

FCC TEST REPORT

REPORT NO.: 060422FIA01

MODEL NO.: 00597TX

RECEIVED: Apr. 24 , 2006

TESTED: Apr. 24 ~ Apr. 25, 2006

ISSUED: Apr. 25, 2006

APPLICANT: Chaney Instrument Co.

ADDRESS: AB 29/F HaiYing Building South Caitian Road
Futian District Shenzhen China

ISSUED BY: ADT (Shanghai) Corporation

ADDRESS: 2F, Building C, No.1618, Yishan Rd., 201103,
Shanghai, China

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ADT (Shanghai) Corporation.



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1 CERTIFICATION

PRODUCT: Rain Gauge
MODEL NO.: 00597TX
APPLICANT: Chaney Instrument Co.
TESTED: Apr. 24 ~ Apr. 25, 2006
TEST ITEM: Engineering Sample
STANDARDS: FCC Part 15:2005,
Subpart C (Section 15.209 and 15.231),
ANSI C63.4-2003

The above equipment has been tested by **ADT (Shanghai) 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.

TECHNICAL

ACCEPTANCE : _____ , **DATE:** APR. 25, 2006
Responsible for EMI (Steven Qian)

APPROVED BY : _____ , **DATE:** APR. 25, 2006
Director of Operations (Wallace Pan, Manager)

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	Remarks
15.207	Conducted Emission Test	N/A	
15.231(c)	20dB Occupied Bandwidth Measurement	PASS	Meet the requirement of limit
15.209 15.231(e)	Radiated Emission Test	PASS	Minimum passing AV margin is -12.95dB at 2955.760MHz

Note: This report contains data that were produced under subcontract by Laboratory ADT (Shanghai) Corporation.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement	Value
Conducted emissions	1.8 dB
Radiated emissions	3.2 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Rain Gauge
MODEL NO.	00597TX
POWER SUPPLY	3Vdc from battery
MODULATION TYPE	ASK
CARRIER FREQUENCY OF EACH CHANNEL	433.92 MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Connector
DATA CABLE SUPPLIED	N/A
I/O PORTS	N/A

NOTE: 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

**Test Mode Applicability AND TESTED CHANNEL DETAIL:**

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APM	
-	-	√	√	--	N/A

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APM: Antenna Port Measurement

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, and X.Y.Z. axis.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Axis
1	1	ASK	X

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, and X.Y.Z. axis.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type	Axis
1	1	ASK	X

3.3 DESCRIPTION OF SUPPORT UNITS

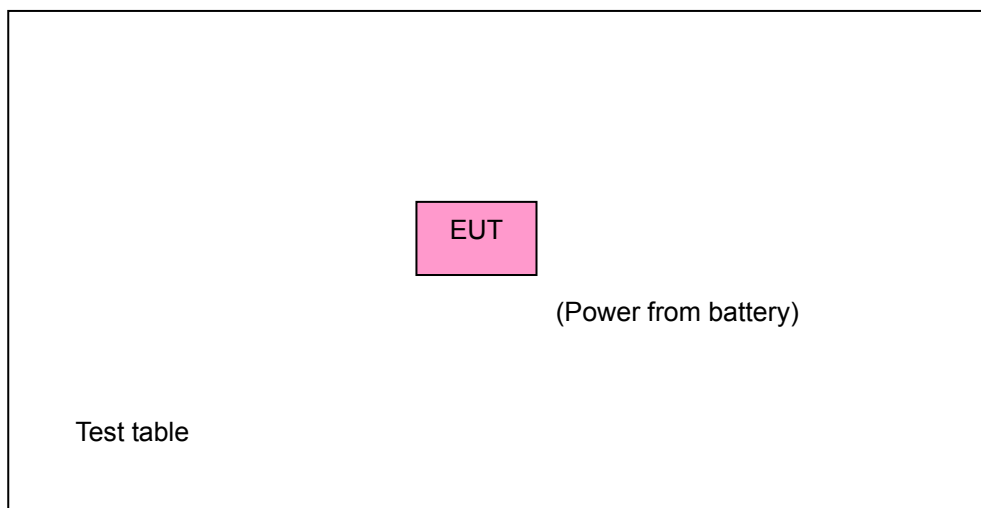
The EUT is a kind of Rain Gauge. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.231)
ANSI C63.4- 2003

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

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent.



4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD:

FCC Part 15: 2005, Subpart C (Section: 15.207)

FREQUENCY (MHz)	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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.

4.1.2 TEST RESULT

Since the EUT does not have AC port, the test item is not applicable.

4.2 20dB OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 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

4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER Agilent	E4403B	E1S1001	Jan. 13, 2007

NOTE: The calibration interval of the above test instruments is 12 months.

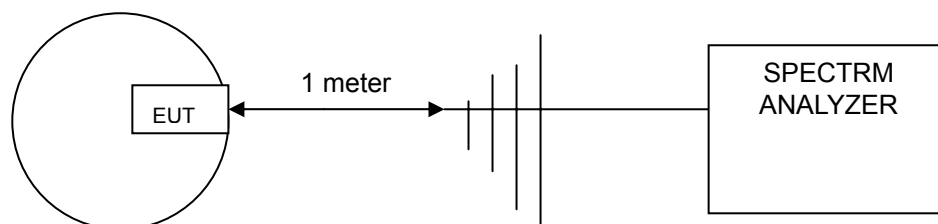
4.2.3 TEST PROCEDURES

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 10 kHz and video bandwidth to 1MHz then select Peak function to scan the channel frequency.
4. The 20dB bandwidth was measured and recorded.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

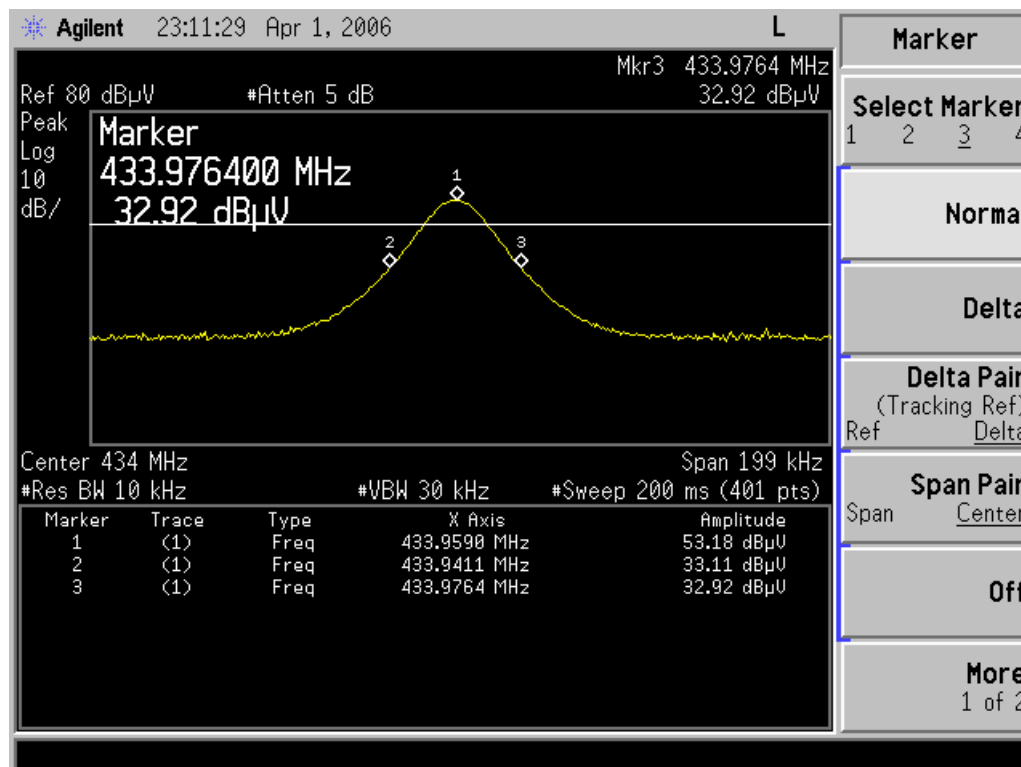
4.2.5 TEST SETUP



4.2.6 TEST RESULTS

Frequency (MHz)	20 dB bandwidth (kHz)	Maximum limit (kHz)	PASS/FAIL
433.92	35.3	1084.8	PASS

The plot of test result is attached as below.



4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD:

FCC Part 15: 2005, Subpart C (Section: 15.205)

FCC Part 15: 2005, Subpart C (Section: 15.209)

FCC Part 15: 2005, Subpart C [Section: 15.231(e)]

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	1000	60.00	100	40.00
70 – 130	500	53.98	50	36.98
130 – 174	500 to 1500	53.98 to 63.52	50 to 150	36.98 to 43.52
174 – 260	1500	63.52	150	43.52
260 – 470	1500 to 5000	63.52 to 73.98	150 to 500	43.52 to 53.98
Above 470	5000	73.98	500	53.98

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, $\mu\text{V/m}$ at 3 meters = $22.72727(F) - 2454.545$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667(F) - 2833.3333$. 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.

FREQUENCY RANGE OF RADIATED MEASUREMENT**(For unintentional radiators)**

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower



4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1001	Apr. 19, 2007
BILOG Antenna SCHWARZBECK	VULB9168	E1A1001	Sep. 26, 2006
Preamplifier Agilent	8447D	E1A2001	Jan. 27, 2007
Preamplifier Agilent	8449B	E1A2002	Jan. 27, 2007
Double Ridged Broadband Horn Antenna Schwarzbeck	BBHA 9120D	E1A1002	Feb. 15, 2007
*Spectrum Analyzer Agilent	E4403B	E1S1001	Jan. 13, 2007
*Spectrum Analyzer ROHDE & SCHWARZ	FSP30	E1S1002	May. 15, 2006
RF signal cable Woken	RG-402	E1CBH01	May. 30, 2006
RF signal cable Woken	RG-402	E1CBH02	May. 30, 2006
RF signal cable Woken	RG-402	E1CBH03	May. 30, 2006
RF signal cable Woken	RG-412	E1CBL02	May. 30, 2006
RF signal cable Woken	RG-412	E1CBL03	May. 30, 2006
RF signal cable Woken	RG-412	E1CBL04	May. 30, 2006
Software ADT	ADT_Radiated_V7.5	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months.
 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 Spectrum Analyzer (model: FSP30) and RF signal cable (SERIAL: E1CBH02&E1CBH03) are used only for the measurement of emission frequency above 2GHz if tested.



4.3.3 TEST PROCEDURE

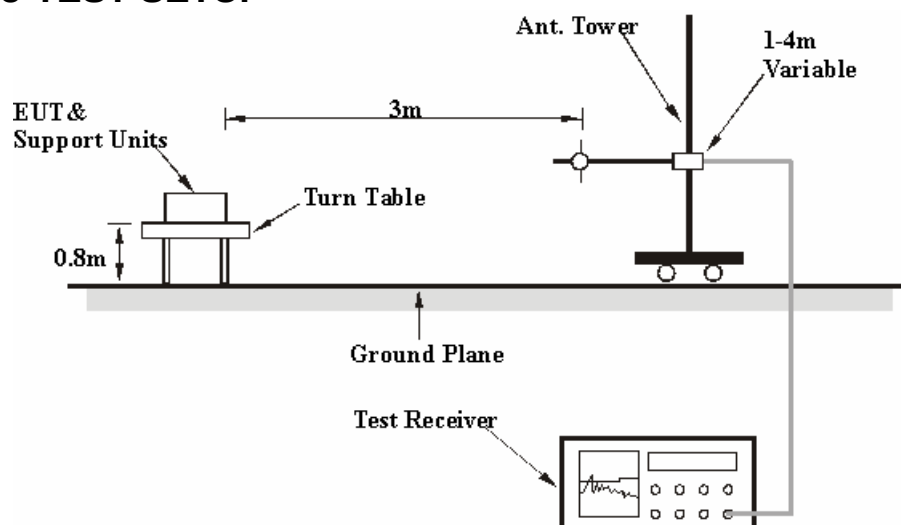
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. 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.
- e. 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.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. 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 120 kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) at frequency above 1GHz.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



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

4.3.6 EUT OPERATING CONDITIONS

Put the Rain Gauge at the centre of the test table and power it on.

4.3.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT	Rain Gauge	MODEL NO.	00597TX
CHANNEL	Channel 1	FREQUENCY RANGE	30 ~ 1000 MHz
MODULATION TYPE	ASK	INPUT POWER (SYSTEM)	3 Vdc from battery
ENVIRONMENTAL CONDITIONS	25 deg. C, 58 % RH, 1013 hPa	DETECTOR FUNCTION	Quasi-Peak / Peak / Average
TESTED BY	BRIGHT		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	139.120 QP	16.14	-6.62	9.52	43.50	-33.98	201.00	332.00
2	245.820 QP	14.78	-6.38	8.40	46.00	-37.60	201.00	235.00
3	323.430 QP	17.10	-6.44	10.67	46.00	-35.33	204.00	124.00
4*	434.980 PK	19.74	49.47	69.21	92.90	-23.69	226.00	143.00
4*	434.980 AV	19.74	38.41	58.15	72.90	-14.75	226.00	143.00
5	536.830 QP	21.71	-6.22	15.50	46.00	-30.50	331.00	24.00
6	609.580 QP	23.31	-5.96	17.35	46.00	-28.65	275.00	222.00
7	694.450 QP	24.49	-6.11	18.38	46.00	-27.62	400.00	107.00
8	869.050 PK	26.45	9.64	36.09	72.90	-36.81	228.00	260.00
8	869.050 AV	26.45	-1.42	25.03	52.90	-27.87	228.00	260.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Factor (Db/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (Db)	Ant. Height (cm)	Table Angle (Deg.)
1	153.680 QP	17.01	-6.89	10.12	43.50	-33.38	173.00	329.00
2	228.850 QP	14.45	-6.70	7.75	46.00	-38.25	169.00	195.00
3	299.180 QP	16.51	-6.20	10.31	46.00	-35.69	251.00	264.00
4	381.620 QP	18.29	-6.49	11.80	46.00	-34.20	208.00	123.00
5*	434.980 PK	19.74	50.04	69.77	92.90	-23.13	194.00	56.00
5*	434.980 AV	19.74	38.97	58.71	72.90	-14.19	194.00	56.00
6	527.120 QP	21.46	-6.09	15.36	46.00	-30.64	187.00	61.00
7	621.700 QP	23.54	-6.22	17.32	46.00	-28.68	196.00	129.00

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:

$$20\log (\text{Duty cycle}) = 20\log \frac{70 \times 0.4}{100\text{ms}} = -11.0568\text{dB}$$

please see page 19 for plotted duty

Above 1GHz Worst-Case Data

EUT	Rain Gauge	MODEL NO.	00597TX
CHANNEL	Channel 1	FREQUENCY RANGE	1GHz – 5GHz
MODULATION TYPE	ASK	INPUT POWER (SYSTEM)	3Vdc from battery
ENVIRONMENTAL CONDITIONS	25 deg. C, 58 % RH, 1013 hPa	DETECTOR FUNCTION	Peak/ Average
TESTED BY	BRIGHT		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	1355.920 PK	31.50	18.93	50.43	74.00	-23.57	183.00	195.00
1	1355.920 AV	31.50	7.91	39.41	54.00	-14.59	183.00	195.00
2	1404.400 PK	31.71	19.67	51.38	74.00	-22.62	192.00	254.00
2	1404.400 AV	31.71	8.61	40.32	54.00	-13.68	192.00	254.00
3	1566.000 PK	31.61	20.22	51.82	74.00	-22.18	175.00	91.00
3	1566.000 AV	31.61	8.27	39.88	54.00	-14.12	175.00	91.00
4	1711.440 PK	31.60	20.99	52.59	74.00	-21.40	165.00	57.00
4	1711.440 AV	31.60	6.99	38.60	54.00	-15.40	165.00	57.00
5	1776.080 PK	32.02	18.13	50.15	74.00	-23.85	210.00	138.00
5	1776.080 AV	32.02	7.10	39.12	54.00	-14.88	210.00	138.00
6	1961.920 PK	33.18	17.89	51.07	74.00	-22.93	146.00	63.00
6	1961.920 AV	33.18	7.81	40.99	54.00	-13.01	146.00	63.00
7	2196.240 PK	35.84	16.09	51.93	74.00	-22.07	175.00	149.00
8	2559.840 PK	36.31	15.74	52.04	74.00	-21.96	248.00	62.00

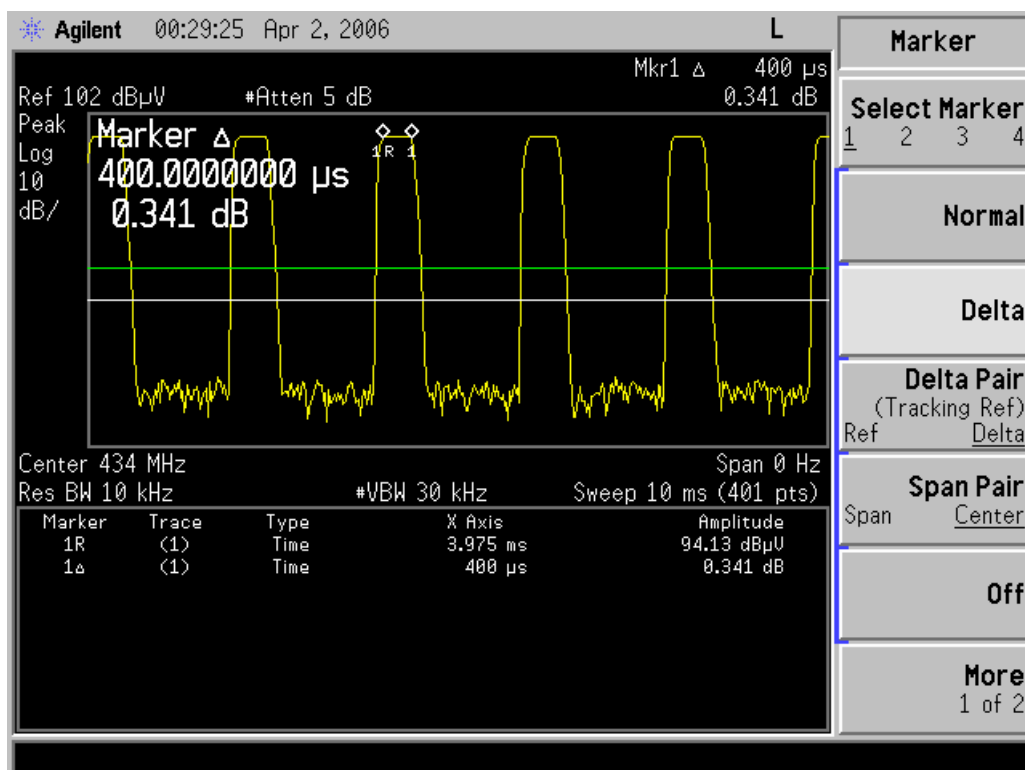
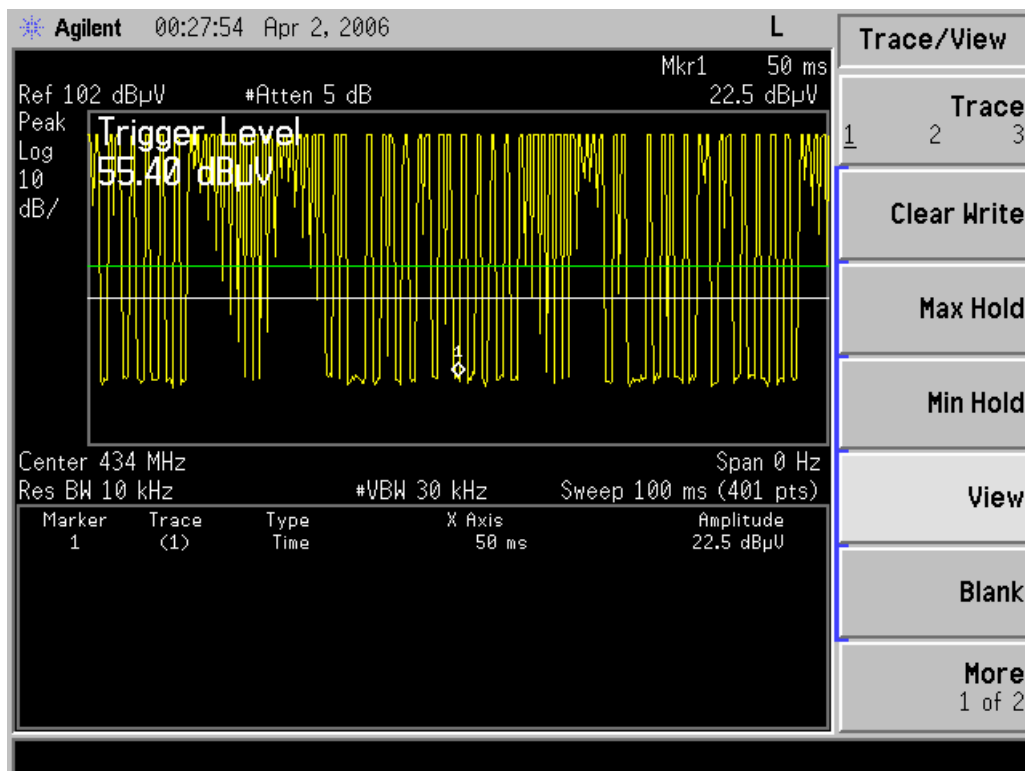

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

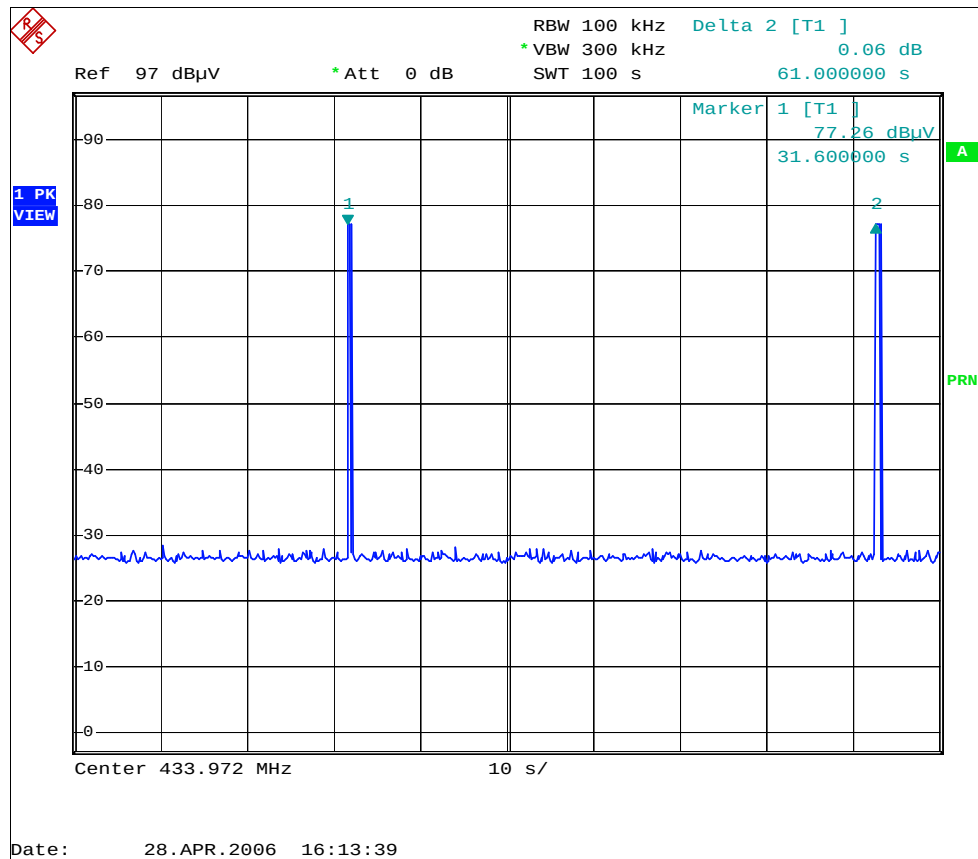
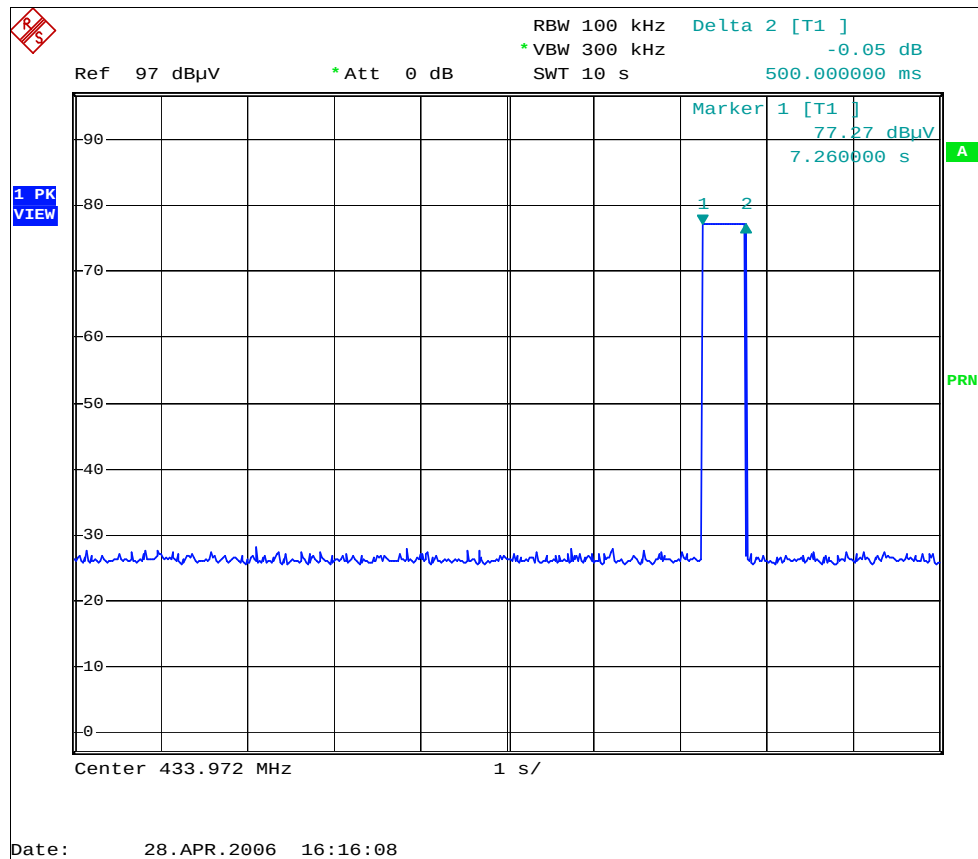
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	1347.840 PK	31.46	21.25	52.71	74.00	-21.29	259.00	95.00
1	1347.840 AV	31.46	5.12	36.58	54.00	-17.42	259.00	95.00
2	1533.680 PK	31.57	20.03	51.59	74.00	-22.41	134.00	94.00
2	1533.680 AV	31.57	6.83	38.4	54.00	-15.60	134.00	94.00
3	1703.360 PK	31.54	21.71	53.25	74.00	-20.75	267.00	115.00
3	1703.360 AV	31.54	6.71	38.25	54.00	-15.75	267.00	115.00
4	1735.680 PK	31.80	18.56	50.37	72.90	-22.53	132.00	106.00
4	1735.680 AV	31.80	7.51	39.31	52.90	-13.59	132.00	106.00
5	1921.520 PK	32.81	17.34	50.15	74.00	-19.85	269.00	249.00
5	1921.520 AV	32.81	7.56	40.37	54.00	-13.63	269.00	249.00
6	1978.080 PK	33.22	17.37	50.59	74.00	-23.41	1321.00	237.00
6	1978.080 AV	33.22	5.34	38.56	54.00	-15.44	1321.00	237.00
7	2155.840 PK	35.45	17.01	52.46	74.00	-21.54	138.00	119.00
8	2301.280 PK	35.98	15.78	51.77	74.00	-22.23	249.00	128.00

- 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.
 5. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

$$20\log (\text{Duty cycle}) = 20\log \frac{70 \times 0.4}{100\text{ms}} = -11.0568\text{dB}$$

please see page 19 for plotted duty





5 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT (Shanghai) Corp., were founded in 2003 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.

JAPAN	VCCI
USA	FCC, A2LA
Norway	DNV



Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.cnadt.com

If you have any comments, please feel free to contact us at the following:

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