# **EMC TEST REPORT**

For

2.4G Wireless Camera

Model Number: ZT-811T ZT-820T FCC ID: TW4-811T

Report Number: WT068000883

Test Laboratory : Shenzhen Academy of Metrology and

Quality Inspection EMC Laboratory

Guangdong EMC Compliance Test Center

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### TEST REPORT DECLARATION

Applicant : SHENZHEN AEE TECHNOLOGY CO., LTD

Address : 1st Floor B building Shenzhen Tsinghua Hi-Tech Park Nanshan

Hi-Tech Park North Shenzhen P.R.C

Manufacturer : SHENZHEN AEE TECHNOLOGY CO., LTD

Address : 1st Floor B building Shenzhen Tsinghua Hi-Tech Park Nanshan

Hi-Tech Park North Shenzhen P.R.C

EUT Description : 2.4G Wireless Camera

Model Number ZT-811T ZT-820T

FCC ID Number TW4-811T

Model Difference : The difference of them is they applied to different markets

Test Standards:

#### FCC Part 15 15.249 :2005

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Tested by:	Derold	Date:	2006.6.1	
_	(Dewelly Yang)	_		
Checked by:	Low lin	Date:	2006.6.1	
	(Louis Lin)		2006.6.1	
Approved by:	<u> </u>	Date:	2006.6.1	
	(Peter Lin)			

Report No.: WT068000883

## 1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

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Test Items	FCC Rules	Test Results		
Conducted Disturbance	15.207	Pass		
Radiated disturbance	15.249	Pass		
Band Edges	15.249	Pass		
Antenna Requirement	15.203	Pass		

## 2. GENERAL INFORMATION

#### 2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3.Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

#### 2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Committee for Laboratories (CNAL) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 97379(open area test site) and 274801(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site), R-1966(semi anechoic chamber), C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is IC4174.

**TUV Rhineland** accredits the Laboratory for conformance to IEC and EN standards, the registration number is **E2024086Z02**.

Measurement Uncertainty

Report No.: WT068000883

## 2.3. Measurement Uncertainty

Conducted Disturbance: 9kHz~30MHz 3.5dB

Radiated Disturbance: 30MHz~1000MHz 4.5dB

1GHz~18GHz 4.6dB

#### 3. PRODUCT DESCRIPTION

## 3.1. EUT Description

Description : 2.4G Wireless Camera

Manufacturer SHENZHEN AEE TECHNOLOGY CO., LTD

Model Number : ZT-811T ZT-820T

Input : DC12V 500mA

Adapter:

M/N:SY-08020

Input Power : Input:AC120V 60Hz 6VA

Output:DC5V 200mA

Operate Frequency : 2414~2468MHz

Modulation Frequency Modulation

Antenna Designation : Non-User Replaceable (Fixed)

## 3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: TW4-811T filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

## 3.3. Block Diagram of EUT Configuration

Adaptor EUT

## 3.4. Operating Condition of EUT

Mode 1:ch1 Mode2: ch2 Mode3:ch3 Mode4:ch4

## 3.5. Special Accessories

Not available for this EUT intended for grant.

## 3.6. Equipment Modifications

Not available for this EUT intended for grant.

## 3.7. Support Equipment List

N/A

## 3.8. Test Conditions

Date of test: May.15,2006

Date of EUT Receive: May.12,2006

Temperature: 24

Relative Humidity: 53%

## 4. TEST EQUIPMENT USED

Table 2 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.26, 2006	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.26, 2006	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Jan.26, 2006	1 Year
SB3612	Audio generator	KENWOOD	AD-203D	Jun.21, 2005	1 Year
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan.26, 2006	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan.26, 2006	1 Year
SB3435	Horn Antenna	Rohde &	HF906	1 26 2006	1 Year
		Schwarz		Jan.26, 2006	
SB3435	Amplifier(1-18GH	Rohde &		1 26 2006	1 37
/01	z)	Schwarz		Jan.26, 2006	1 Year
SB3435	Amplifier(18-40G	Rohde &		M 06 2006	1 Year
/02	Hz)	Schwarz		May.06, 2006	
SB3435	Horn Antenna	Rohde &	AT4560	1.6	4 **
/03		Schwarz		May.06, 2006	1 Year
SB3612	Audio generator	KENWOOD	AD-203D	Jun.21, 2005	1 Year
SB3450/	3m Semi-anechoic	Albatross Projects	9X6X6	Jan 26,2006	1 Voor
01	chamber				1 Year

#### 5. CONDUCTED DISTURBANCE TEST

#### 5.1. Test Standard and Limit

#### 5.1.1.Test Standard

FCC Part 15 15.207:2005

#### 5.1.2.Test Limit

Table 3 Conducted Disturbance Test Limit (Class B)

Fraguanay	Maximum RF Line Voltage (dBμV)			
Frequency	Quasi-peak Level	Average Level		
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *		
500kHz~5MHz	56	46		
5MHz~30MHz	60	50		

- Decreasing linearly with logarithm of the frequency
- The lower limit shall apply at the transition frequency.

#### **5.2. Test Procedure**

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9kHz.

#### **5.3.** Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

#### 5.4. Test Data

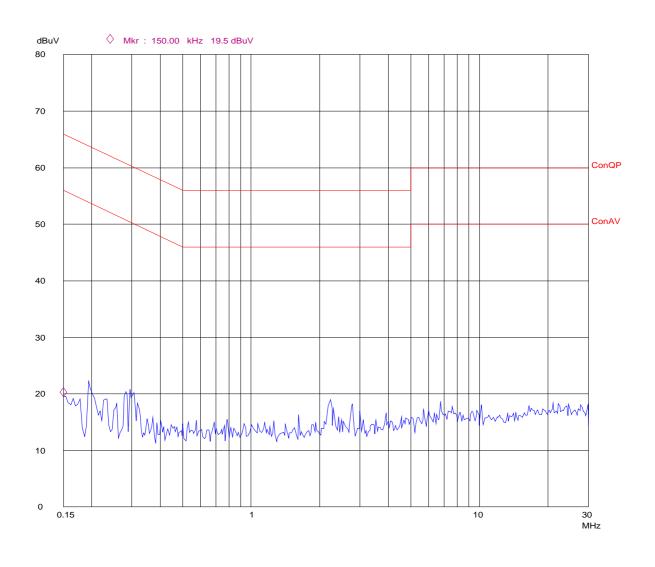
The emissions don't show in below are too low against the limits. Refer to the test curves . Working mode: Ch1 (the worst case)

## **Conducted Disturbance**

EUT: Op Cond: Test Spec: Comment: M/N:ZT-811T

ON

L AC 120V/60Hz

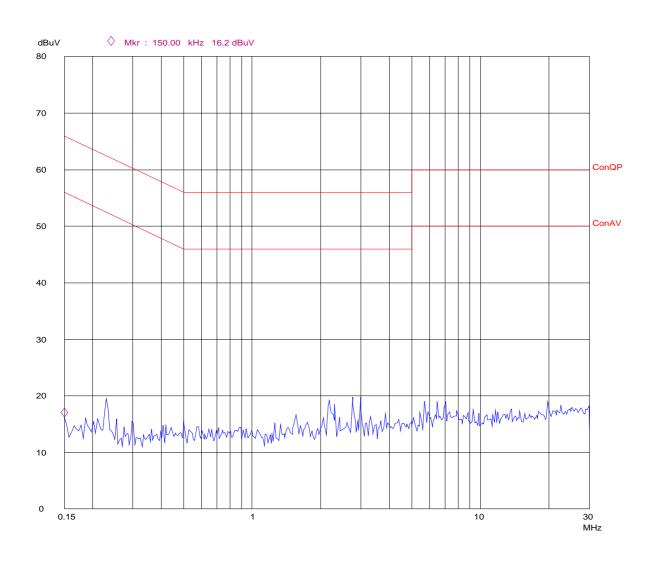


## **Conducted Disturbance**

M/N:ZT-811T

EUT: Op Cond: Test Spec: Comment: ON

AC 120V/60Hz



#### 6. RADIATED DISTURBANCE TEST

#### 6.1. Test Standard and Limit

#### 6.1.1.Test Standard

FCC Part 15 15.249:2005

#### 6.1.2.Test Limit

Table 4 Radiated Disturbance Test Limit

FREQUENCY			FIELD STRENGTHS	FIELD	
M	ΙΗz		LIMITS	STRENGTHS	
			$(\mu V/m)$	LIMITS	
				$dB (\mu V/m)$	
Fundamental			50000	94.0	
Harmonics			500	54.0	
30	~	88	100	40.0	
88	~	216	150	43.5	
216	~	960	200	46.0	
960	~		500	54.0	

<sup>\*</sup> The lower limit shall apply at the transition frequency.

#### 6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, AV values with a resolution bandwidth of 1 MHz.

Measurements were made at 3 meters

#### 6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

<sup>\*</sup> The test distance is 3m.

## 6.4. Test Data

Emissions don't show below are too low against the limits, the test curves are shown in the APPENDIX

Table 5 General Radiated Emission Data

Ambient temperature: 24° C						
Relative hun	•					
Test mode:	1 (ch1 2414)	MHz)				
Frequency	Emission	Read	Correction	Polarizatio	Limita	
MHz	QP	Value	Factor		Limits	Note
	(dBuV/m)	(dBuV)	(dB/m)	n	(dBuV/m)	
42.960	35.6	22.4	13.2	Vertical	40.0	
85.91	34.7	24.1	10.6	Vertical	40.0	
114.510	33.4	19.9	13.5	Vertical	43.5	
124.080	34.5	21.1	13.4	Vertical	43.5	
200.450	34.8	23.7	11.1	Vertical	43.5	
57.270	29.8	23.1	6.7	Horizontal	40.0	
124.700	30.5	17.1	13.4	Horizontal	43.5	

- 2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
- 3. The other emission levels were very low against the limit.

Table 6 General Radiated Emission Data

24° C Ambient temperature: Relative humidity: 53 % Test mode: 2 (ch2 2432MHz) Frequency **Emission** Correction Read Polarizatio Limits MHz QP Value Factor Note (dBuV/m) (dBuV/m)(dBuV) (dB/m)42.980 35.8 22.6 13.2 Vertical 40.0 85.930 33.7 23.1 10.6 Vertical 40.0 18.9 13.5 Vertical 114.550 32.4 43.5 20.1 13.4 Vertical 124.089 33.5 43.5 23.0 11.1 Vertical 200.455 34.1 43.5 ---23.3 6.7 Horizontal 30.0 40.0 57.289

**REMARKS**: 1. Emission level(dBuV/m)=Read 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.

Table 7 General Radiated Emission Data

Ambient temperature: 24° C Relative humidity: 53 % Test mode: 3 (ch3 2450MHz) Emission Correction Frequency Read Polarizatio Limits MHz OP Value Factor Note (dBuV/m)(dBuV/m) (dBuV) (dB/m)42.983 35.8 32.6 13.2 Vertical 40.0 85.938 33.9 23.3 Vertical 10.6 40.0 Vertical 18.9 13.5 114.550 32.4 43.5 20.2 13.4 Vertical 124.090 33.6 43.5 23.0 11.1 Vertical 200.455 34.1 43.5 23.4 6.7 Horizontal 57.287 30.1 40.0

- 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The other emission levels were very low against the limit.

Table 8 General Radiated Emission Data

24° C Ambient temperature: Relative humidity: 53 % Test mode: 4 (ch4 2468MHz) Frequency Emission Read Correction Polarizatio Limits MHz QP Value Factor Note (dBuV/m) (dBuV/m)(dBuV) (dB/m)Vertical 42.970 35.0 21.8 13.2 40.0 85.936 37.7 27.1 10.6 Vertical 40.0 18.9 13.5 Vertical 114.559 32.4 43.5 13.4 Vertical 20.5 124.089 33.9 43.5 23.7 11.1 Vertical 200.456 34.8 43.5 ---24.3 6.7 Horizontal 31.0 40.0 57.279

- 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The other emission levels were very low against the limit.

Table 9 Fundamental and harmonics Radiated Emission Data

Ambient temperature: 24° C Relative humidity: 53 % Test mode: 1 (ch4 2414MHz) Correction Frequency **Emission** Read Polarizatio Limits GHz AV Value Factor Note (dBuV/m)(dB/m)(dBuV/m)(dBuV) 2.414 Horizontal 94.0 89.5 93.5 -4.0 Fundamental (AV) 2.414 101.0 105.0 -4.0 Horizontal 114.0 Fundamental (Peak) 2.414 83.5 87.5 -4.0 94.0 Vertical Fundamental (AV) 2.414 95.5 99.5 -4.0 Vertical 114.0 Fundamental (Peak) 49.0 2.0 Horizontal Harmonic 4.828 51.0 54.0 (AV) 61.1 2.0 Horizontal Harmonic 4.828 63.1 74.0 (Peak) 48.3 2.0 Vertical Harmonic 4.828 50.3 54.0 Harmonic 2.0 Vertical 60.1 4.828 62.1 74.0 (Peak) 35.3 7.4 Horizontal Harmonic 7.242 42.7 54.0 (AV) 46.7 7.4 Horizontal Harmonic 7.242 54.1 74.0 (Peak) 34.3 7.4 Vertical Harmonic 7.242 41.7 54.0 (AV) 45.6 7.4 Vertical Harmonic 7.242 53.0 74.0 (Peak) 38.0 9.5 Harmonic Horizontal 9.652 47.5 54.0 (AV) 39.6 9.5 Horizontal Harmonic 59.1 74.0 9.652 (Peak) 36.6 9.5 Vertical Harmonic 9.652 46.1 54.0 (AV) 47.5 9.5 Vertical Harmonic 57.0 74.0 9.652 (Peak)

<sup>2.</sup> Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)

<sup>3.</sup> The other emission levels were very low against the limit.

Table 10 Fundamental and harmonics Radiated Emission Data

24° C Ambient temperature: Relative humidity: 53 % Test mode: 2 (ch4 2432MHz) Frequency **Emission** Read Correction Polarizatio Limits GHz AV Value Factor Note (dBuV/m) (dBuV/m)(dBuV) (dB/m)2.432 86.6 89.5 -3.9 Horizontal 94.0 Fundamental (AV) 2.432 98.1 102.0 -3.9 Horizontal 114.0 Fundamental (Peak) 2.432 82.4 86.3 -3.9 Vertical 94.0 Fundamental (AV) 2.432 93.0 96.9 Vertical 114.0 Fundamental -3.9 (Peak) 47.5 2.1 Horizontal Harmonic 4.864 49.6 54.0 (AV) 57.9 2.1 Horizontal Harmonic 60.0 74.0 4.864 (Peak) 46.6 2.1 Vertical Harmonic 4.864 48.7 54.0 (AV) 56.9 2.1 Vertical Harmonic 59.0 74.0 4.864 (Peak) 7.5 36.5 Horizontal Harmonic 7.296 44.0 54.0 (A<u>V)</u> 46.6 7.5 Horizontal Harmonic 7.296 54.1 74.0 (Peak) 7.5 35.4 Vertical Harmonic 7.296 42.9 54.0 (AV) 45.0 7.5 Vertical Harmonic 7.296 52.5 74.0 (Peak)

- 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)
- 3. The other emission levels were very low against the limit.

Table 11 Fundamental and harmonics Radiated Emission Data

Ambient temperature: 24° C Relative humidity: 53 % Test mode: 3(ch4 2450MHz) Frequency **Emission** Read Correction Polarizatio Limits Value Factor Note GHz AV (dBuV/m) (dBuV/m)(dBuV) (dB/m)2.450 87.6 91.8 -4.2 Horizontal 94.0 Fundamental (AV) 2.450 98.1 102.3 -4.2 Horizontal 114.0 Fundamental (Peak) 2.450 82.7 86.9 -4.2 Vertical 94.0 Fundamental (AV) 97.2 -4.2 2.450 93.0 Vertical 114.0 Fundamental (Peak) 45.5 2.1 Horizontal Harmonic 54.0 4.890 47.6 (AV) 55.8 2.1 Horizontal Harmonic 4.890 57.9 74.0 (Peak) Vertical 43.6 2.1 Harmonic 4.890 45.7 54.0 (AV) 2.1 Vertical Harmonic 53.9 4.890 56.0 74.0 (Peak) 35.4 7.6 Horizontal Harmonic 7.340 43.0 54.0 (AV) 46.5 7.6 Horizontal Harmonic 7.340 54.1 74.0 (Peak) 33.5 7.6 Vertical Harmonic 41.1 7.340 54.0 (AV) 44.4 Vertical 7.6 Harmonic 7.340 52.0 74.0 (Peak)

- 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)
- 3. The other emission levels were very low against the limit.

Table 12 Fundamental and harmonics Radiated Emission Data

Ambient temperature:

Relative humidity:

7.404

7.404

7.404

7.404

9.869

9.869

9.869

9.869

42.3

52.4

41.6

51.0

48.1

59.2

47.1

57.1

24° C

53 %

Test mode: 4(ch4 2468MHz) Emission Freque Read Correctio Limits Polarizatio ΑV ncy Value n Factor (dBuV/ Note GHz (dBuV/m n (dBuV) (dB/m)m) 92.2 -3.7 2.468 88.5 Horizontal 94.0 Fundamental (AV) 2.468 99.0 102.7 -3.7 Horizontal 114.0 Fundamental (Peak) 2.468 83.0 86.7 -3.7Vertical 94.0 Fundamental 2.468 84.1 87.8 -3.7 Vertical 114.0 Fundamental (Peak) 47.8 2.3 Horizontal Harmonic 50.1 54.0 4.936 (AV) 2.3 Horizontal 58.7 Harmonic 4.936 74.0 61.0 (Peak) 47.0 2.3 Vertical Harmonic 4.936 49.3 54.0 (AV) 46.7 2.3 Vertical Harmonic 4.936 59.0 74.0 (Peak)

7.7

7.7

7.7

7.7

9.8

9.8

9.8

9.8

Horizontal

Horizontal

Vertical

Vertical

Horizontal

Horizontal

Vertical

Vertical

Harmonic

Harmonic

Harmonic

Harmonic

Fundamental

Fundamental

Fundamental

Fundamental

(AV)

(Peak)

(AV)

(Peak)

(AV)

(Peak)

(AV)

(Peak)

54.0

74.0

54.0

74.0

54.0

74.0

54.0

74.0

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

35.6

44.7

33.9

43.3

37.9

49.4

37.3

47.3

<sup>2.</sup> Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)+Amplifier Factor(dB)

<sup>3.</sup> The other emission levels were very low against the limit.

### 7. BAND EDGE

#### 7.1. Test Standard and Limit

#### 7.1.1.Test Standard

FCC Part 15 15.249:2005

## 7.2. Band Edge FCC 15.249(d) Limit

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation

#### 7.3. Test Procedure

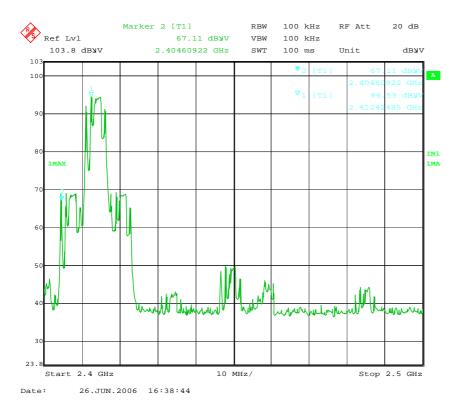
- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instruments. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3. Measure the highest amplitude appearing on spectral display and set it as reference level. Plot the graph with marking the highest point and edge frequency.
- 4. Repeat above procedures until all measured frequencies were complete.

## 7.4. Test Arrangement

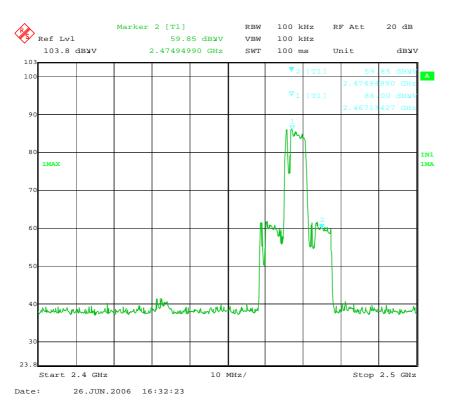
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

## 7.5. Test Data

## Ch1 2414MHz



## Ch4 2468MHz



8.	ANTENNA REQUIREMENT
	According to 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. The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.