

# EMC TEST REPORT

For

2.4G wireless camera

Model Number: ZT-830T

FCC ID: TW4-830T

Report Number : WT068000869

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory Guangdong EMC Compliance Test Center
Site Location	:	Bldg. of Metrology & Quality Inspection, Longzhu Road, Shenzhen, Guangdong, China
Tel	:	0086-755-26941637, 26941529, 26941531
Fax	:	0086-755-26941545
Email	:	emclab@sohu.com

## TABLE OF CONTENTS

<b>TEST REPORT DECLARATION .....</b>	<b>3</b>
<b>1. TEST RESULTS SUMMARY .....</b>	<b>4</b>
<b>2. GENERAL INFORMATION .....</b>	<b>5</b>
2.1. Report information .....	5
2.2. Laboratory Accreditation and Relationship to Customer .....	5
2.3. Measurement Uncertainty .....	6
<b>3. PRODUCT DESCRIPTION .....</b>	<b>6</b>
3.1. EUT Description .....	6
3.2. Related Submittal(s) / Grant (s) .....	6
3.3. Block Diagram of EUT Configuration.....	6
3.4. Operating Condition of EUT .....	6
3.5. Special Accessories.....	7
3.6. Equipment Modifications.....	7
3.7. Support Equipment List .....	7
3.8. Test Conditions .....	7
<b>4. TEST EQUIPMENT USED .....</b>	<b>7</b>
<b>5. CONDUCTED DISTURBANCE TEST .....</b>	<b>8</b>
5.1. Test Standard and Limit.....	8
5.2. Test Procedure .....	8
5.3. Test Arrangement.....	8
5.4. Test Data .....	8
<b>6. RADIATED DISTURBANCE TEST .....</b>	<b>13</b>
6.1. Test Standard and Limit.....	13
6.2. Test Procedure .....	13
6.3. Test Arrangement.....	13
6.4. Test Data .....	14
<b>7. BAND EDGE .....</b>	<b>19</b>
7.1. Test Standard and Limit.....	19
7.2. Band Edge FCC 15.249(d) Limit.....	19
7.3. Test Procedure .....	19
7.4. Test Arrangement.....	19
7.5. Test Data .....	20
<b>8. ANTENNA REQUIREMENT .....</b>	<b>22</b>

**TEST REPORT DECLARATION**

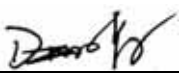
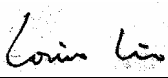

Applicant : SHENZHEN AEE TECHNOLOGY CO., LTD  
Address : 1st Floor B building Shenzhen Tsinghua Hi-Tech Park Nanshan  
Hi-Tech Park North Shenzhen P.R.C  
Manufacturer : SHENZHEN AEE TECHNOLOGY CO., LTD  
Address : 1st Floor B building Shenzhen Tsinghua Hi-Tech Park Nanshan  
Hi-Tech Park North Shenzhen P.R.C  
EUT Description : 2.4G wireless camera  
Model Number ZT-830T  
FCC ID Number TW4-830T

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:	 _____ (Dewelly Yang)	Date:	2006.5.30 _____
Checked by:	 _____ (Louis Lin)	Date:	2006.5.30 _____
Approved by:	 _____ (Peter Lin)	Date:	2006.5.30 _____

## 1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

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

### 2.3. Measurement Uncertainty

Conducted Disturbance : 9kHz~30MHz 3.5dB

Radiated Disturbance: 30MHz~1000MHz 4.5dB  
1GHz~18GHz 4.6dB

## 3. PRODUCT DESCRIPTION

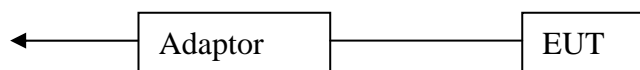
### 3.1. EUT Description

Description	: 2.4G wireless camera
Manufacturer	: SHENZHEN AEE TECHNOLOGY CO., LTD
Model Number	: ZT-830T
Input Power	Adapter: M/N:GPE051-050070-1 : Input:AC100-240V 50/60Hz Output:DC5V 700mA
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: TW4-830T filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

### 3.3. Block Diagram of EUT Configuration



### 3.4. Operating Condition of EUT

Mode 1:ch1  
Mode2: ch2  
Mode3: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 & Schwarz	HF906	Jan.26, 2006	1 Year
SB3435 /01	Amplifier(1-18GHz)	Rohde & Schwarz	---	Jan.26, 2006	1 Year
SB3435 /02	Amplifier(18-40GHz)	Rohde & Schwarz	---	May.06, 2006	1 Year
SB3435 /03	Horn Antenna	Rohde & Schwarz	AT4560	May.06, 2006	1 Year
SB3612	Audio generator	KENWOOD	AD-203D	Jun.21, 2005	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Jan 26,2006	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)

Frequency	Maximum RF Line Voltage (dB $\mu$ V)	
	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)



Table 4 Conducted Disturbance Test Data

Model : ZT-830T

Mode: 1

Line							
Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
		Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)
0.420	10.1	30.7	40.8	57.5	25.2	35.3	47.5
0.480	10.2	27.5	37.7	56.4	21.9	32.1	46.4
0.845	10.1	23.9	34.0	56	15.5	25.6	46
1.320	10.2	26.4	36.6	56	19.4	29.6	46
1.985	10.0	24.4	34.4	56	18.9	28.9	46
2.045	10.0	24.9	34.9	56	18.2	28.2	46

**REMARKS:** 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)  
 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)  
 3. The other emission levels were very low against the limit.

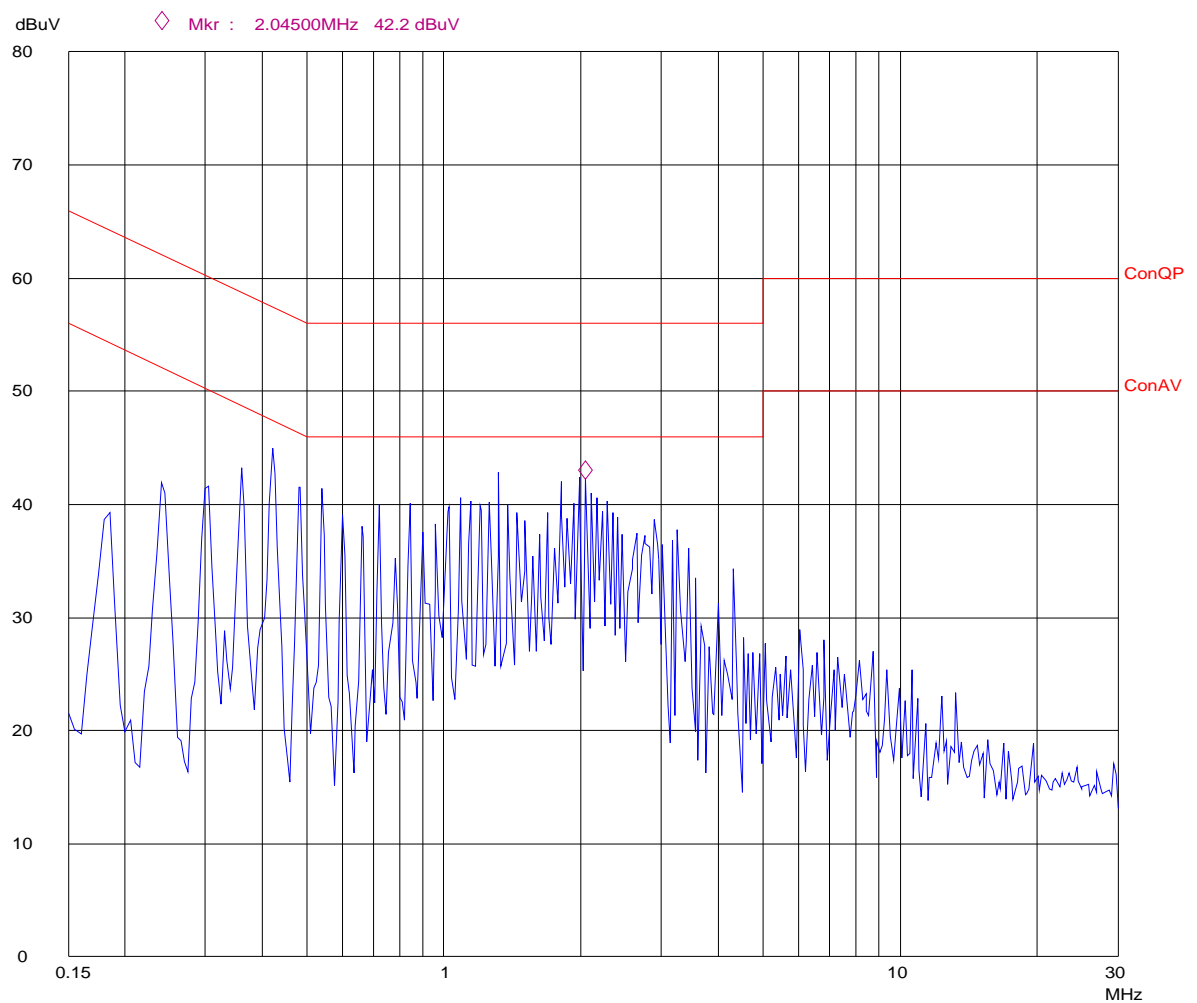
Table 5 Conducted Disturbance Test Data

Model : ZT-830T							
Mode: 1							
Neutral							
Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
		Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)	Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V)	Limits (dB $\mu$ V)
0.300	10.0	32.7	42.7	60.2	30.5	40.5	50.2
0.420	10.1	35.6	45.6	57.5	33.4	43.5	47.5
0.485	10.2	31.6	41.8	56.3	29.4	39.6	46.3
1.090	10.1	27.1	37.2	56	22.8	32.9	46
1.875	10.0	31.1	41.1	56	26.6	36.6	46
2.834	10.1	24.6	34.7	56	19.7	29.8	46

**REMARKS:** 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)  
 2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)  
 3. The other emission levels were very low against the limit.

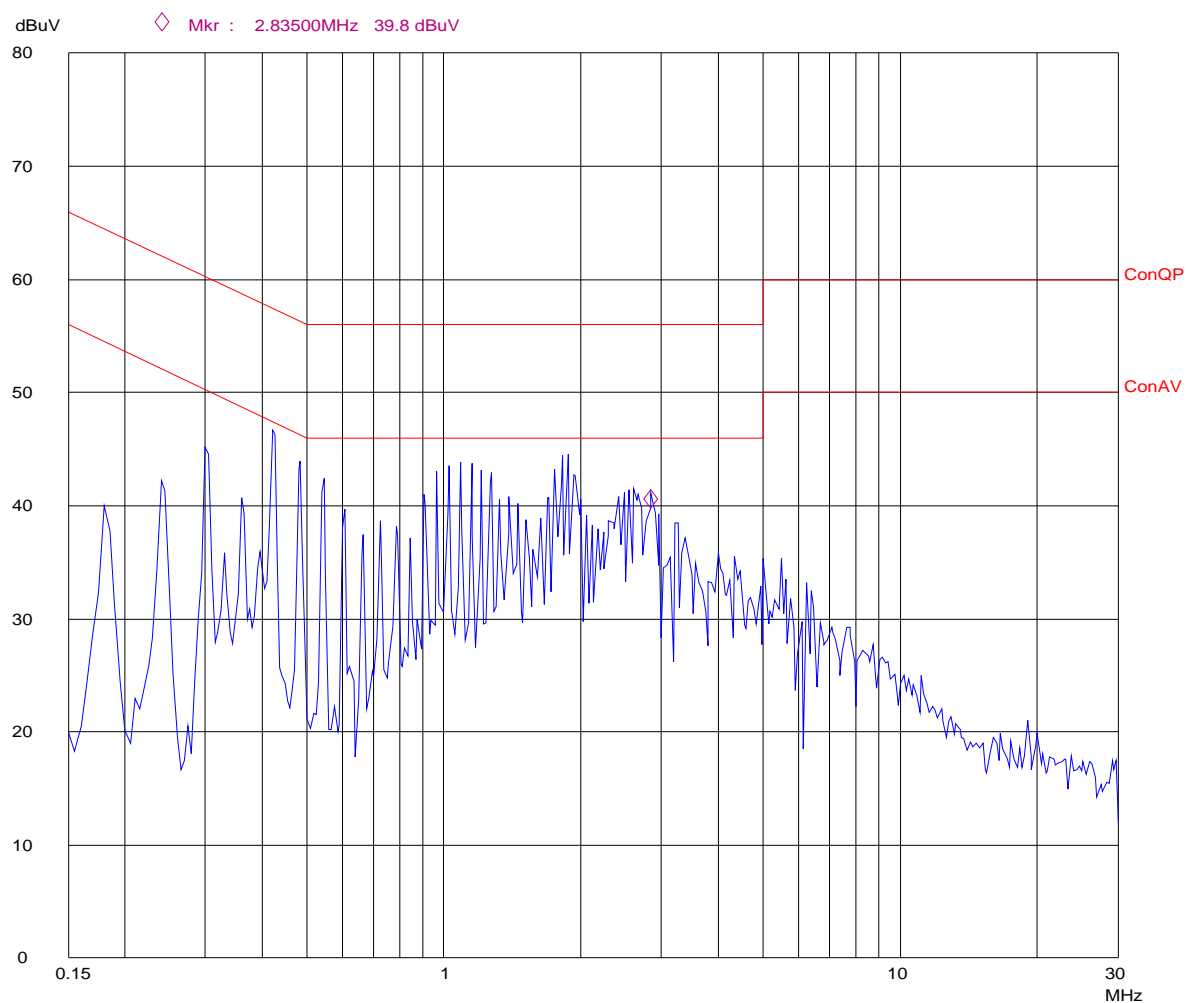
## Conducted Disturbance

EUT: M/N:ZT-830T  
Op Cond: ON  
Test Spec: L  
Comment: AC 120V/60Hz



## Conducted Disturbance

EUT: M/N:ZT-830T  
Op Cond: ON  
Test Spec: N  
Comment: 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 6 Radiated Disturbance Test Limit

FREQUENCY MHz	FIELD STRENGTHS LIMITS ( $\mu\text{V/m}$ )	FIELD STRENGTHS LIMITS dB ( $\mu\text{V/m}$ )
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

\* The lower limit shall apply at the transition frequency.

\* The test distance is 3m.

### 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.

## 6.4. Test Data

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

Table 7 General Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 1 (ch1 2414MHz)						
Frequency MHz	Emission QP (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
38.680	28.8	13.1	15.7	Horizontal	40.0	- -
40.920	34.2	19.8	14.4	Vertical	40.0	- -
51.440	25.4	16.8	8.6	Horizontal	40.0	---
47.280	36.4	26.0	10.4	Vertical	40.0	---
650.680	31.8	11.2	20.6	Horizontal	46.0	---
837.160	34.5	12.3	22.2	Vertical	46.0	---

**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 8 General Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 2 (ch2 2432MHz)						
Frequency MHz	Emission QP (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
38.680	28.0	12.3	15.7	Horizontal	40.0	- -
40.920	34.1	19.7	14.4	Vertical	40.0	- -
51.447	25.9	17.3	8.6	Horizontal	40.0	---
47.280	36.0	25.6	10.4	Vertical	40.0	---
650.670	31.1	10.5	20.6	Horizontal	46.0	---
837.162	34.3	12.1	22.2	Vertical	46.0	---

**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 9 General Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 4 (ch4 2468MHz)						
Frequency MHz	Emission QP (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
38.681	28.5	12.8	15.7	Horizontal	40.0	- -
40.928	34.2	19.8	14.4	Vertical	40.0	- -
51.440	25.3	16.7	8.6	Horizontal	40.0	---
47.283	36.1	25.7	10.4	Vertical	40.0	---
650.680	31.8	11.2	20.6	Horizontal	46.0	---
837.164	34.6	12.4	22.2	Vertical	46.0	---

**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 10 Fundamental and harmonics Radiated Emission Data

Ambient temperature: 24° C						
Relative humidity: 53 %						
Test mode: 1 (ch4 2414MHz)						
Frequency GHz	Emission AV (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
2.414	85.0	89.0	-4.0	Horizontal	94.0	Fundamental (AV)
2.414	86.1	90.1	-4.0	Horizontal	114.0	Fundamental (Peak)
2.414	84.3	88.3	-4.0	Vertical	94.0	Fundamental (AV)
2.414	95.0	99.0	-4.0	Vertical	114.0	Fundamental (Peak)
4.828	38.6	36.6	2.0	Horizontal	54.0	Harmonic (AV)
4.828	48.5	46.5	2.0	Horizontal	74.0	Harmonic (Peak)
4.828	41.1	39.1	2.0	Vertical	54.0	Harmonic (AV)
4.828	53.1	51.1	2.0	Vertical	74.0	Harmonic (Peak)
7.242	41.2	33.8	7.4	Horizontal	54.0	Harmonic (AV)
7.242	52.0	44.6	7.4	Horizontal	74.0	Harmonic (Peak)
7.242	41.3	33.9	7.4	Vertical	54.0	Harmonic (AV)
7.242	52.0	44.6	7.4	Vertical	74.0	Harmonic (Peak)

**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)+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: 2 (ch4 2432MHz)						
Frequency GHz	Emission AV (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
2.432	81.3	85.2	-3.9	Horizontal	94.0	Fundamental (AV)
2.432	91.6	95.5	-3.9	Horizontal	114.0	Fundamental (Peak)
2.432	87.9	91.8	-3.9	Vertical	94.0	Fundamental (AV)
2.432	98.0	101.9	-3.9	Vertical	114.0	Fundamental (Peak)
4.864	38.4	36.3	2.1	Horizontal	54.0	Harmonic (AV)
4.864	48.4	46.3	2.1	Horizontal	74.0	Harmonic (Peak)
4.864	37.9	35.8	2.1	Vertical	54.0	Harmonic (AV)
4.864	48.1	46.0	2.1	Vertical	74.0	Harmonic (Peak)
7.296	40.1	32.6	7.5	Horizontal	54.0	Harmonic (AV)
7.296	50.1	42.6	7.5	Horizontal	74.0	Harmonic (Peak)
7.296	41.7	34.2	7.5	Vertical	54.0	Harmonic (AV)
7.296	52.0	44.5	7.5	Vertical	74.0	Harmonic (Peak)

**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)+Amplifier Factor(dB)  
 3. The other emission levels were very low against the limit.

Table 12 Fundamental and harmonics Radiated Emission Data

Ambient temperature: 24° C Relative humidity: 53 % Test mode: 4(ch4 2468MHz)						
Frequency GHz	Emission AV (dBuV/m)	Read Value (dBuV)	Correction Factor (dB/m)	Polarization	Limits (dBuV/m)	Note
2.468	88.0	91.7	-3.7	Horizontal	94.0	Fundamental (AV)
2.468	98.0	101.7	-3.7	Horizontal	114.0	Fundamental (Peak)
2.468	86.2	89.9	-3.7	Vertical	94.0	Fundamental (AV)
2.468	96.0	99.7	-3.7	Vertical	114.0	Fundamental (Peak)
4.936	38.5	36.2	2.3	Horizontal	54.0	Harmonic (AV)
4.936	48.3	46.0	2.3	Horizontal	74.0	Harmonic (Peak)
4.936	38.4	36.1	2.3	Vertical	54.0	Harmonic (AV)
4.936	48.3	46.0	2.3	Vertical	74.0	Harmonic (Peak)
7.404	41.1	33.4	7.7	Horizontal	54.0	Harmonic (AV)
7.404	52.0	44.3	7.7	Horizontal	74.0	Harmonic (Peak)
7.404	41.2	33.5	7.7	Vertical	54.0	Harmonic (AV)
7.404	52.0	44.3	7.7	Vertical	74.0	Harmonic (Peak)

**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)+Amplifier Factor(dB)  
 3. 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**

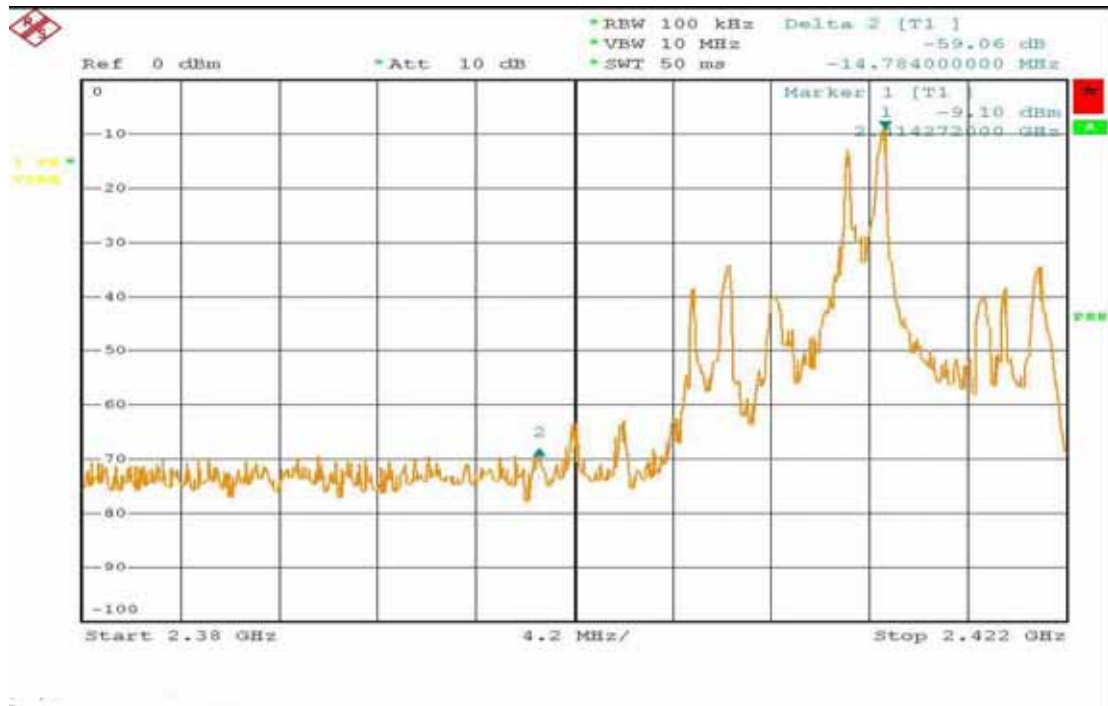
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instruments. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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**

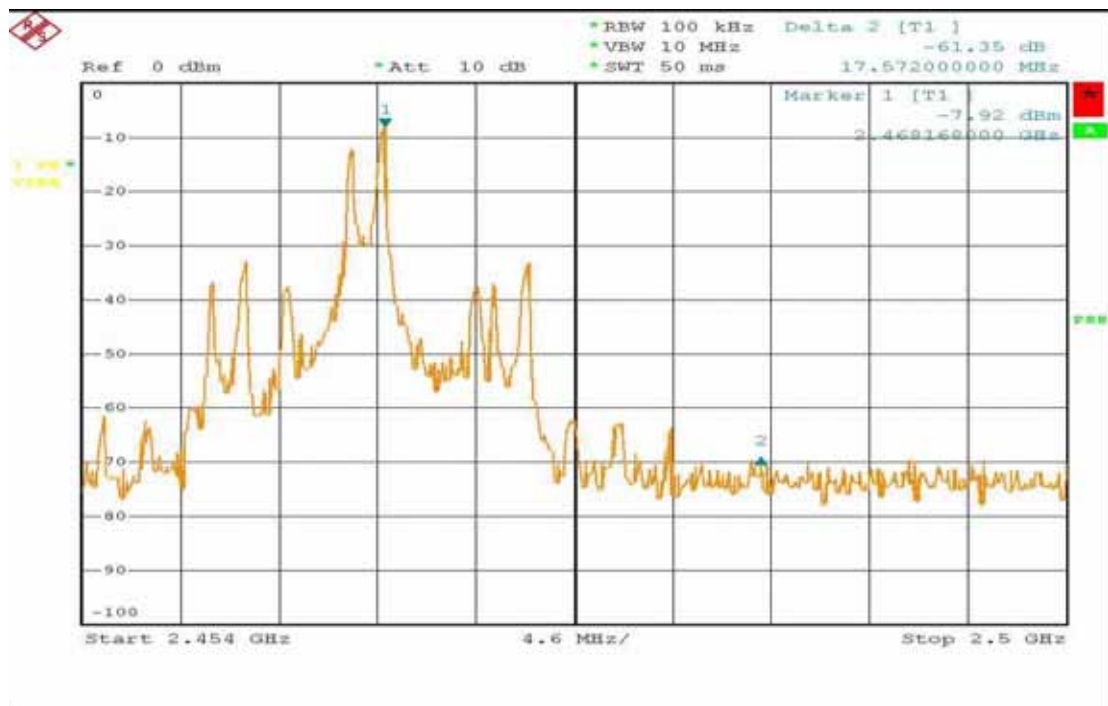
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

## 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.