# FCC TEST REPORT

**REPORT NO.:** RF950305H02

**MODEL NO.:** C-X2C31

**RECEIVED:** March 06, 2006

**TESTED:** March 16 to 17, 2006

**ISSUED:** March 22, 2006

**APPLICANT:** LOGITECH FAR EAST LTD.

**ADDRESS:** #2 Creation Rd. 4, Science-Based Ind. Park
Hsinchu Taiwan, R.O.C.

**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.



No. 2177-01

# Table of Contents

# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT :** | Logitech Cordless Precision |
| **BRAND NAME :** | Logitech |
| **MODEL NO :** | C-X2C31 |
| **TESTED:** | March 16 to 17, 2006 |
| **APPLICANT :** | LOGITECH FAR EAST LTD. |
| **STANDARDS :** | 47 CFR Part 15, Subpart C (Section 15.249), ANSI C63.4-2003 |

The above equipment (Model: C-X2C31) 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:** March 22, 2006
( Midoli Peng )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** March 22, 2006
Responsible for RF
( Hank Chung )

**APPROVED BY :** May Chen , **DATE:** March 22, 2006
( May Chen, Deputy 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 | NA | Minimum passing margin is –3.00dB at 0.158MHz |
| 15.249 | Radiated Emission Test | PASS | Minimum passing margin is –18.20dB at 864.0MHz & –18.20dB at 4880.0MHz |
| 15.249 | Band Edge Measurement | PASS | Meet the requirement of limit |

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | Logitech Cordless Precision |
| **MODEL NO.** | C-X2C31 |
| **FCC ID** | JNZ222543 |
| **POWER SUPPLY** | DC 3.5V from host equipment |
| **MODULATION TYPE** | GFSK |
| **CARRIER FREQUENCY OF EACH CHANNEL** | 2401MHz ~ 2480MHz |
| **NUMBER OF CHANNEL** | 80 |
| **ANTENNA TYPE** | PCB strip antenna with 1.31dBi antenna gain |
| **DATA CABLE** | NA |
| **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

Eighty channels are provided in this EUT.

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2401 | 14 | 2415 | 28 | 2429 | 42 | 2443 | 56 | 2457 | 70 | 2471 |
| 1 | 2402 | 15 | 2416 | 29 | 2430 | 43 | 2444 | 57 | 2458 | 71 | 2472 |
| 2 | 2403 | 16 | 2417 | 30 | 2431 | 44 | 2445 | 58 | 2459 | 72 | 2473 |
| 3 | 2404 | 17 | 2418 | 31 | 2431 | 45 | 2446 | 59 | 2460 | 73 | 2474 |
| 4 | 2405 | 18 | 2419 | 32 | 2433 | 46 | 2447 | 60 | 2461 | 74 | 2475 |
| 5 | 2406 | 19 | 2420 | 33 | 2434 | 47 | 2448 | 61 | 2462 | 75 | 2476 |
| 6 | 2407 | 20 | 2421 | 34 | 2435 | 48 | 2449 | 62 | 2463 | 76 | 2477 |
| 7 | 2408 | 21 | 2422 | 35 | 2436 | 49 | 2450 | 63 | 2464 | 77 | 2478 |
| 8 | 2409 | 22 | 2423 | 36 | 2437 | 50 | 2451 | 64 | 2465 | 78 | 2479 |
| 9 | 2410 | 23 | 2424 | 37 | 2438 | 51 | 2452 | 65 | 2466 | 79 | 2480 |
| 10 | 2411 | 24 | 2425 | 38 | 2439 | 52 | 2453 | 66 | 2467 | | |
| 11 | 2412 | 25 | 2426 | 39 | 2440 | 53 | 2454 | 67 | 2468 | | |
| 12 | 2413 | 26 | 2427 | 40 | 2441 | 54 | 2455 | 68 | 2469 | | |
| 13 | 2414 | 27 | 2428 | 41 | 2442 | 55 | 2456 | 69 | 2470 | | |

**NOTE:**

1. Below 1 GHz, the channel 0, 39, and 79 were pre-tested in chamber. The channel 79, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 39, and 79 were tested individually.

## 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Logitech Cordless Precision. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**47 CFR Part 15, Subpart C (Section 15.249)**
**ANSI C63.4: 2003**

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

## 3.4 DESCRIPTION OF SUPPORT UNITS

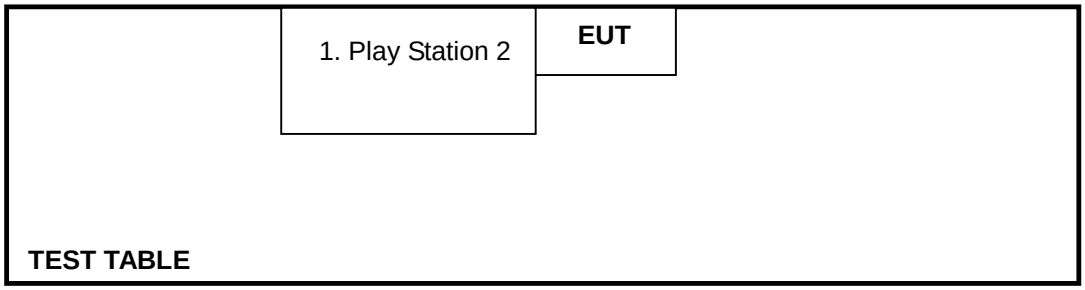
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| No. | Product | Brand | Model No. | Serial No. | FCC ID |
|---|---|---|---|---|---|
| 1 | Play Station 2 | Sony | SCPH-50007 | FG3397818 | NA |

| No. | Signal cable description |
|---|---|
| 1 | NA |

Note: 1. All power cords of the above support units are unshielded (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

### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5<br>0.5-5<br>5-30 | 66 to 56<br>56<br>60 | 56 to 46<br>46<br>50 |

**NOTE**:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class 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 |
|---|---|---|---|
| Test Receiver | ESCS 30 | 100375 | Sep. 19, 2006 |
| Line-Impedance Stabilization Network(for EUT) | ENV-216 | 100071 | Nov. 10, 2006 |
| ROHDE & SCHWARZ LISN | KNW-407 | 8/1395/12 | Jul. 19, 2006 |
| RF Signal Cable | RG233/U | Cable_CA_02 | Dec. 10, 2006 |
| Terminator(for KYORITSU) | 50 | 2 | Oct. 08, 2006 |
| Software | ADT_Cond_V7.3.2 | 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. B.
3. The VCCI Con B Registration No. is C-2193.

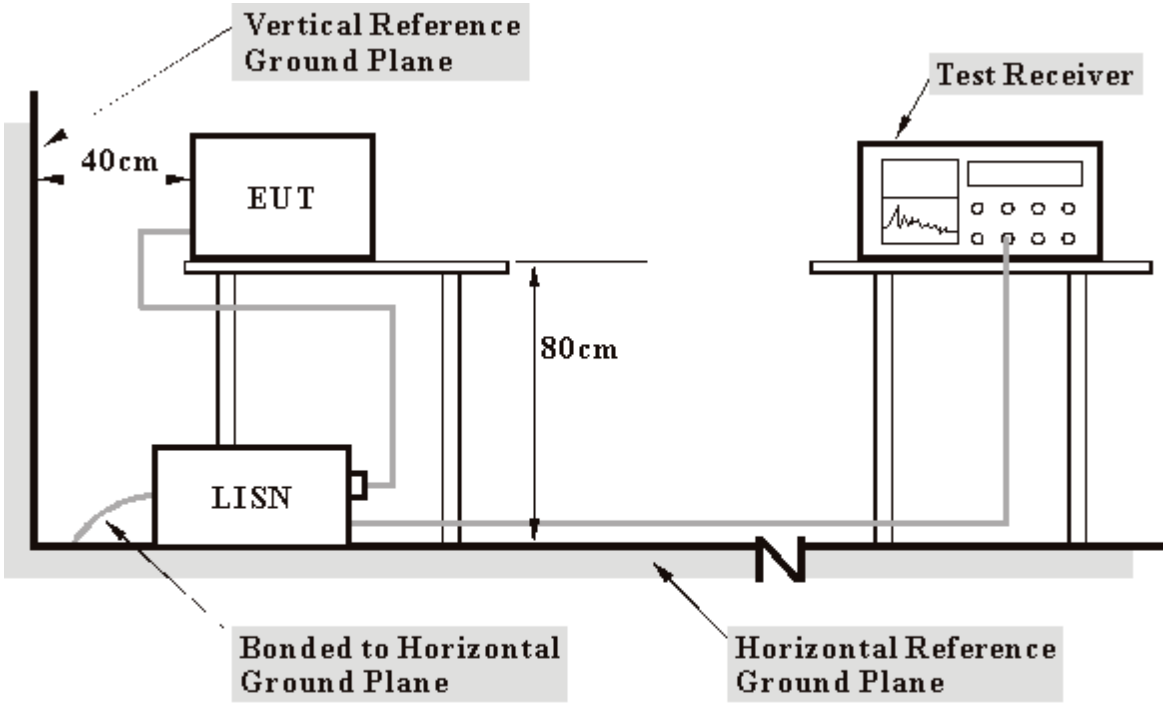
## 4.1.3 TEST PROCEDURES

a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/HOST were checked for maximum conducted interference.

c. 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

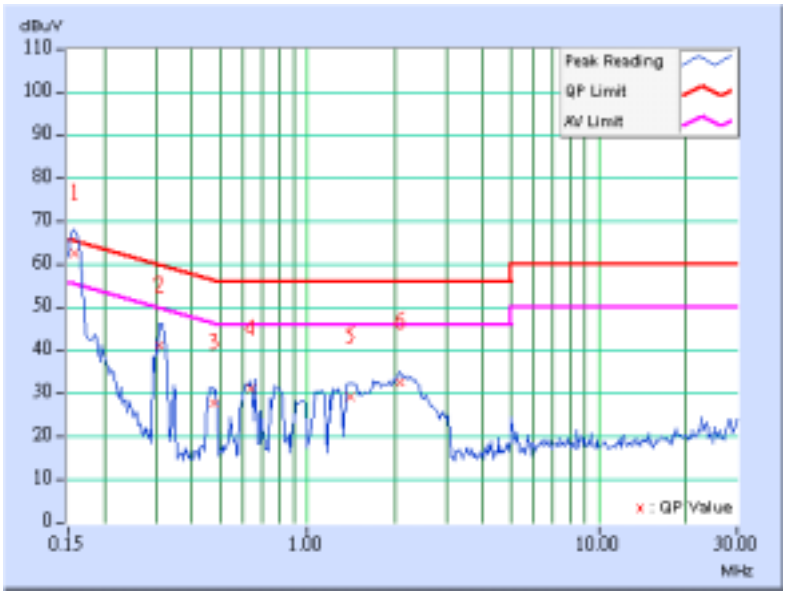
a. Plug the EUT into the support unit 1 (PS2) that placed on a testing table.
b. The support unit 1 (PS2) ran a test program to enable EUT under transmission condition continuously at specific channel frequency.

## 4.1.6 TEST RESULTS

| | | | |
|---|---|---|---|
| **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz | **6DB BANDWIDTH** | 9 kHz |
| **ENVIRONMENTAL CONDITIONS** | 20 deg. C, 60%RH, 969 hPa | **PHASE** | Line (L) |
| **TESTED BY** | Eric Lee | | |

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| **1** | **0.158** | **9.60** | **52.95** | **42.98** | **62.55** | **52.58** | **65.58** | **55.58** | **-3.03** | **-3.00** |
| 2 | 0.310 | 9.60 | 31.59 | - | 41.19 | - | 59.97 | 49.97 | -18.78 | - |
| 3 | 0.474 | 9.60 | 17.97 | - | 27.57 | - | 56.44 | 46.44 | -28.87 | - |
| 4 | 0.641 | 9.60 | 21.46 | - | 31.06 | - | 56.00 | 46.00 | -24.94 | - |
| 5 | 1.396 | 9.64 | 19.48 | - | 29.12 | - | 56.00 | 46.00 | -26.88 | - |
| 6 | 2.076 | 9.70 | 22.89 | - | 32.59 | - | 56.00 | 46.00 | -23.41 | - |

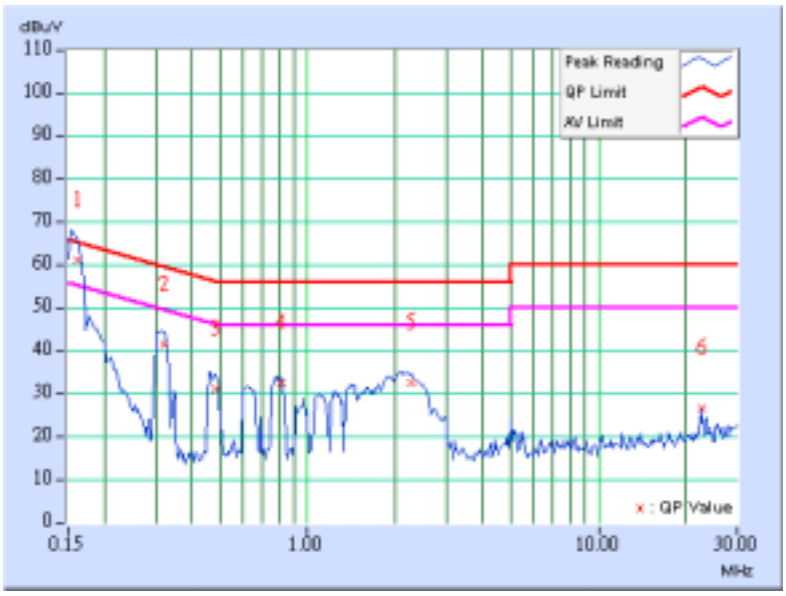
**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



| | | | |
|---|---|---|---|
| **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz | **6dB BANDWIDTH** | 9 kHz |
| **ENVIRONMENTAL CONDITIONS** | 20 deg. C, 60%RH, 969 hPa | **PHASE** | Neutral (N) |
| **TESTED BY** | Eric Lee | | |

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.162 | 9.60 | 51.11 | 42.68 | 60.71 | 52.28 | 65.38 | 55.38 | -4.67 | -3.10 |
| 2 | 0.320 | 9.60 | 31.55 | - | 41.15 | - | 59.71 | 49.71 | -18.56 | - |
| 3 | 0.480 | 9.60 | 20.97 | - | 30.57 | - | 56.34 | 46.34 | -25.77 | - |
| 4 | 0.814 | 9.60 | 22.52 | - | 32.12 | - | 56.00 | 46.00 | -23.88 | - |
| 5 | 2.275 | 9.70 | 22.42 | - | 32.12 | - | 56.00 | 46.00 | -23.88 | - |
| 6 | 22.570 | 10.10 | 16.57 | - | 26.67 | - | 60.00 | 50.00 | -33.33 | - |

**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

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.

## 4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL |
|---|---|---|---|
| ADVANTEST Spectrum Analyzer | R3271A | 85060311 | July 07, 2006 |
| HP Pre_Amplifier | 8449B | 3008A01922 | Oct. 02, 2006 |
| ROHDE & SCHWARZ Test Receiver | ESCS30 | 100287 | Dec. 08, 2006 |
| CHASE Broadband Antenna | VULB9168 | 138 | Dec. 21, 2006 |
| Schwarzbeck Horn_Antenna | BBHA9120 | D124 | Dec. 11, 2006 |
| Schwarzbeck Horn_Antenna | BBHA 9170 | BBHA9170153 | Jan. 05, 2007 |
| SCHWARZBECK Biconical Antenna | VHBA9123 | 459 | Jun. 26, 2006 |
| SCHWARZBECK Periodic Antenna | UPA6108 | 1148 | Jun. 26, 2006 |
| RF Switches (ARNITSU) | CS-201 | 1565157 | NA |
| RF CABLE (Chaintek) 1GHz-20GHz | SF102 | 22054-2 | Nov. 16. 2006 |
| RF Cable(RICHTEC) | 9913-30M | STCCAB-30M-1GHz-021 | Jul. 16, 2006 |
| Software | ADT_Radiated_V5.14 | 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 Periodic Antenna)and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824-3.
7. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Measurement | Value |
|---|---|
| Radiated emissions (30MHz-1GHz) | 2.98 dB |
| Radiated emissions (1GHz ~18GHz) | 2.21 dB |
| Radiated emissions (18GHz ~20GHz) | 1.88 dB |

### 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.

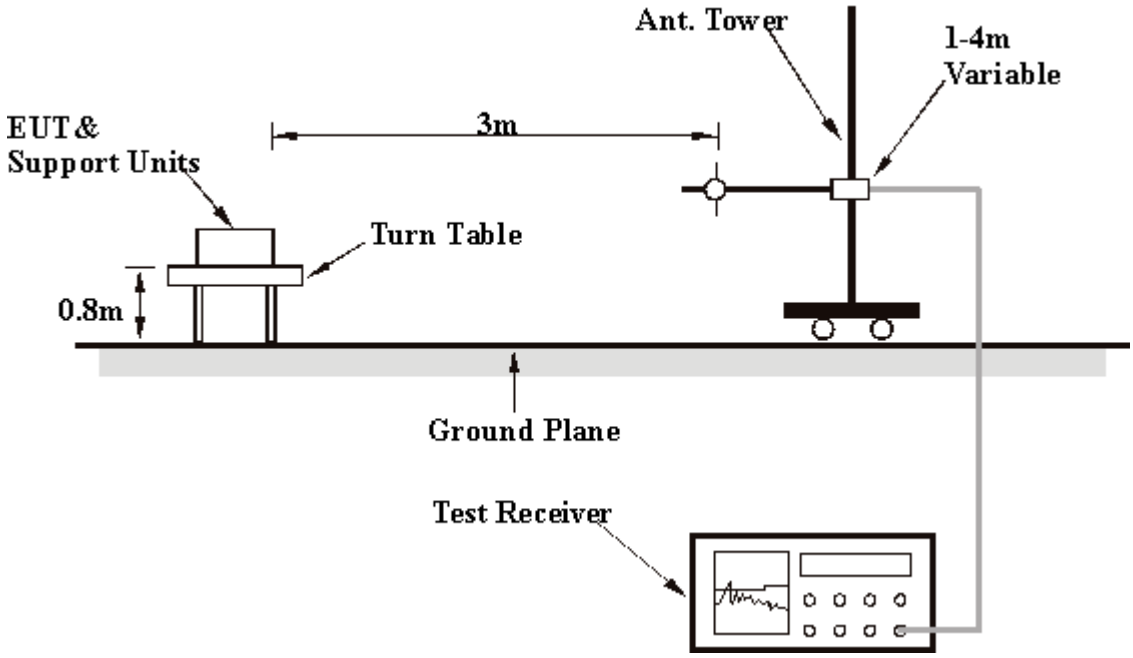
**NOTE:**

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

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.5 TEST SETUP




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

### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.5

## 4.2.7 TEST RESULTS

| | | | |
|---|---|---|---|
| **MODE** | Channel 79 | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **FREQUENCY RANGE** | 30-1000 MHz | **DETECTOR FUNCTION & BANDWIDTH** | Quasi-Peak, 120kHz |
| **ENVIRONMENTAL CONDITIONS** | 22 deg. C, 66%RH, 969 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 | 160.00 | 18.10 QP | 43.50 | -25.40 | 1.18 H | 236 | 4.00 | 14.10 |
| 2 | 240.00 | 17.90 QP | 46.00 | -28.10 | 1.30 H | 19 | 4.60 | 13.30 |
| 3 | 320.00 | 17.90 QP | 46.00 | -28.10 | 1.06 H | 132 | 0.80 | 17.00 |
| 4 | 400.00 | 19.00 QP | 46.00 | -27.00 | 1.29 H | 308 | 0.00 | 19.00 |
| 5 | 480.00 | 20.60 QP | 46.00 | -25.40 | 1.40 H | 207 | -0.70 | 21.20 |
| 6 | 528.00 | 22.80 QP | 46.00 | -23.20 | 1.12 H | 45 | 0.20 | 22.60 |
| 7 | 624.00 | 21.60 QP | 46.00 | -24.40 | 1.24 H | 343 | -3.20 | 24.70 |
| 8 | 864.00 | 25.50 QP | 46.00 | -20.50 | 1.35 H | 125 | -3.00 | 28.50 |

| 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 | 160.00 | 20.80 QP | 43.50 | -22.80 | 1.18 V | 279 | 6.60 | 14.10 |
| 2 | 240.06 | 17.30 QP | 46.00 | -28.70 | 1.08 V | 82 | 4.00 | 13.30 |
| 3 | 320.02 | 16.70 QP | 46.00 | -29.30 | 1.00 V | 215 | -0.40 | 17.10 |
| 4 | 399.95 | 22.10 QP | 46.00 | -23.90 | 1.00 V | 332 | 3.10 | 19.00 |
| 5 | 480.00 | 20.30 QP | 46.00 | -25.70 | 1.22 V | 287 | -0.90 | 21.20 |
| 6 | 528.00 | 22.40 QP | 46.00 | -23.60 | 1.04 V | 345 | -0.20 | 22.60 |
| 7 | 624.00 | 24.90 QP | 46.00 | -21.10 | 1.11 V | 238 | 0.20 | 24.70 |
| 8 | 864.00 | 27.80 QP | 46.00 | -18.20 | 1.12 V | 70 | -0.80 | 28.50 |

**REMARKS**: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
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.

| | | | |
|---|---|---|---|
| **MODE** | Channel 0 | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **FREQUENCY RANGE** | 1000~25000MHz | **DETECTOR FUNCTION & BANDWIDTH** | Peak (PK)<br>Average (AV)<br>1 MHz |
| **ENVIRONMENTAL CONDITIONS** | 21 deg. C, 69%RH, 969 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 | 2390.00 | 43.80 PK | 74.00 | -30.20 | 1.22 H | 152 | 10.10 | 33.70 |
| 1 | 2390.00 | 12.40 AV | 54.00 | -41.60 | 1.22 H | 152 | -21.30 | 33.70 |
| 2 | *2401.00 | 90.30 PK | 114.00 | -23.70 | 1.20 H | 6 | 60.50 | 29.80 |
| 2 | *2401.00 | 58.90 AV | 94.00 | -35.10 | 1.20 H | 6 | 29.10 | 29.80 |
| 3 | 4800.00 | 55.40 PK | 74.00 | -18.60 | 1.00 H | 280 | 20.40 | 35.00 |
| 3 | 4800.00 | 24.00 AV | 54.00 | -30.00 | 1.00 H | 280 | -11.00 | 35.00 |
| 4 | 7200.00 | 49.10 PK | 74.00 | -24.90 | 1.22 H | 152 | 8.60 | 40.40 |
| 4 | 7200.00 | 17.70 AV | 54.00 | -36.30 | 1.22 H | 152 | -22.80 | 40.40 |

**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 | 34.40 PK | 74.00 | -39.60 | 1.71 V | 154 | 0.70 | 33.70 |
| 1 | 2390.00 | 3.00 AV | 54.00 | -51.00 | 1.71 V | 154 | -30.70 | 33.70 |
| 2 | *2401.00 | 84.80 PK | 114.00 | -29.20 | 1.71 V | 154 | 55.00 | 29.80 |
| 2 | *2401.00 | 53.40 AV | 94.00 | -40.60 | 1.71 V | 154 | 23.60 | 29.80 |
| 3 | 4800.00 | 51.80 PK | 74.00 | -22.20 | 1.17 V | 2 | 16.80 | 35.00 |
| 3 | 4800.00 | 20.40 AV | 54.00 | -33.60 | 1.17 V | 2 | -14.60 | 35.00 |
| 4 | 7200.00 | 48.40 PK | 74.00 | -25.60 | 1.02 V | 25 | 7.90 | 40.40 |
| 4 | 7200.00 | 17.00 AV | 54.00 | -37.00 | 1.02 V | 25 | -23.50 | 40.40 |

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
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.

| | | | |
|---|---|---|---|
| **MODE** | Channel 39 | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **FREQUENCY RANGE** | 1000~25000MHz | **DETECTOR FUNCTION & BANDWIDTH** | Peak (PK)<br>Average (AV)<br>1 MHz |
| **ENVIRONMENTAL CONDITIONS** | 21 deg. C, 69%RH, 969 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 | *2440.00 | 90.50 PK | 114.00 | -23.50 | 1.17 H | 12 | 60.60 | 29.90 |
| 1 | *2440.00 | 59.10 AV | 94.00 | -34.90 | 1.17 H | 12 | 29.20 | 29.90 |
| **2** | **4880.00** | **55.80 PK** | **74.00** | **-18.20** | **1.08 H** | **212** | **20.40** | **35.30** |
| 2 | 4880.00 | 24.40 AV | 54.00 | -29.60 | 1.08 H | 212 | -11.00 | 35.30 |
| 3 | 7320.00 | 49.20 PK | 74.00 | -24.80 | 1.15 H | 109 | 8.50 | 40.70 |
| 3 | 7320.00 | 17.80 AV | 54.00 | -36.20 | 1.15 H | 109 | -22.90 | 40.70 |

**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 | *2440.00 | 85.10 PK | 114.00 | -28.90 | 1.60 V | 152 | 55.20 | 29.90 |
| 1 | *2440.00 | 53.70 AV | 94.00 | -40.30 | 1.60 V | 152 | 23.80 | 29.90 |
| 2 | 4880.00 | 52.00 PK | 74.00 | -22.00 | 1.02 V | 26 | 16.60 | 35.30 |
| 2 | 4880.00 | 20.60 AV | 54.00 | -33.40 | 1.02 V | 26 | -14.80 | 35.30 |
| 3 | 7320.00 | 48.40 PK | 74.00 | -25.60 | 1.08 V | 32 | 7.70 | 40.70 |
| 3 | 7320.00 | 17.00 AV | 54.00 | -37.00 | 1.08 V | 32 | -23.70 | 40.70 |

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
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.

| | | | |
|---|---|---|---|
| **MODE** | Channel 79 | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **FREQUENCY RANGE** | 1000~25000MHz | **DETECTOR FUNCTION & BANDWIDTH** | Peak (PK)<br>Average (AV)<br>1 MHz |
| **ENVIRONMENTAL CONDITIONS** | 21 deg. C, 69%RH, 969 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 | 90.50 PK | 114.00 | -23.50 | 1.25 H | 3 | 60.40 | 30.10 |
| 1 | *2480.00 | 59.10 AV | 94.00 | -34.90 | 1.25 H | 3 | 29.00 | 30.10 |
| 2 | 2483.50 | 47.30 PK | 74.00 | -26.70 | 1.25 H | 3 | 17.20 | 30.10 |
| 2 | 2483.50 | 15.90 AV | 54.00 | -38.10 | 1.25 H | 3 | -14.20 | 30.10 |
| 3 | 4960.00 | 55.50 PK | 74.00 | -18.50 | 1.02 H | 252 | 19.80 | 35.70 |
| 3 | 4960.00 | 24.10 AV | 54.00 | -29.90 | 1.02 H | 252 | -11.60 | 35.70 |
| 4 | 7440.00 | 49.90 PK | 74.00 | -24.10 | 1.44 H | 128 | 8.90 | 40.90 |
| 4 | 7440.00 | 18.50 AV | 54.00 | -35.50 | 1.44 H | 128 | -22.50 | 40.90 |

**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 | 85.20 PK | 114.00 | -28.80 | 1.68 V | 147 | 55.10 | 30.10 |
| 1 | *2480.00 | 53.80 AV | 94.00 | -40.20 | 1.68 V | 147 | 23.70 | 30.10 |
| 2 | 2483.50 | 42.00 PK | 74.00 | -32.00 | 1.68 V | 147 | 11.90 | 30.10 |
| 2 | 2483.50 | 10.60 AV | 54.00 | -43.40 | 1.68 V | 147 | -19.50 | 30.10 |
| 3 | 4960.00 | 52.70 PK | 74.00 | -21.30 | 1.16 V | 44 | 17.00 | 35.70 |
| 3 | 4960.00 | 21.30 AV | 54.00 | -32.70 | 1.16 V | 44 | -14.40 | 35.70 |
| 4 | 7440.00 | 48.90 PK | 74.00 | -25.10 | 1.08 V | 72 | 7.90 | 40.90 |
| 4 | 7440.00 | 17.50 AV | 54.00 | -36.50 | 1.08 V | 72 | -23.50 | 40.90 |

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
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.

## 4.3 BAND EDGES MEASUREMENT

### 4.3.1 LIMITS OF BAND EDGES MEASUREMENT

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

### 4.3.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| R&S SPECTRUM ANALYZER | FSP40 | 100036 | Nov. 23, 2006 |

**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.

### 4.3.3 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.

### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

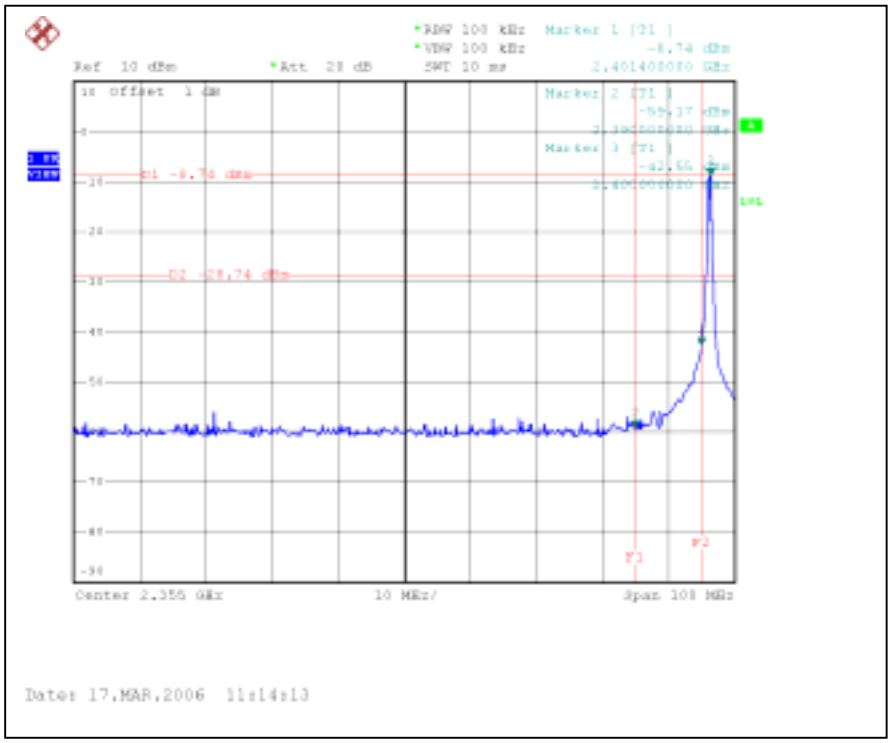
### 4.3.5 EUT OPERATING CONDITION

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

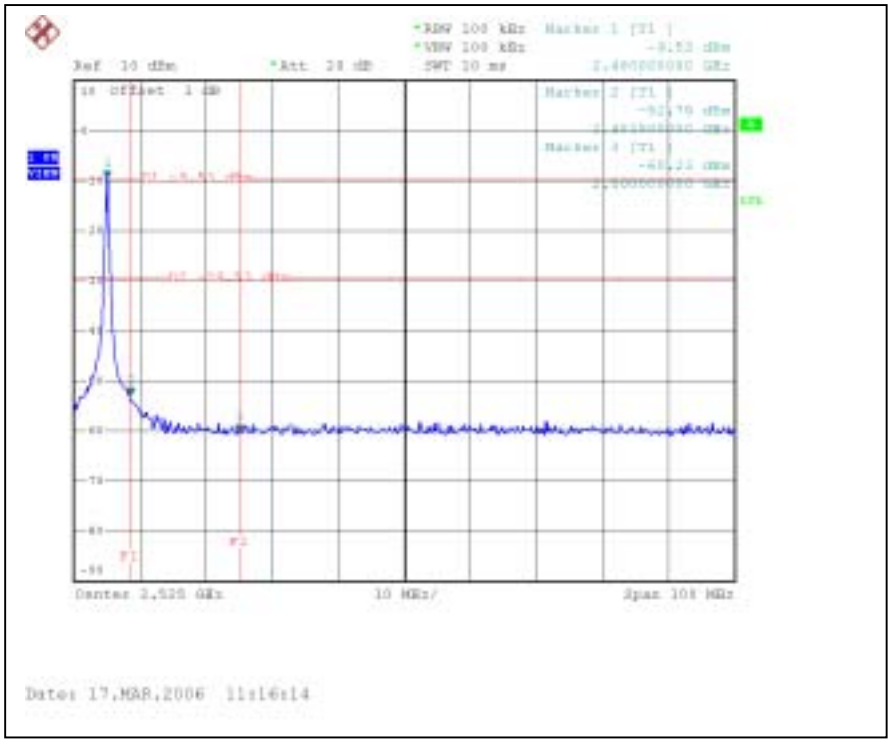
### 4.3.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer pages form 13 to 20 for met the requirement of the general radiated emission limits in § 15.209.

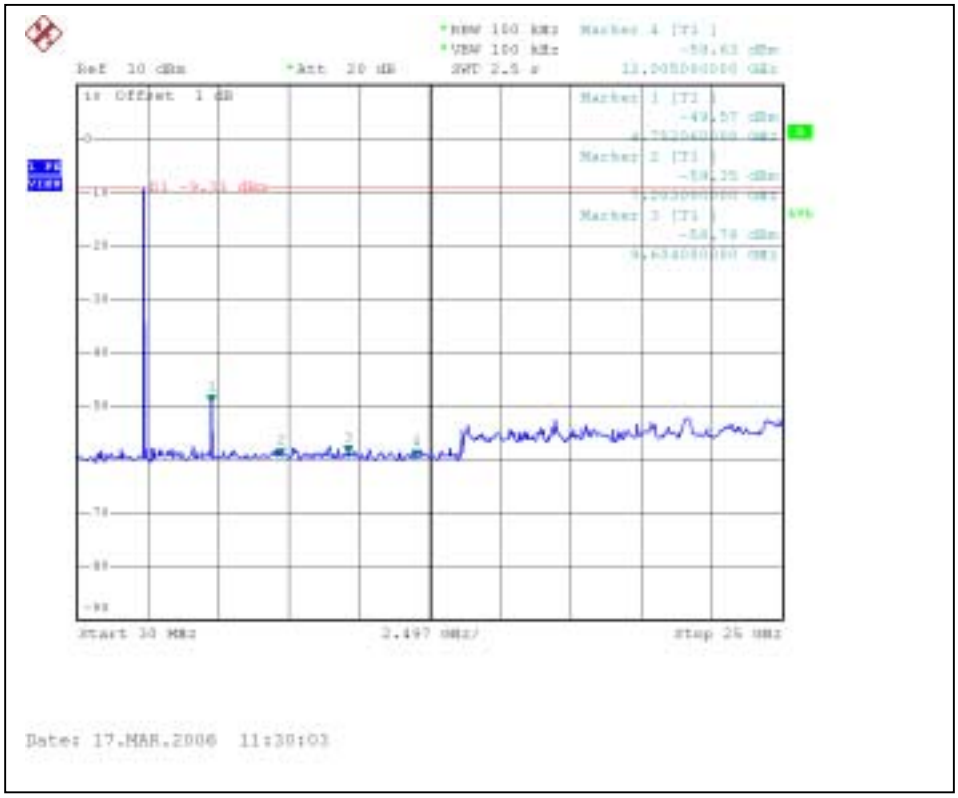
CH0



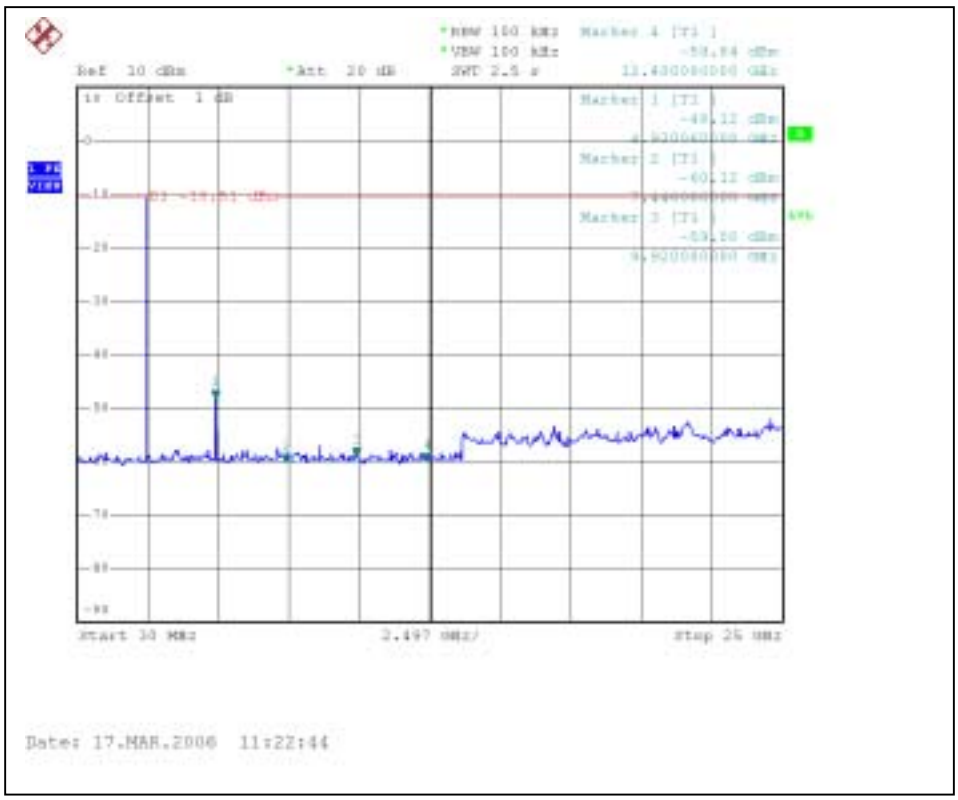

CH79



CH0


Ref 10 dBm
Att 20 dB
SWT 2.5 s
1s Offset 1 dB
Start 30 MHz
2.497 GHz/
Stop 26 GHz
Date: 17.MAR.2006 11:30:03

CH79


Ref 10 dBm
Att 20 dB
SWT 2.5 s
1s Offset 1 dB
Start 30 MHz
2.497 GHz/
Stop 26 GHz
Date: 17.MAR.2006 11:22:44

# 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:

| | |
|---|---|
| **USA** | FCC, UL, A2LA |
| **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

**Email**: service@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.

# APPENDIX-A

## MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.