



FCC TEST REPORT

REPORT NO.: RF930423L01

MODEL NO.: AHP304R2T

RECEIVED: Apr. 23, 2004

TESTED: Apr. 28 ~ Apr. 29, 2004

APPLICANT: AVANTI HEARTH PRODUCTS

ADDRESS: 204 South Avon Street Suite 200,
Gastonia, NC 28054, U.S.A

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1 CERTIFICATION

PRODUCT : BUILT-IN ELECTRIC FIREPLACE THERMO
REMOTE CONTROLLER
MODEL NO.: AHP304R2T
BRAND: AVANTI
APPLICANT : AVANTI HEARTH PRODUCTS
TESTED: Apr. 28 ~ Apr. 29, 2004
TEST ITEM: ENGINEERING SAMPLE
STANDARDS : FCC Part 15, Subpart C (Section 15.231),
ANSI C63.4-2001

The above equipment 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: Windy Chou, **DATE:** May 4, 2004
Windy Chou

APPROVED BY: Cody Chang, **DATE:** May 4, 2004
Cody Chang / Supervisor

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C | | | |
|--|-------------------------------------|--------|--|
| STANDARD PARAGRAPH | TEST TYPE | RESULT | REMARK |
| 15.207 | Conducted Emission Test | NA | 3Vdc from batteries |
| 15.209 15.231 | Radiated Emission Test | PASS | Minimum passing margin is -0.79dB at 433.88MHz |
| 15.231 | 20dB Occupied Bandwidth 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 | BUILT-IN ELECTRIC FIREPLACE THERMO REMOTE CONTROLLER |
| MODEL NO. | AHP304R2T |
| BRAND | AVANTI |
| POWER SUPPLY | 3Vdc from batteries |
| MODULATION TYPE | ASK |
| CARRIER FREQUENCY OF EACH CHANNEL | 433.92MHz |
| NUMBER OF CHANNEL | 1 |
| ANTENNA TYPE | Printed antenna |
| DATA CABLE | NA |
| I/O PORTS | NA |

NOTE:

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

3.2 DESCRIPTION OF TEST MODES

One channel is provided to this EUT:

| Channel | Frequency |
|---------|------------|
| 1 | 433.92 MHz |

Note: The EUT was pre-tested with X, Y, Z positions. The worst emission level was found when the EUT was tested under 2 positions, therefore only this positions will be used during the test.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a BUILT-IN ELECTRIC FIREPLACE THERMO REMOTE CONTROLLER. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.231)

ANSI C63.4: 2001

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

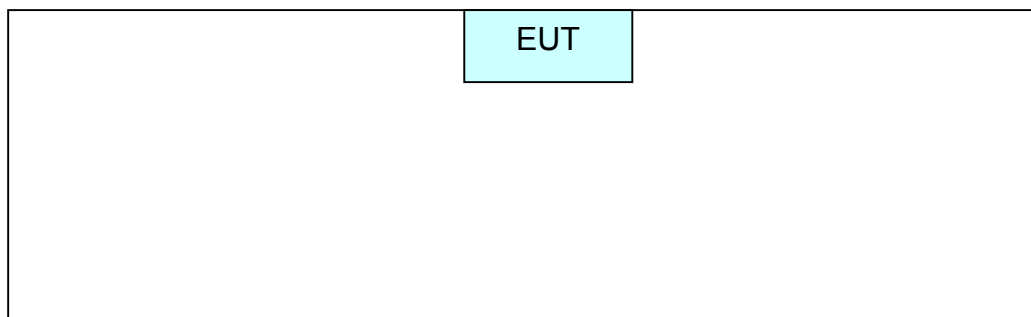
NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



3.4 DESCRIPTION OF SUPPORT UNITS

NA

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

NA

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.231 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 | | Field Strength of Spurious | |
|-----------------------------|-------------------------------|----------------|----------------------------|----------------|
| | uV/meter | dBuV/meter | uV/meter | dBuV/meter |
| 40.66 – 40.70 | 2250 | 67.04 | 225 | 48.04 |
| 70 – 130 | 1250 | 61.94 | 125 | 41.94 |
| 130 – 174 | 1250 to 3750 | 61.94 to 71.48 | 125 to 375 | 41.94 to 51.48 |
| 174 – 260 | 3750 | 71.48 | 75 | 37.50 |
| 260 – 470 | 3750 to 12500 | 71.48 to 81.94 | 375 to 1250 | 51.48 to 61.94 |
| Above 470 | 12500 | 81.94 | 1250 | 61.94 |

NOTE:

- (1) Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, uV/m at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
- (2) The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

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 | $2400/F(\text{kHz})$ | 300 |
| 0.490-1.705 | $24000/F(\text{kHz})$ | 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 |
|---|--------------------|--------------|------------------|
| Test Receiver ROHDE & SCHWARZ | ESI7 | 100033 | May 28, 2004 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100040 | Dec. 15, 2004 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-153 | Feb. 03, 2005 |
| HORN Antenna SCHWARZBECK | 9120D | 9120D-408 | Feb. 03, 2005 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA 9170243 | Feb. 23, 2005 |
| Preamplifier Agilent | 8447D | 2944A10633 | Jan. 15, 2005 |
| Preamplifier Agilent | 8449B | 3008A01964 | Jan. 27, 2005 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 218183/4 | Mar. 05, 2005 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 218195/4 | Mar. 05, 2005 |
| Software ADT. | ADT_Radiated_V5.14 | NA | NA |
| Antenna Tower inn-co GmbH | MA 4000 | 013303 | NA |
| Antenna Tower Controller inn-co GmbH | CO2000 | 017303 | NA |
| Turn Table ADT. | TT100. | TT93021703 | NA |
| Turn Table Controller ADT. | SC100. | SC93021703 | 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 HwaYa Chamber 3.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The IC Site Registration No. is IC4924-3.

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 the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

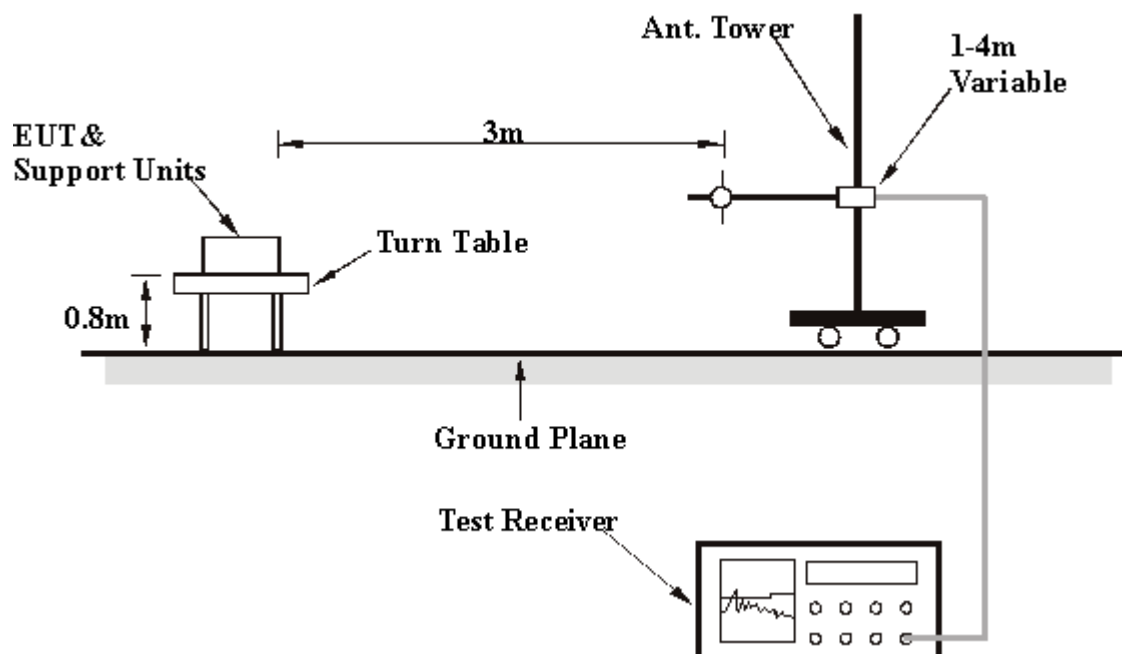
NOTE:

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 item 4.1.6

4.2.7 TEST RESULTS

| | | | |
|-------------------------------------|--|------------------------------|------------|
| EUT | BUILT-IN ELECTRIC FIREPLACE THERMO REMOTE CONTROLLER | MODEL | AHP304R2T |
| FREQUENCY RANGE | Below 1000MHz | MODE | Z axis |
| INPUT POWER (SYSTEM) | 3Vdc | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 25deg. C, 57%RH, 991hPa | TESTED BY: Gary Chang | |

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 | 99.98 | 25.85 QP | 43.50 | -17.65 | 4.00 H | 106 | 14.71 | 11.14 |
| 2 | *433.88 | 72.60 PK | 100.80 | -28.20 | 1.13 H | 259 | 54.86 | 17.74 |
| 3 | *433.88 | 64.32 AV | 80.80 | -15.68 | 1.13 H | 259 | 53.11 | 17.74 |
| 4 | 836.71 | 24.94 QP | 46.00 | -21.06 | 1.00 H | 187 | 0.82 | 24.12 |
| 5 | 867.82 | 32.39 PK | 52.60 | -20.21 | 1.00 H | 190 | 7.79 | 24.60 |
| 6 | 867.82 | 24.19 AV | 43.66 | -19.47 | 1.00 H | 190 | -0.67 | 24.12 |
| 7 | 908.64 | 25.68 QP | 46.00 | -20.32 | 1.00 H | 316 | 0.34 | 25.34 |
| 8 | 939.74 | 26.48 QP | 46.00 | -19.52 | 4.00 H | 310 | 0.78 | 25.70 |

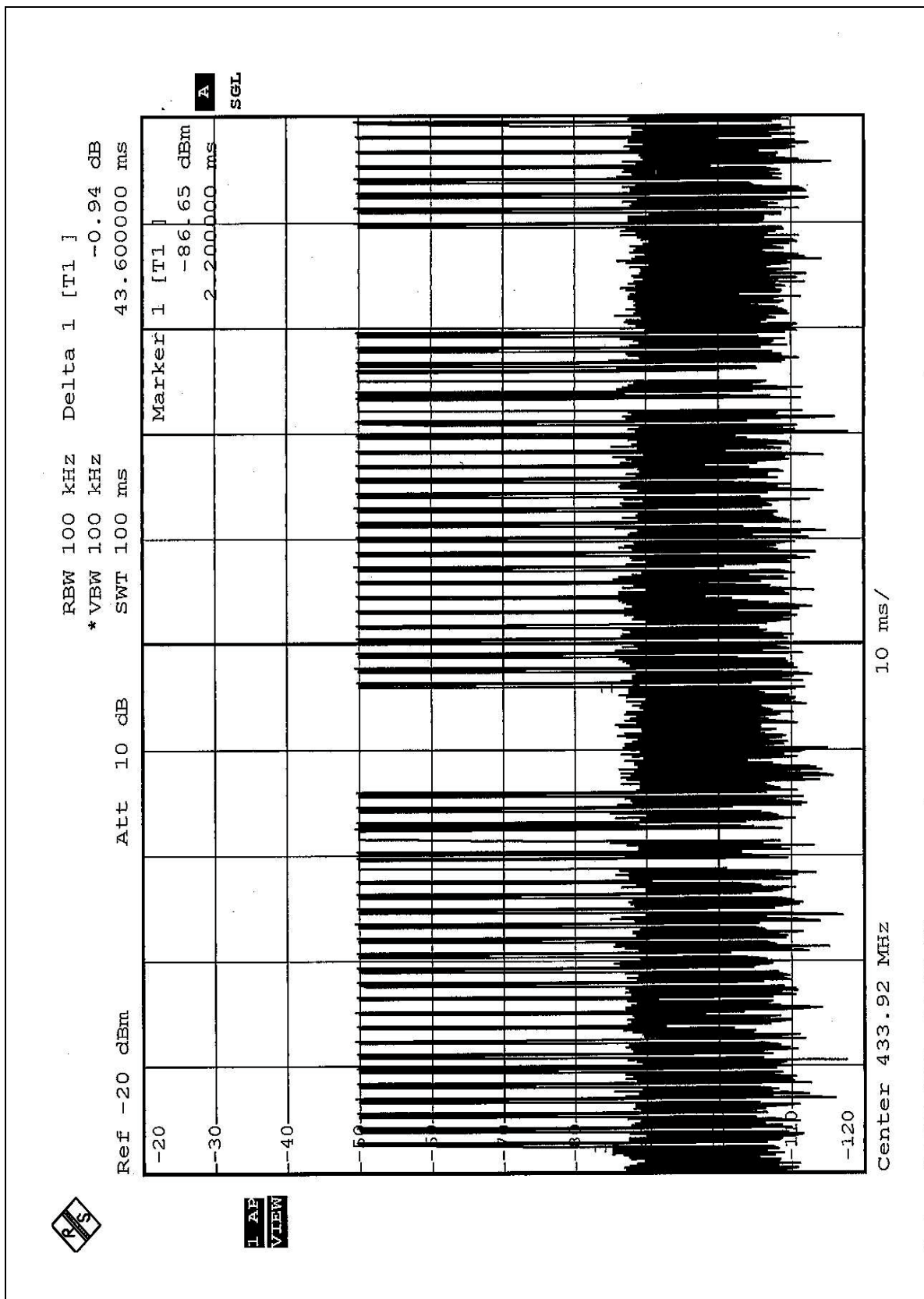
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

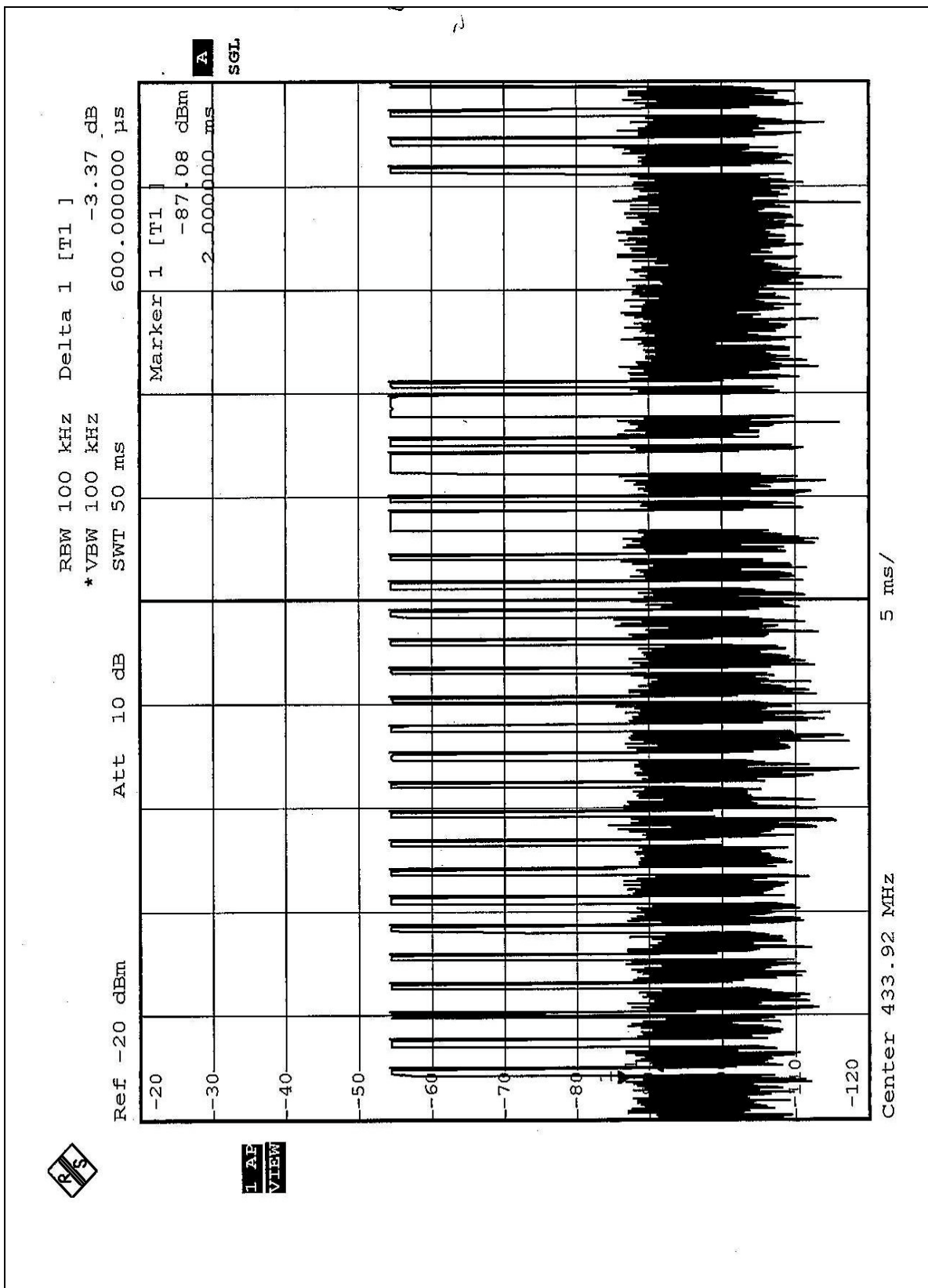
| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| 1 | 31.94 | 23.17 QP | 40.00 | -16.83 | 1.00 V | 118 | 8.66 | 14.50 |
| 2 | 99.98 | 29.87 QP | 43.50 | -13.63 | 1.00 V | 190 | 18.73 | 11.14 |
| 3 | *433.88 | 81.86 PK | 100.80 | -18.94 | 1.00 V | 265 | 64.12 | 17.74 |
| 4 | *433.88 | 73.58 AV | 80.80 | -6.42 | 1.00 V | 265 | 62.11 | 17.74 |
| 5 | 867.82 | 35.79 PK | 61.86 | -26.07 | 1.00 V | 241 | 11.19 | 24.60 |
| 6 | 867.82 | 27.51 AV | 52.92 | -25.41 | 1.00 V | 241 | 11.19 | 24.60 |
| 7 | 916.41 | 26.04 QP | 46.00 | -19.96 | 3.00 V | 313 | 0.61 | 25.43 |
| 8 | 951.40 | 26.55 QP | 46.00 | -19.45 | 3.00 V | 271 | 0.72 | 25.83 |

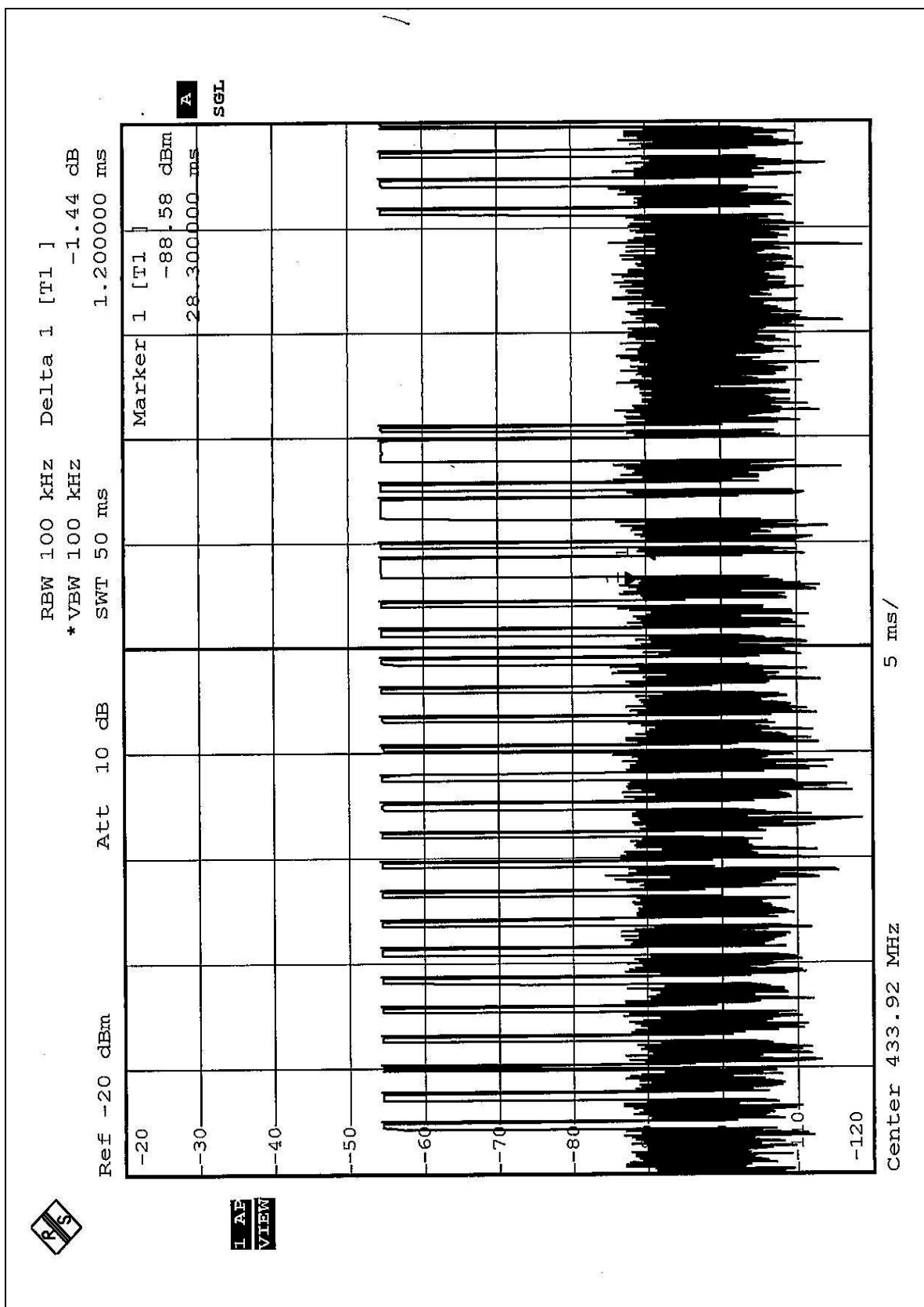
- NOTE:** 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB) = Antenna Factor (dB) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*” = Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle)
Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{(0.6\text{ms} \times 22) + (1.2\text{ms} \times 3)}{43.6\text{ms}} = -8.28\text{dB}$$

please see page 14 to 16 for plotted duty







4.3 20dB OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF BAND EDGES MEASUREMENT

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

| Fundamental Frequency (MHz) | Limit of 20 dB Bandwidth(kHz) |
|-----------------------------|-------------------------------|
| 433.92 | 1084.8 |

4.3.2 TEST INSTRUMENTS

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

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

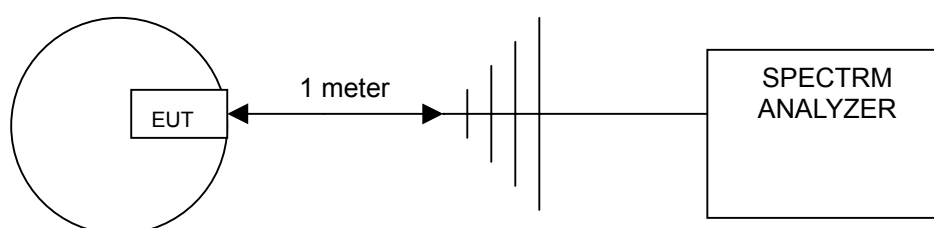
4.3.3 TEST PROCEDURES

- 1 The EUT was placed on the turning table.
- 2 The signal was coupled to the spectrum analyzer through an antenna.
- 3 Set the resolution bandwidth to 10kHz and video bandwidth to 30kHz then select Peak function to scan the channel frequency.
- 4 The 20dB bandwidth was measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

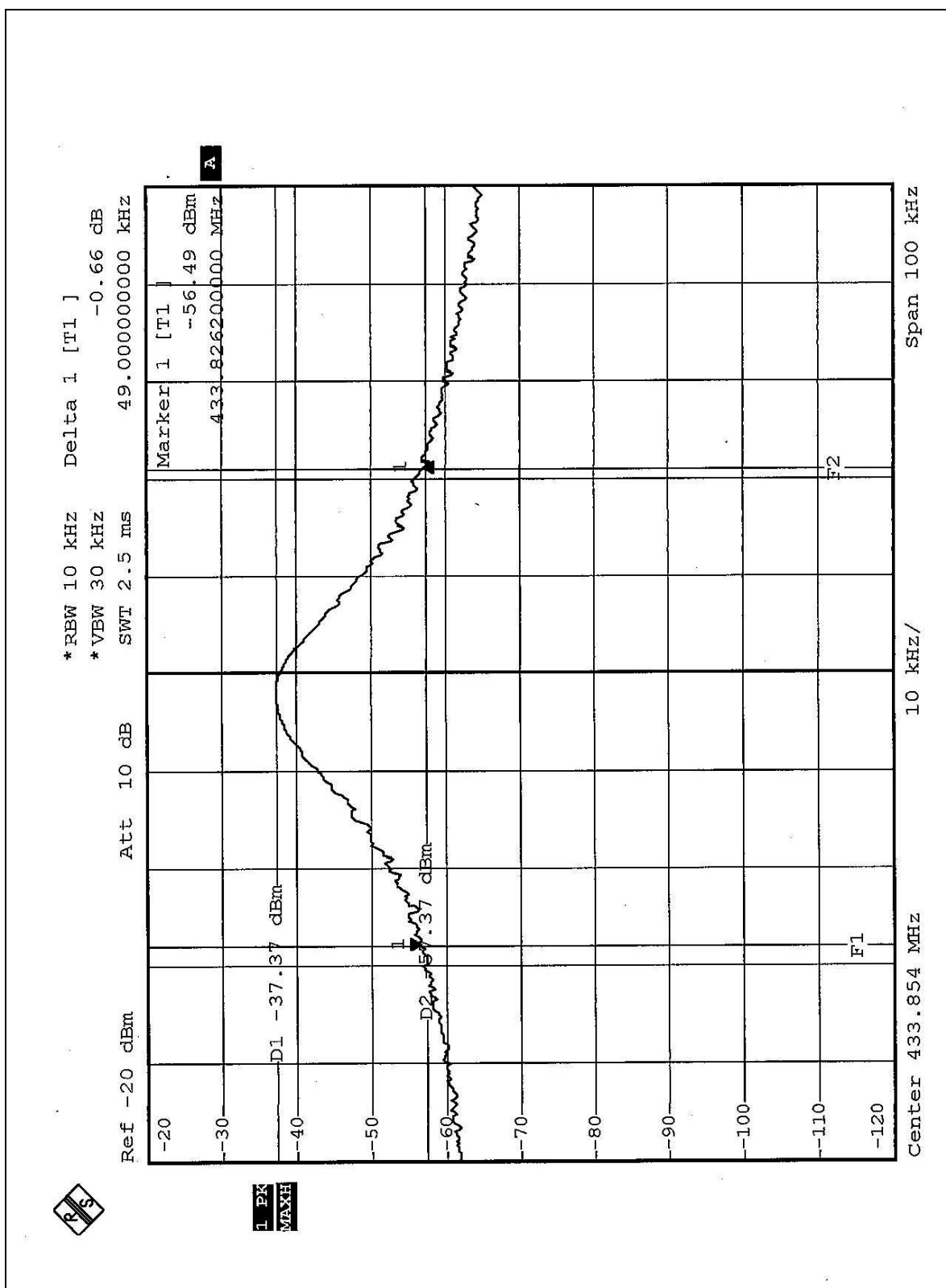
4.3.5 TEST SETUP



4.3.6 TEST RESULTS

| Frequency (MHz) | 20 dB bandwidth (kHz) | Maximum limit (kHz) | PASS/FAIL |
|-----------------|-----------------------|---------------------|-----------|
| 433.92 | 49.00 | 1084.80 | PASS |

The plot of test result is attached as below.



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST (For Z axis)





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:

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