

FCC TEST REPORT

REPORT NO.: 050912FIA01

MODEL NO.: MI2529

RECEIVED: Sept 19, 2005

TESTED: Sept 19 ~ Sept 30, 2005

ISSUED: Sept 30, 2005

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: Full weather station
MODEL NO.: MI2529
APPLICANT: Chaney Instrument Co.
TESTED: Sept 19 ~ Sept 30, 2005
TEST ITEM: Engineering Sample
STANDARDS: FCC Part 15:2005,
Subpart A (Section 15.35),
Subpart C (Section 15.207,15.209 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:** SPET 30, 2005
Responsible for EMI (Wailand Zhang)

APPROVED BY : _____ , **DATE:** SPET 30, 2005
(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 margin is -1.27dB at 1301.760MHz

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	1.8dB
Radiated emissions	3.5dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Full weather station
MODEL NO.	MI2529
POWER SUPPLY	3 Vdc from battery
MODULATION TYPE	ASK
CARRIER FREQUENCY OF EACH CHANNEL	433.92MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Soldered on PCB
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	
-	-	X	X	X	NA

Where PLC: Power Line Conducted Emission
RE≥1G: Radiated Emission above 1GHz

RE<1G RE: Radiated Emission below 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

Antenna Port Conducted Measurement:

- ☒ 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 Full weather station. 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

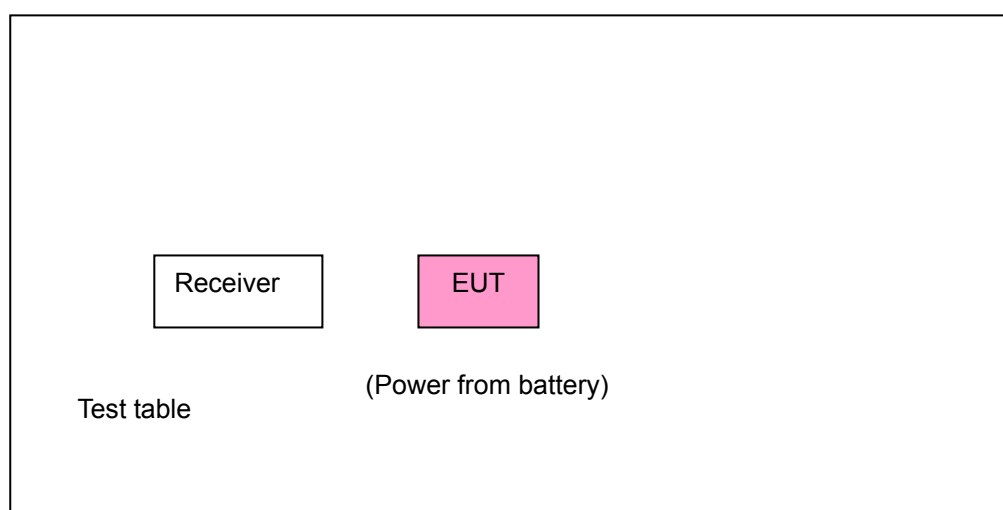
All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent 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	NA	NA	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA



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	MY41440678	Jan. 13, 2006

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

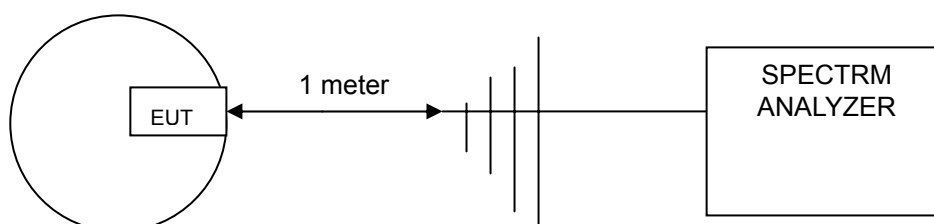
4.2.3 TEST PROCEDURES

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 10kHz 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

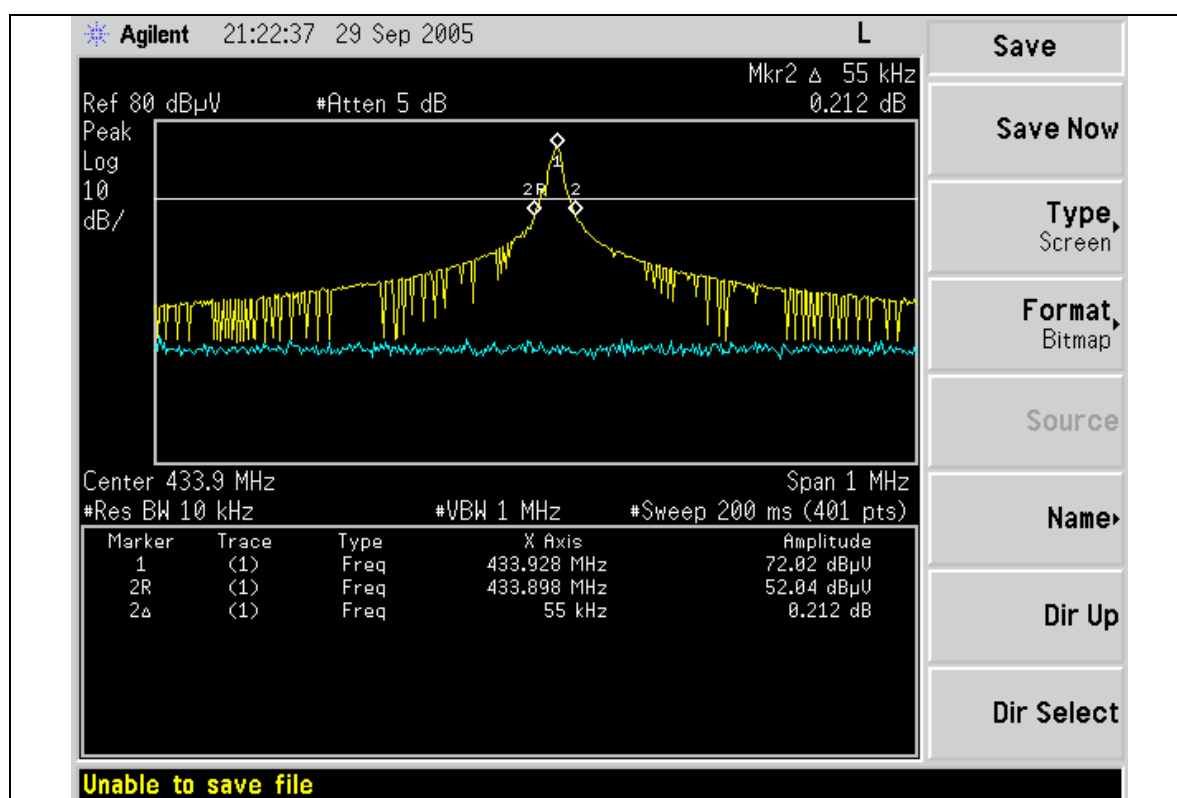
4.2.5 TEST SETUP



4.2.6 TEST RESULTS

Frequency (MHz)	20 dB bandwidth (kHz)	Maximum limit (kHz)	PASS/FAIL
433.92	55	1084.80	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, uV/m at 3 meters = $22.72727(F) - 2454.545$; for the band 260-470 MHz, uV/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(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.

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	100296	Apr. 19, 2006
BILOG Antenna SCHWARZBECK	VULB9168	9168-159	Sep. 26, 2006
Preamplifier Agilent	8447D	2944A10643	Jan. 27, 2006
Preamplifier Agilent	8449B	3008A01966	Jan. 27, 2006
Double Ridged Broadband Horn Antenna Schwarzbeck	BBHA 9120D	9120D-398	Feb.15, 2006
*Spectrum Analyzer Agilent	E4403B	MY41440678	Jan. 13, 2006
*Spectrum Analyzer ROHDE & SCHWARZ	FSP30	100019	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	NA	NA

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.

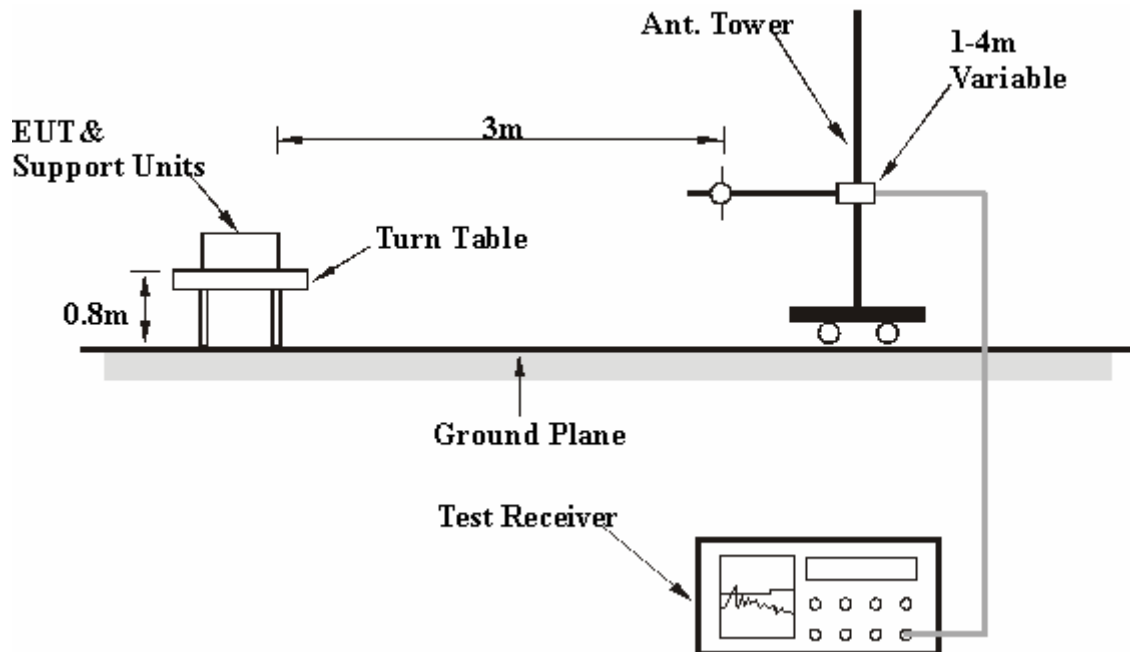
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz 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 MI2529 at the centre of the test table and the receiver 10cm far from it, then have the test.

4.3.7 TEST RESULTS

Below 1GHz Worst-Case Data

EUT	Full weather station	MODEL NO.	MI2529
CHANNEL	Channel 1	FREQUENCY RANGE	30 ~ 1000 MHz
MODULATION TYPE	ASK	INPUT POWER (SYSTEM)	3 Vdc from battery
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH, 991hPa	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	160.950	16.98	6.43	23.41QP	43.50	-20.09	100.00	133.30
2	323.430	17.10	7.39	24.49QP	46.00	-21.51	100.00	128.90
*3	433.920	19.74	51.15	70.89PK	92.87	-21.98	100.00	16.80
*3	433.920	19.74	41.35	61.09AV	72.87	-11.78	100.00	16.80
4	580.480	22.73	6.27	29.00QP	46.00	-17.00	100.00	101.70
5	694.450	24.49	7.35	31.84QP	46.00	-14.16	100.00	89.90
6	867.840	26.41	31.49	57.90PK	72.87	-14.97	100.00	230.50
6	867.840	26.41	21.69	48.10AV	52.87	-4.77	100.00	230.50

- 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:

$$20\log(\text{Duty cycle}) = 20\log \frac{74 \times 0.4375\text{ms}}{100\text{ms}} = -9.80\text{dB}$$

please see page 20 to 22 for plotted duty.

EUT	Full weather station	MODEL NO.	MI2529
CHANNEL	Channel 1	FREQUENCY RANGE	30 ~ 1000 MHz
MODULATION TYPE	ASK	INPUT POWER (SYSTEM)	3 Vdc from battery
ENVIRONMENTAL CONDITIONS	25deg. C, 61%RH, 991hPa	DETECTOR FUNCTION	Quasi-Peak / Peak / Average
TESTED BY	BRIGHT		

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	17.01	8.06	25.07QP	43.50	-18.43	100.00	20.30
2	301.600	16.58	7.00	23.58QP	46.00	-22.42	100.00	34.50
*3	433.920	19.74	39.80	59.54PK	92.87	-33.33	100.00	59.20
*3	433.920	19.74	30.00	49.74AV	72.87	-23.13	100.00	59.20
4	580.480	22.73	5.37	28.10QP	46.00	-17.90	100.00	50.80
5	738.100	25.22	5.71	30.93QP	46.00	-15.07	100.00	101.70
6	867.840	26.41	33.90	60.31PK	72.87	-12.57	100.00	42.60
6	867.840	26.41	24.10	50.51AV	52.87	-2.36	100.00	42.60

- 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:

$$20\log(\text{Duty cycle}) = 20\log \frac{74 \times 0.4375\text{ms}}{100\text{ms}} = -9.80\text{dB}$$

please see page 20 to 22 for plotted duty

ASK modulation

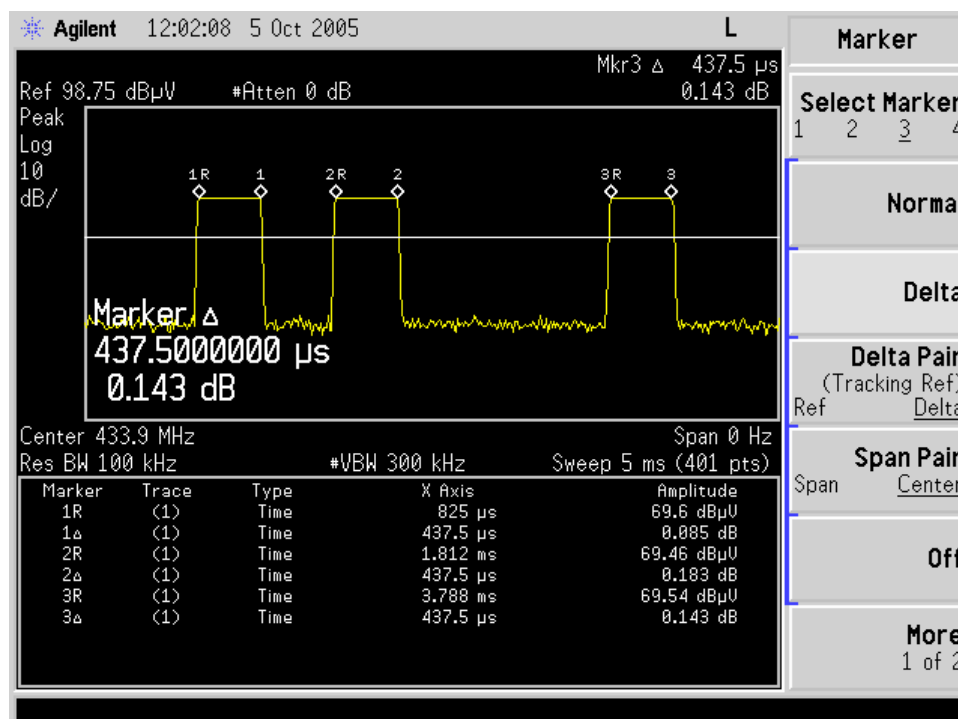
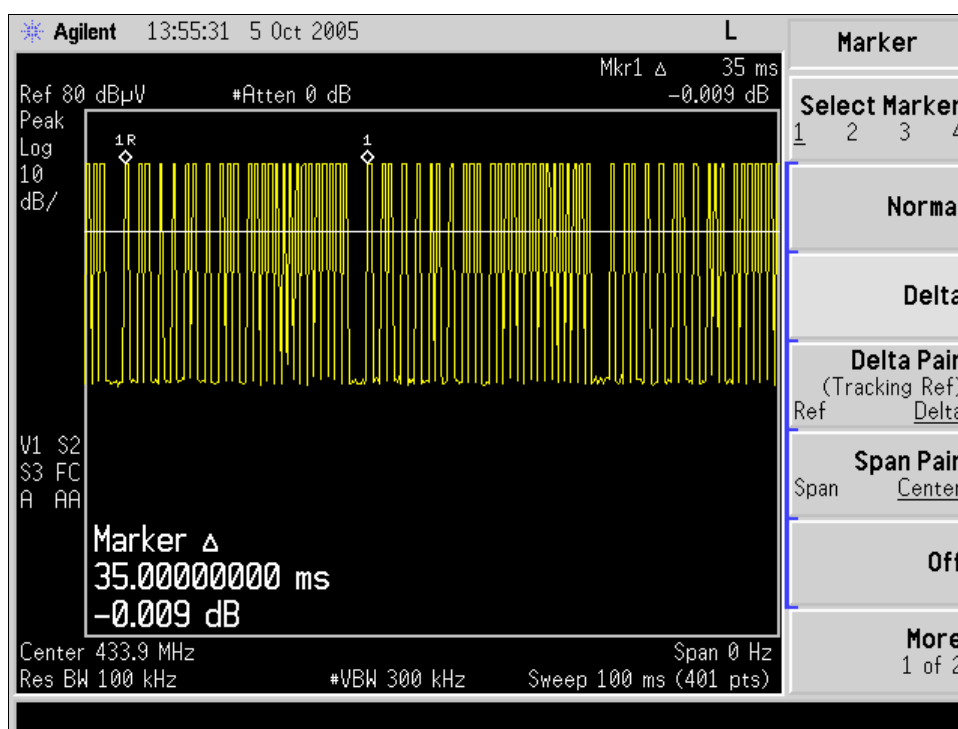
EUT	Full weather station	MODEL NO.	MI2529
CHANNEL	Channel 1	FREQUENCY RANGE	1GHz – 5GHz
MODULATION TYPE	ASK	INPUT POWER (SYSTEM)	3Vdc from battery
ENVIRONMENTAL CONDITIONS	25deg. C, 61%RH, 991hPa	DETECTOR FUNCTION	Peak/ Average
TESTED BY	Name of Engineer		

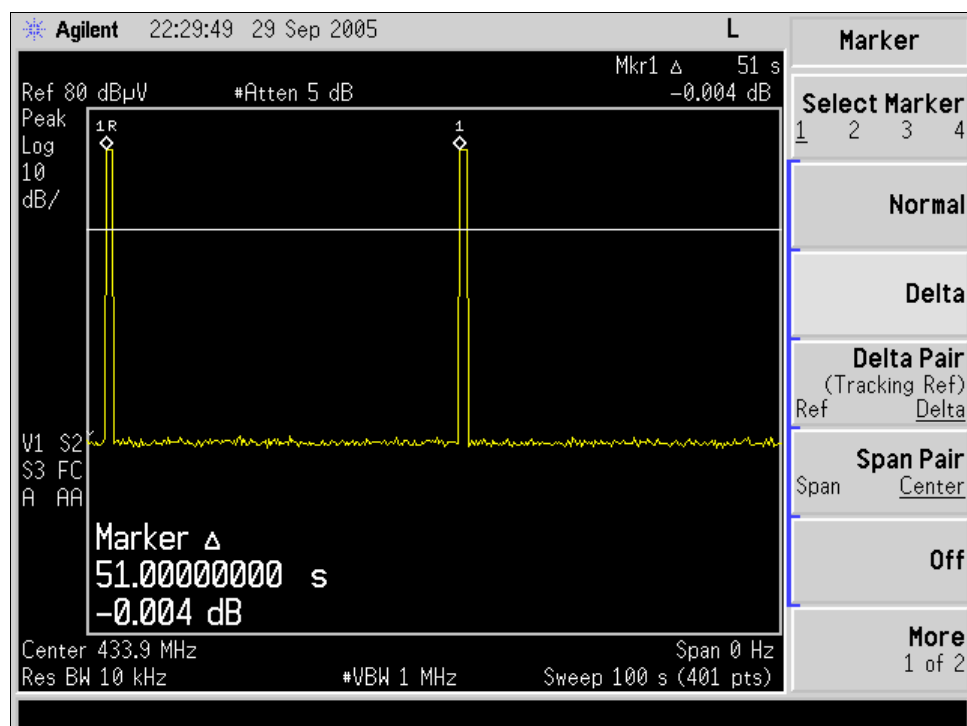
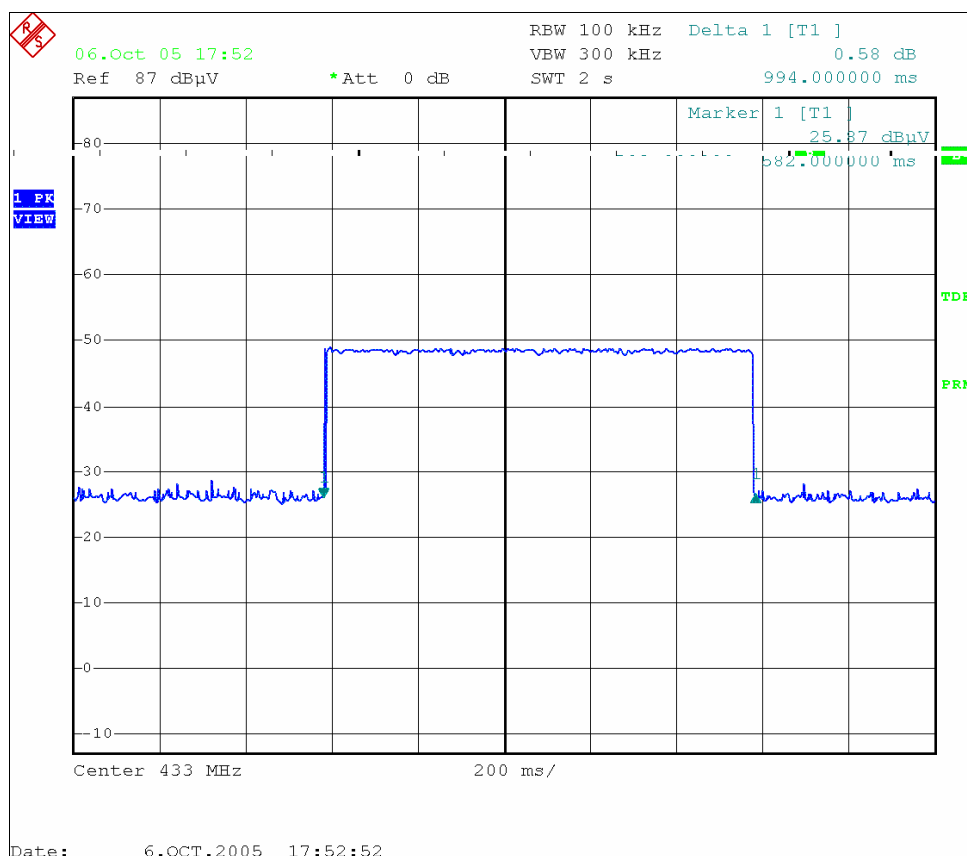
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Factor (dB/M)	Reading (dBuV/M)	Emission (dBuV/M)	Limit (dBuV/M)	Margin (dB)	Ant. Height (cm)	Table Angle (Deg.)
1	2169.600	35.61	22.52	58.13PK	72.87	-14.74	100.00	25.90
1	2169.600	35.61	12.72	48.33AV	52.87	-4.54	100.00	25.90
2	2603.520	36.29	16.51	52.80PK	72.87	--20.07	100.00	78.60
2	2603.520	36.29	6.71	43.00AV	52.87	-9.87	100.00	78.60
3	3037.440	37.34	18.07	55.41PK	72.87	-17.46	100.00	48.40
3	3037.440	37.34	8.27	45.61AV	52.87	-7.26	100.00	48.40
4	3497.120	39.22	3.88	43.10AV	53.98	-10.88	100.00	59.50
5	4353.600	42.59	12.92	55.52PK	73.98	-18.46	100.00	37.50
6	4418.240	42.93	13.02	55.95PK	73.98	-18.03	100.00	58.50

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	1301.760	31.32	30.09	61.40PK	72.87	-11.47	100.00	95.80
1	1301.760	31.32	20.29	51.60AV	52.87	-1.27	100.00	95.80
2	1735.680	31.80	28.62	60.42PK	72.87	-12.45	100.00	78.40
2	1735.680	31.80	18.82	50.62AV	52.87	-2.25	100.00	78.40
3	2603.520	36.29	19.51	55.80PK	72.87	-17.07	100.00	78.90
3	2603.520	36.29	9.71	46.00AV	52.87	-6.87	100.00	78.90
4	3037.440	37.34	20.74	58.08PK	72.87	-14.79	100.00	62.10
4	3037.440	37.34	10.94	48.28AV	52.87	-4.59	100.00	62.10
5	3471.260	38.94	17.11	56.06PK	73.98	-17.92	100.00	48.50
6	3505.200	39.29	3.84	43.13AV	53.98	-10.85	100.00	78.50

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.





5 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST

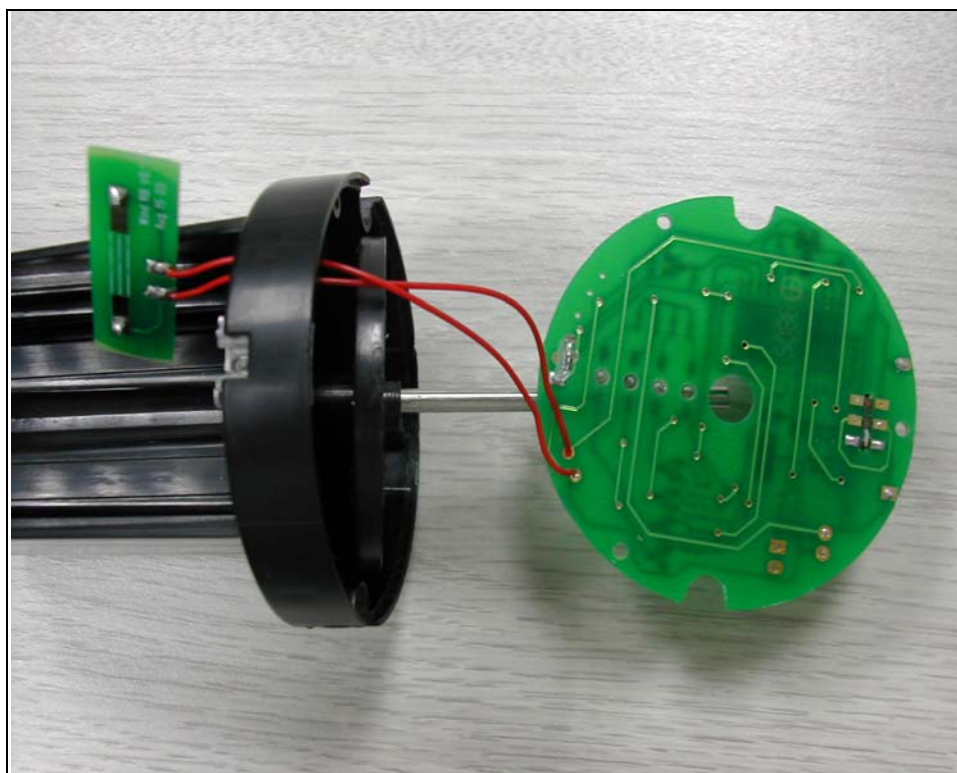
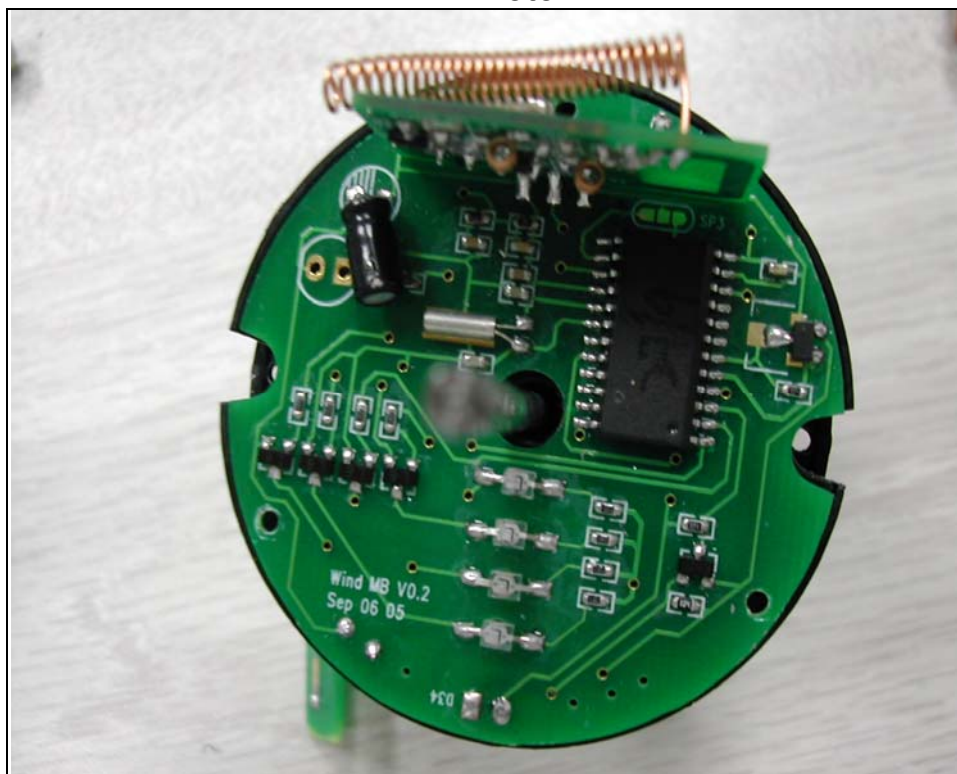


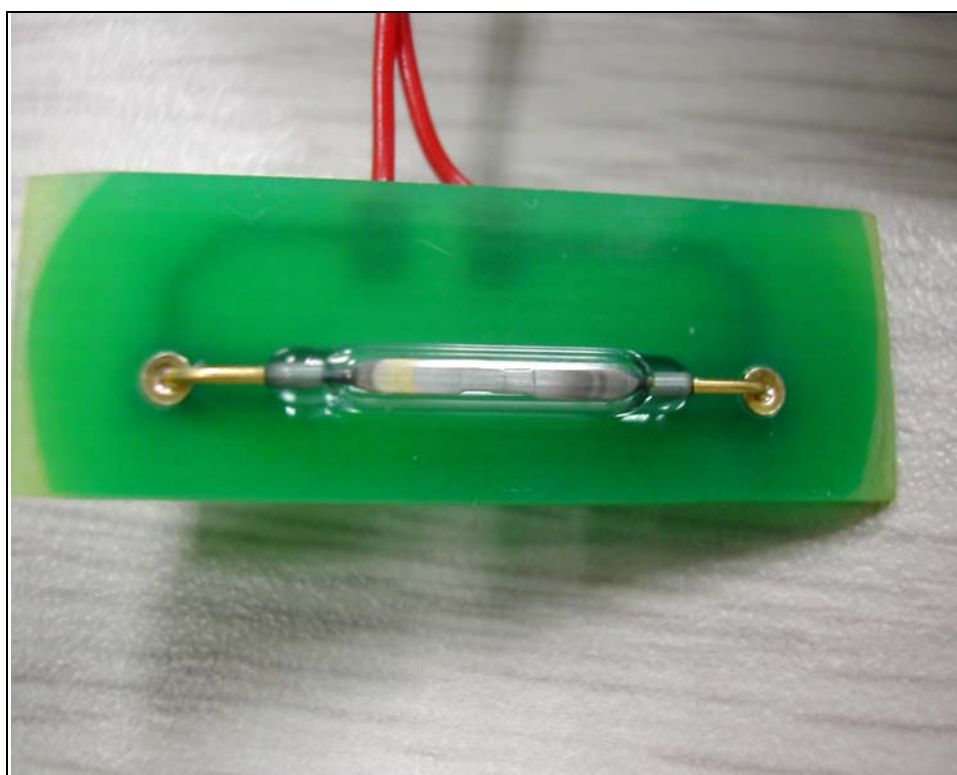
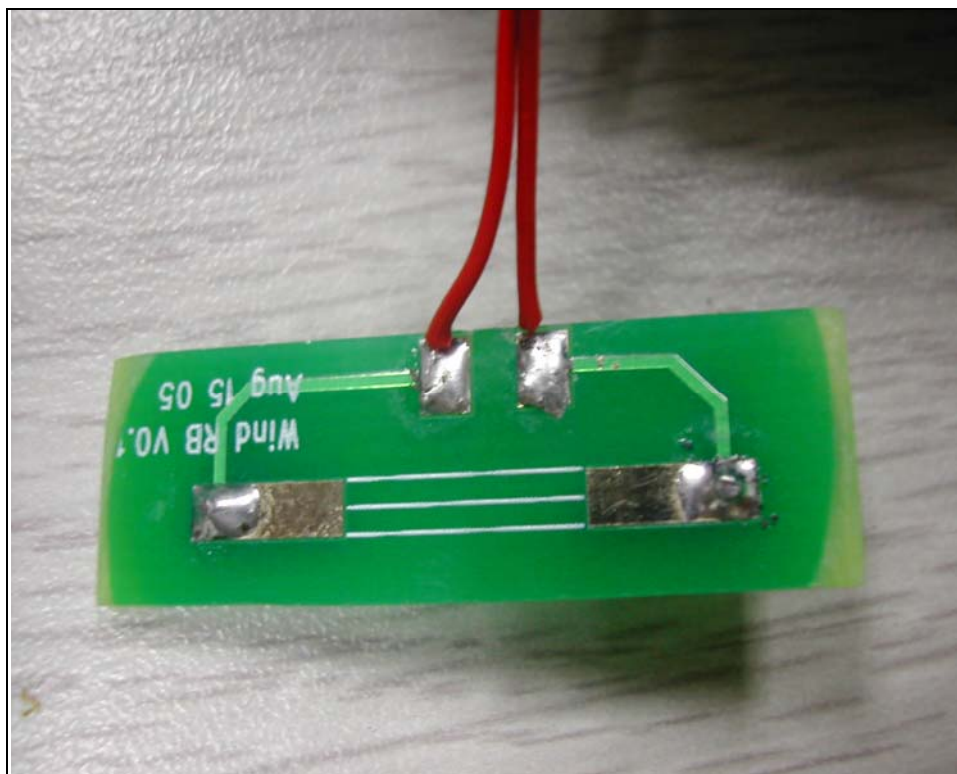
6 PHOTOGRAPHS OF THE EUT

Out Photo



In Photo





7 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
Norway	DNV
USA	FCC, NVLAP, A2LA

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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