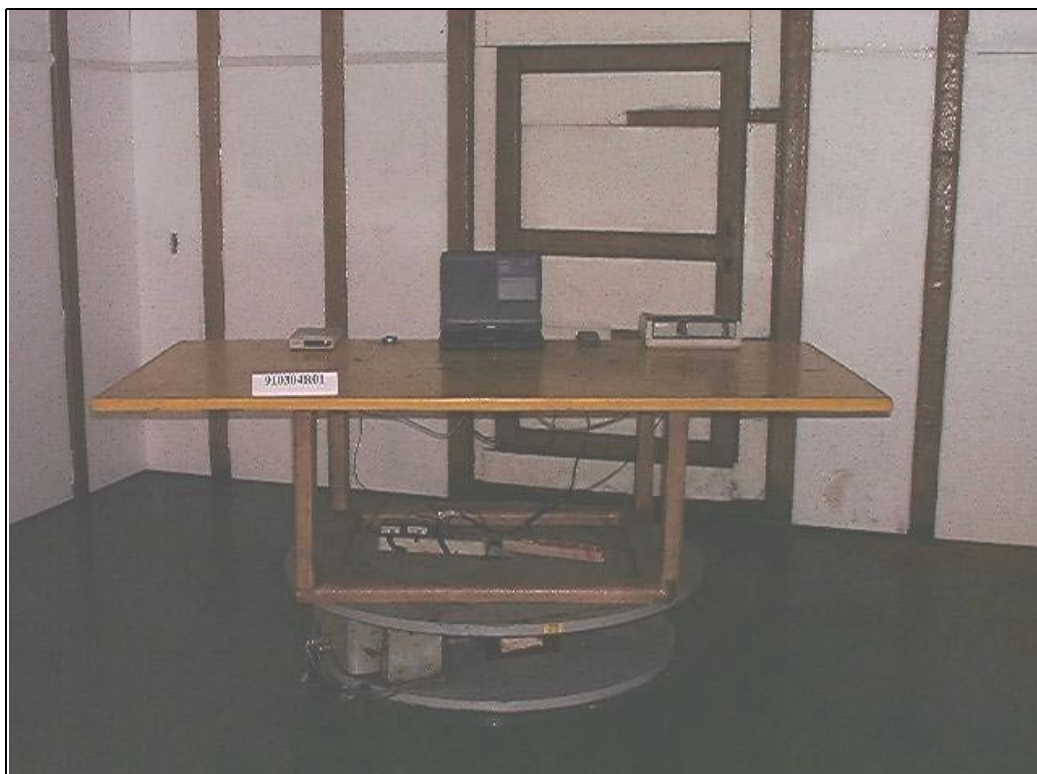
The antenna used in this product is Printed Antenna. There is no antenna connector. The maximum Gain of this antenna is only 3.5dBi.

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