

# FCC TEST REPORT

For

**Lan Castle Technology Co., Ltd.**

**Villa Wireless color high definition video intercom system**

Trade Name : **AN-TONE**

Model No. : 90204-C

FCC ID : YOW90204

Operating Frequency : 2402-2483.5MHz

Type of Modulation : FHSS

Antenna Gain : 2-3dBi

Applicant : Lan Castle Technology Co., Ltd.  
No. 5 Xiaoyang Rd, First Industrial Park, Tanzhou Town,  
Zhongshan City

Regulation : **FCC Part 15.247 Subpart C**

Prepared by : Shenzhen AOV Testing Technology Co., Ltd.  
2-6/F, No.5, Yuantou Lane, Tanglang, Taoyuan Street,  
Nanshan District, Shenzhen, Guangdong, China

Test Date : August 09-10, 2010

Date of Report : August 11, 2010

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## TEST REPORT DECLARATION

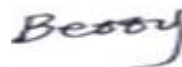
Applicant : Lan Castle Technology Co., Ltd.  
 Manufacturer : Lan Castle Technology Co., Ltd.  
 EUT Description : Villa Wireless color high definition video intercom system

**Test Procedure Used:**  
**FCC Part 15.247 Subpart C**

The E. U. T. listed below has been completed RFI testing by Shenzhen AOV Testing Technology Co., Ltd. at the test site of Bontek Compliance Testing Laboratory Ltd. And the Interference emissions can pass **FCC Subpart C** limitations.

The test configurations and the facility comply with the radiated and AC line conducted test site criteria in **ANSI C63.4-2003**.

Date of Test: August 09-10, 2010



Prepared by: Project Engineer



Reviewer : Project Manager

## 1. GENERAL INFORMATION

### 1.1. General Information

Applicant : Lan Castle Technology Co., Ltd.  
No. 5 Xiaoyang Rd, First Industrial Park, Tanzhou Town,  
Zhongshan City

Manufacturer : Lan Castle Technology Co., Ltd.  
No. 5 Xiaoyang Rd, First Industrial Park, Tanzhou Town,  
Zhongshan City

### 1.2. Test Facility

Test Firm : Bontek Compliance Testing Laboratory Ltd.  
Certificated by FCC, Registration No.: 338263  
Address : FL.1, Building H-3, Hua Qiao Cheng East Industrial Area  
Qiaocheng East Road, Nanshan, Shenzhen, P.R.China  
Tel : 86-755-86337020  
Fax : 86-755-86337028

### 1.3. Test Instrument Used

No.	Equipment	Manufacturer	Model No.	S/N	Calibrate date	Calibrate Interval
1.	EMI Test Receiver	R&S	ESPI	100097	2010-2-22	one year
2.	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07101	2010-2-22	one year
3.	EMI Test Receiver	R&S	ESCI	100687	2010-2-22	one year
4.	EMI Test Receiver	R&S	FSU	BCT-019	2010-2-22	one year
5.	Amplifier	HP	8447D	1937A02492	2010-2-22	one year
6.	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2010-2-22	one year
7.	Horn Antenna	SCHWARZBECK	BBHA9120A	B08000991-0001	2010-2-22	one year
8.	High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	166	2010-2-22	one year
9.	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	811	2010-2-22	one year
10.	Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	304	2010-2-22	one year
11.	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	D-69250	2010-2-22	one year
12.	Positioning Controller	C&C	CC-C-1F	MF7802113	2010-2-22	one year
13.	Triple-Loop Antenna	EVERFINE	LLA-2	607004	2010-2-22	one year
14.	10dB attenuator	SCHWARZBECK	MTAIMP-136	R65.90.0001 #06	2010-2-22	one year

## 2. AC POWER LINE CONDUCTED EMISSIONS

### MEASUREMENT

#### 2.1.Rules Part No.

15.207

#### 2.2.Limits

For a Low-power Radio-frequency device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz shall not exceed below limits table.

Frequency MHz	Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes:

1. \*Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

#### 2.3.Test Procedure

The EUT is put on the table that is 0.8m high above the ground and at least away from other Metallic surface 0.4m. The EUT is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohms coupling impedance for the testing equipment; and the peripheral equipment powers form other L.I.S.N. Please refer to the block diagram of the test setup and photographs. Both sides of AC line (Line & Neutral) are checked for maximum conducted interference. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables must be changed according to FCC part 15 B.

#### 2.4.Test Result

**PASS**

Detailed information, Please refer to the following page.

## Tx mode

### Line:

Frequency (MHz)	AV Read Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.1860	43.20	54	10.80
5.7570	37.50	50	12.50
13.4500	32.60	50	17.40

Frequency (MHz)	QP Read Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)
0.1815	60.50	64	3.50
0.1860	59.70	64	4.30
13.5000	44.80	60	15.20

### Neutral:

Frequency (MHz)	AV Read Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.1950	43.40	54	10.60
5.8425	37.30	50	12.70
13.4800	33.40	50	16.60

Frequency (MHz)	QP Read Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)
0.1860	60.30	64	3.70
0.2625	53.30	61	7.70
13.4500	45.00	60	15.00

## Rx mode

### Line:

Frequency (MHz)	AV Read Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.1869	40.20	54	13.80
5.8570	39.10	50	10.90
12.7300	34.80	50	15.20

Frequency (MHz)	QP Read Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)
0.2015	58.60	64	5.40
0.1960	60.70	64	3.30
11.4000	48.20	60	11.80



**Neutral:**

Frequency (MHz)	AV Read Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.2250	46.20	54	7.80
6.5425	40.30	50	9.70
15.6000	35.20	50	14.80

Frequency (MHz)	QP Read Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)
0.1760	61.10	64	2.90
0.2826	54.60	61	6.40
14.8700	46.00	60	14.00

### 3. MAXIMUM PEAK CONDUCTED RF OUTPUT POWER

#### 3.1.Rules Part No.

15.247(b)

#### 3.2.Limits

The maximum peak conducted RF output power measurement is 1W(30.0dBm).

#### 3.3.Test Procedure

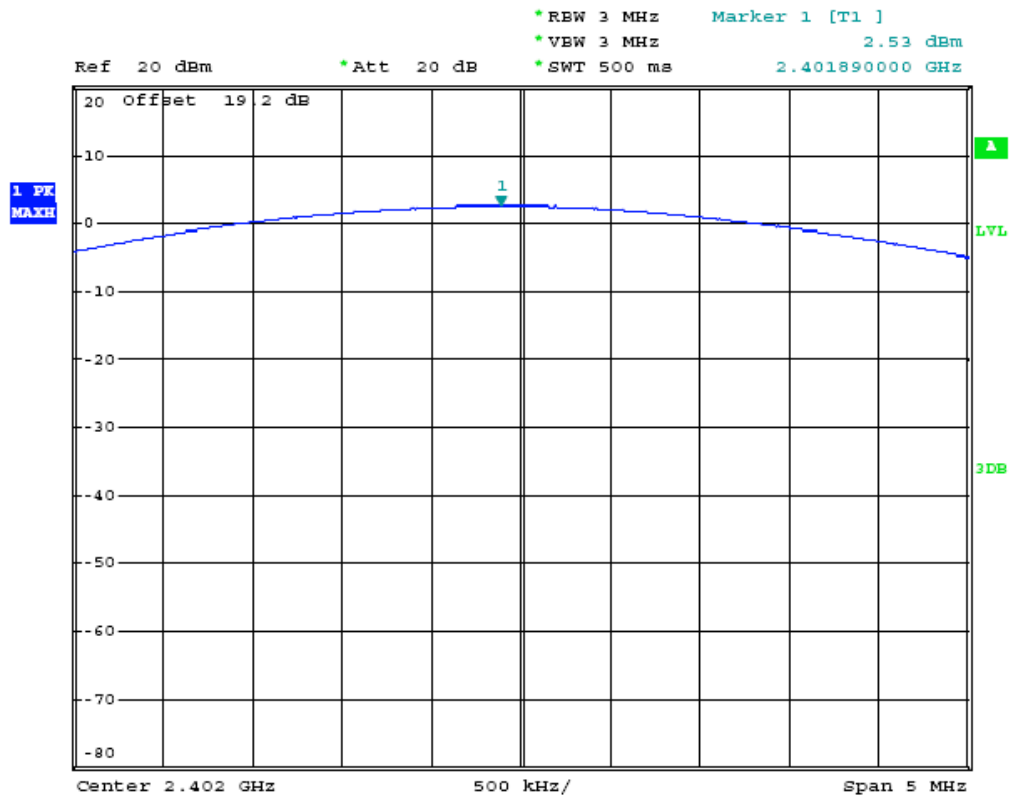
The antenna of the EUT was connected to the RF input cord of power meter with a coaxial cable, power was read directly from the meter and cable loss was added to the reading to obtain power at the EUT antenna terminal. The EUT output power was set to maximum to produce the worse case test result.

#### 3.4.Test Result

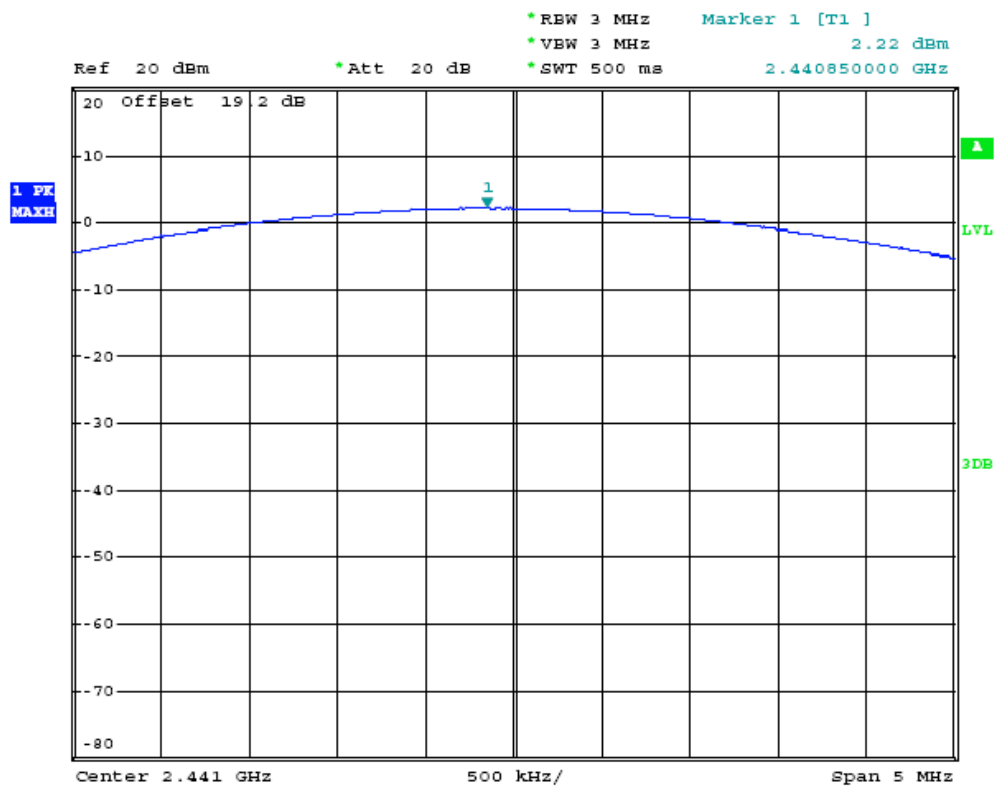
**PASS**

Channel	Frequency (MHz)	Peak output power (dBm)	Limit (dBm)
Low	2402	2.53	30.0
Middle	2441	2.22	30.0
High	2483	1.50	30.0

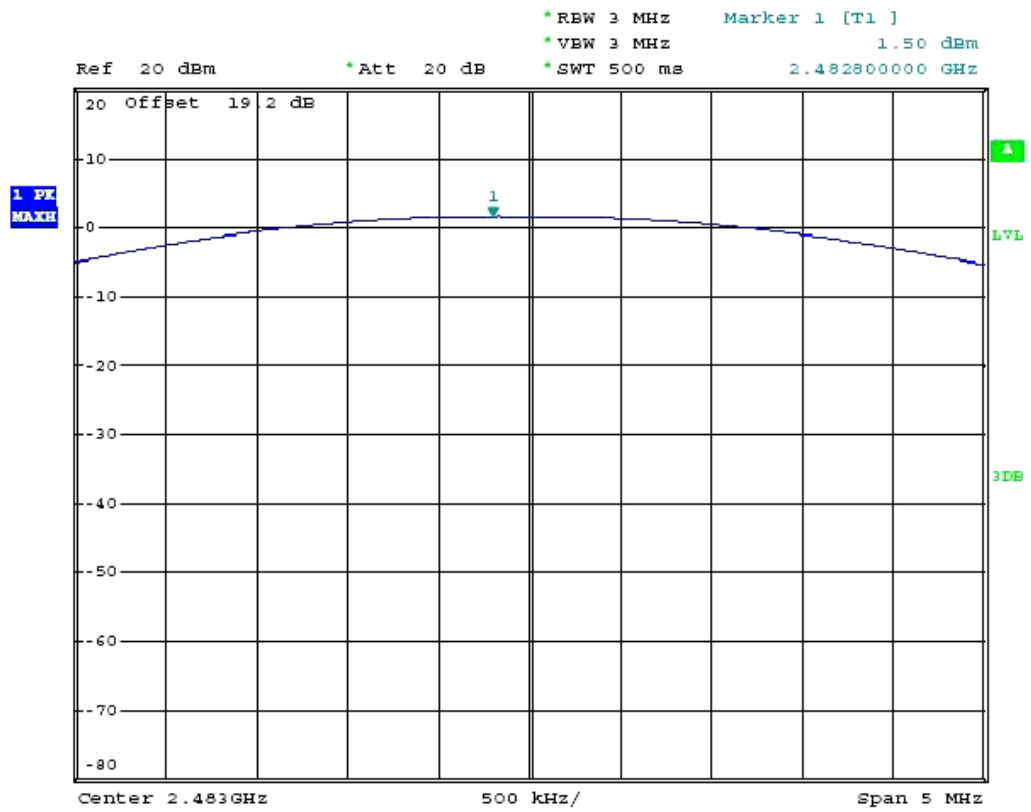
## Low Channel: 2402MHz



## Middle Channel: 2441MHz



# High Channel: 2483MHz



## 4. HOPPING CHANNEL SEPARATION

### 4.1. Test Standard

15.247(a)

### 4.2. Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 4.3. Test Procedure

Record the respond of frequency waveform when the EUT was working by a spectrum analyzer or EMI Receiver.

### 4.4. Test Result

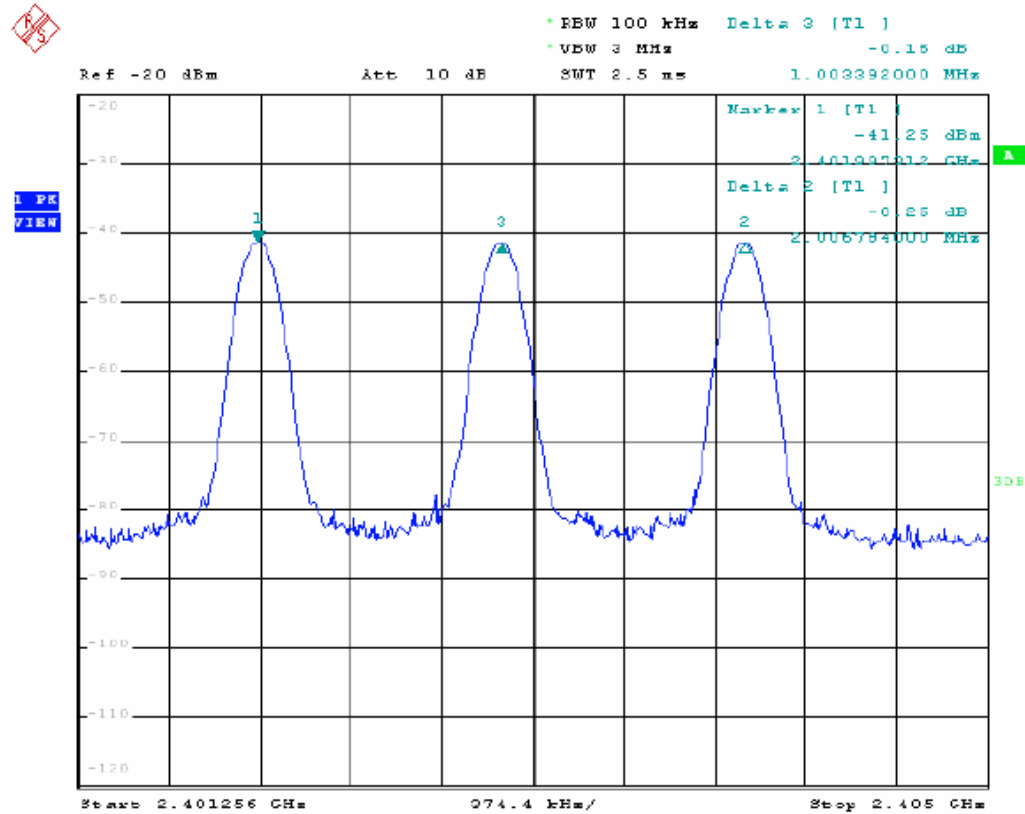
**PASS**

Channel	Frequency (MHz)	Channel Separation (MHz)
Low	2402	1.00
Middle	2441	1.00
High	2483	1.00

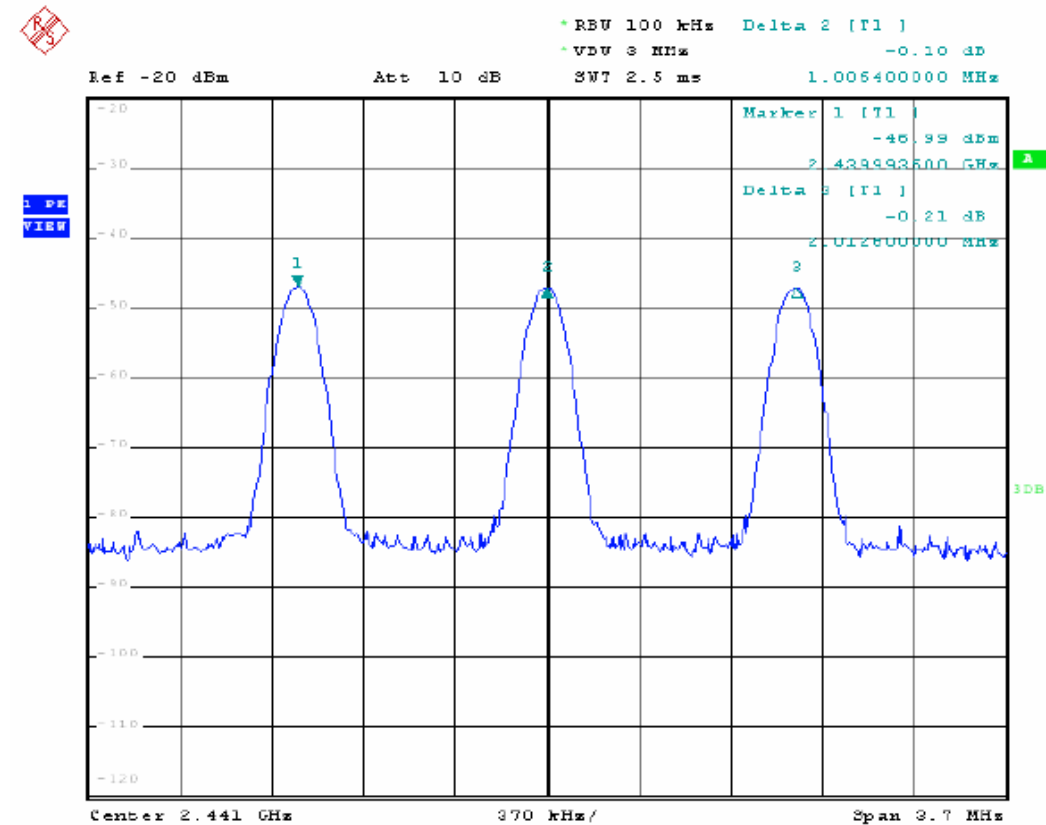
Channel Separation > 2/3 of 20dB Bandwidth

Detailed information, Please refer to the following page.

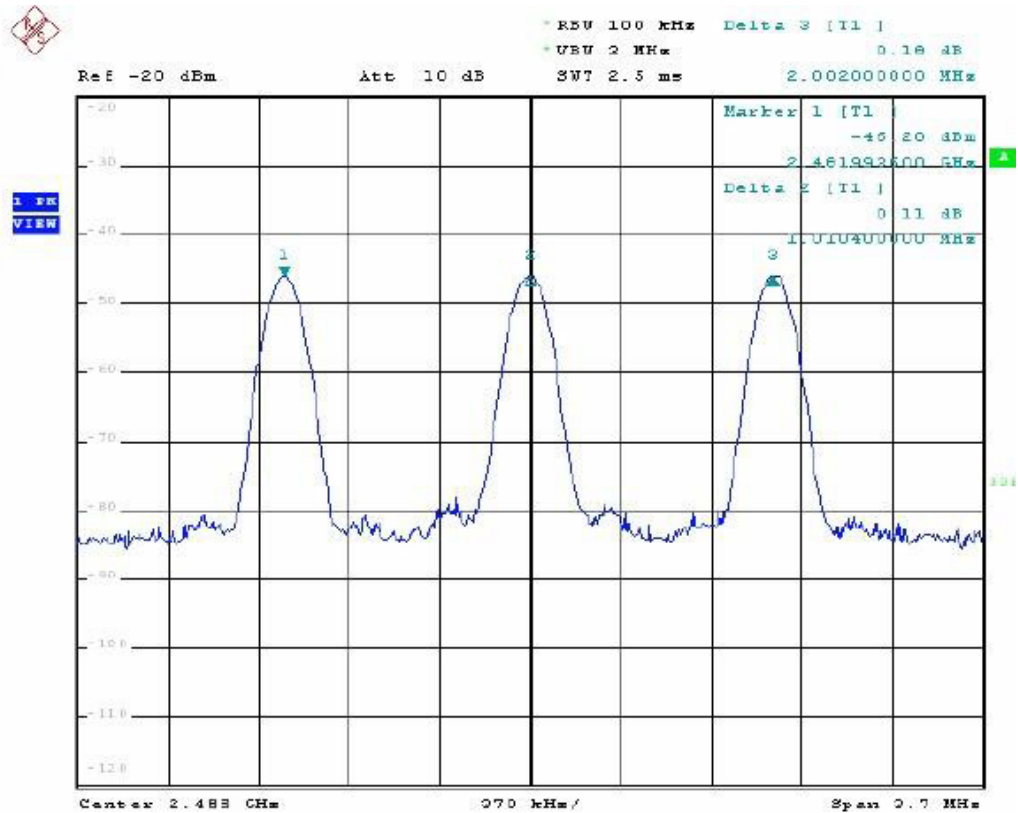
### Low Channel: 2402MHz



### Middle Channel: 2441MHz



High Channel: 2483MHz



## 5. NUMBER OF HOPPING FREQUENCY

### 5.1.Test Standard

15.247(b)

### 5.2.Limits

For frequency hopping systems operating in the 2402-2483.5 MHz band employing at least 75 non-overlapping hopping channels.

### 5.3.Test Procedure

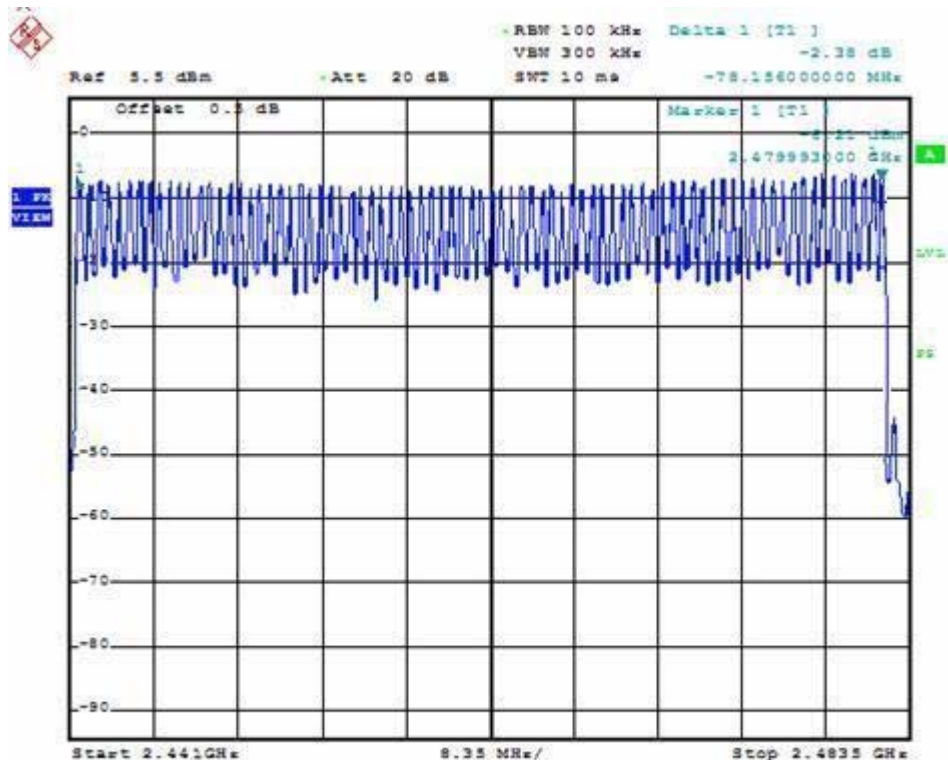
Record the respond of frequency waveform when the EUT was working by a spectrum analyzer or EMI Receiver.

### 5.4.Test Result

**PASS**

Hopping Channel is 82.

Detailed information, Please refer to the following page.





## 6. BAND EDGE

### 6.1.Rules Part No.

15.247(c)

### 6.2.Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 6.3.Test Procedure

#### **ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:**

1. The EUT was tested according to ANSI C63.4 - 2003.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
3. 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 , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- 6.The antenna polarization: Vertical polarization and Horizontal polarization.

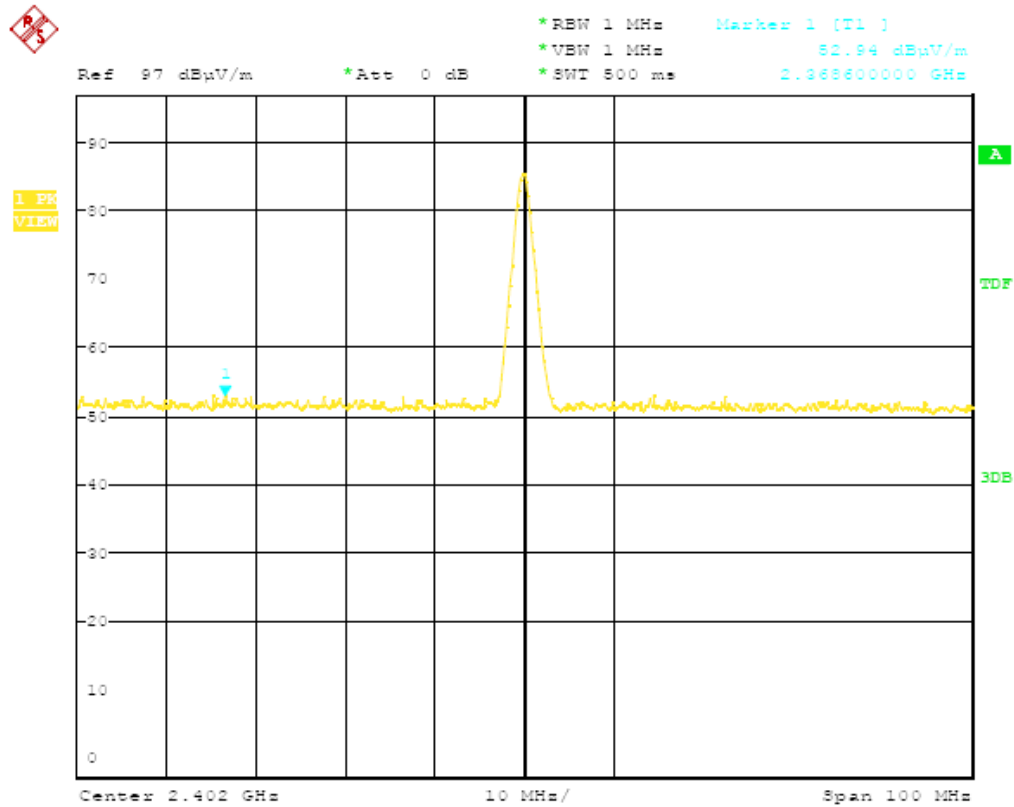
### 6.4.Test Result

**PASS**

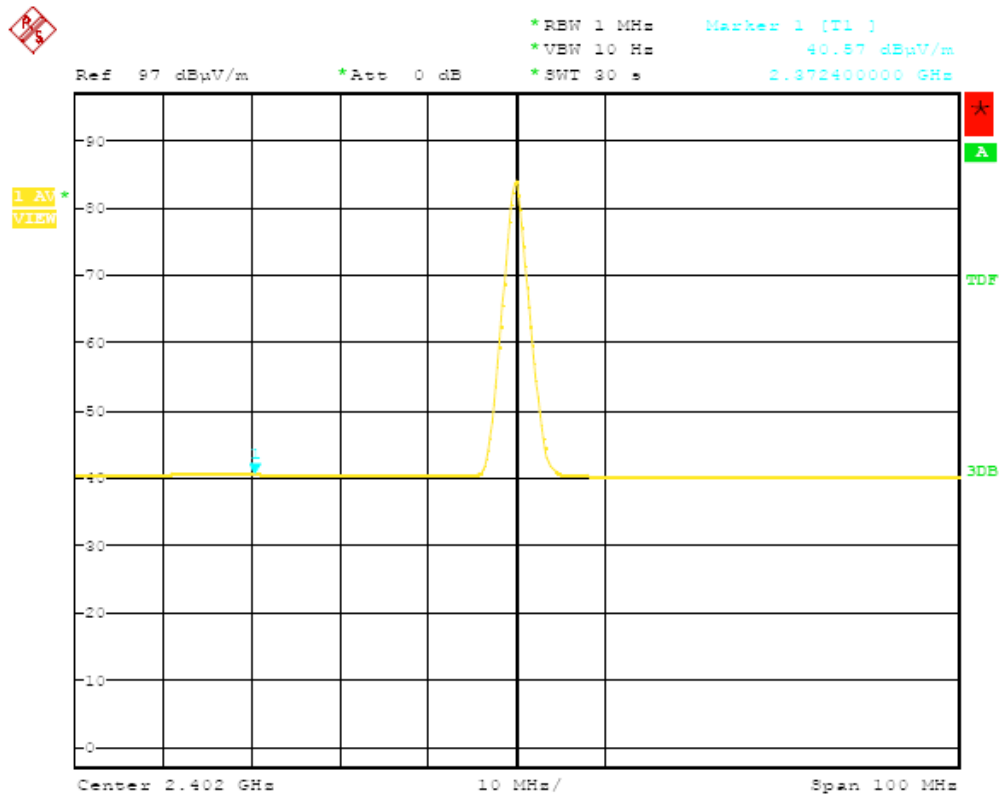
Detailed information, Please refer to the following page.

Low channel: 2402MHz

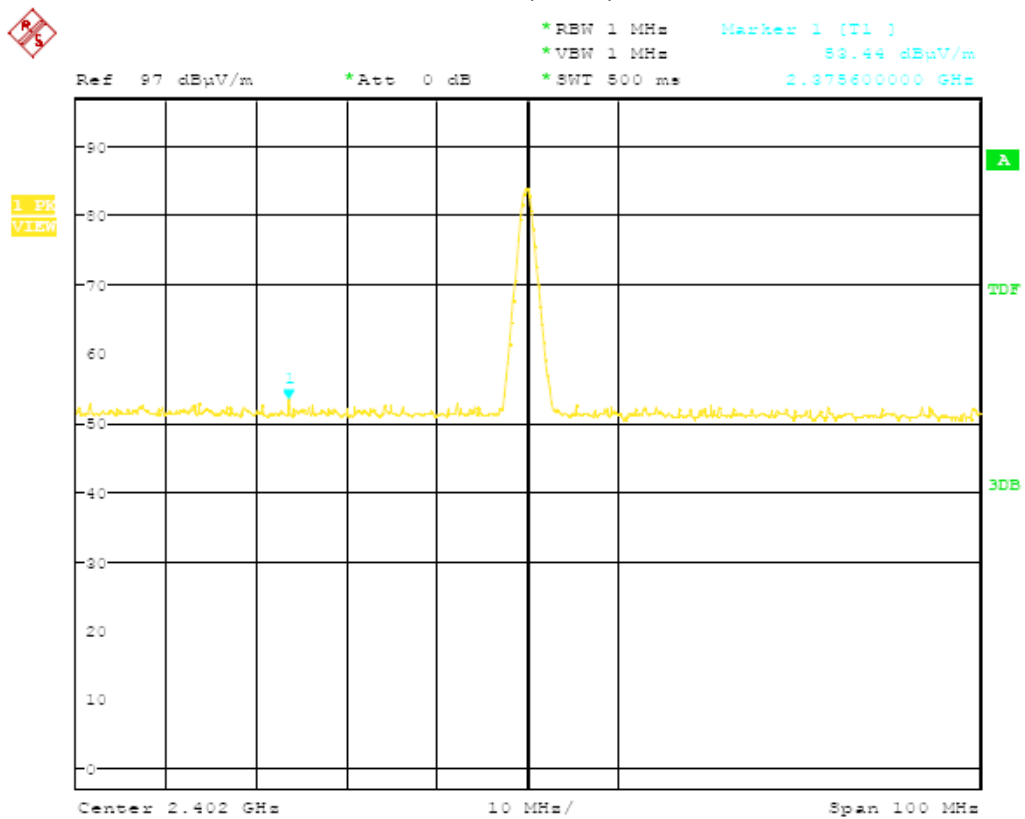
Horizontal (Peak)



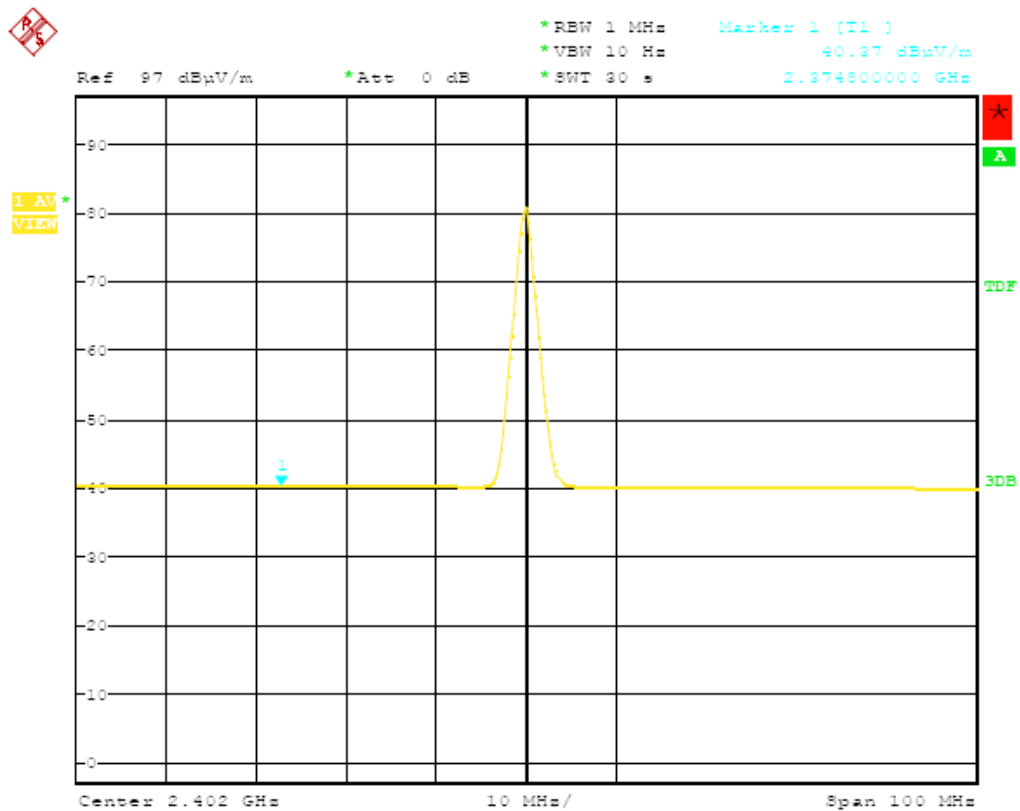
Horizontal (Average)



### Vertical (Peak)

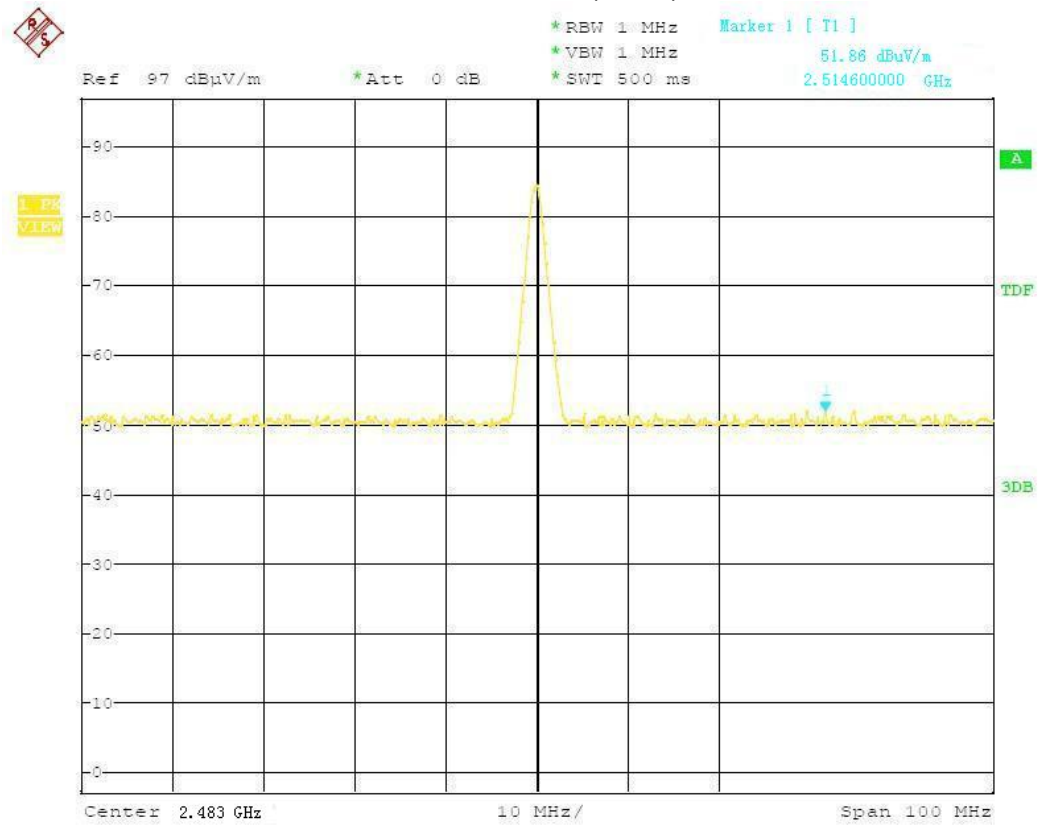


### Vertical (Average)

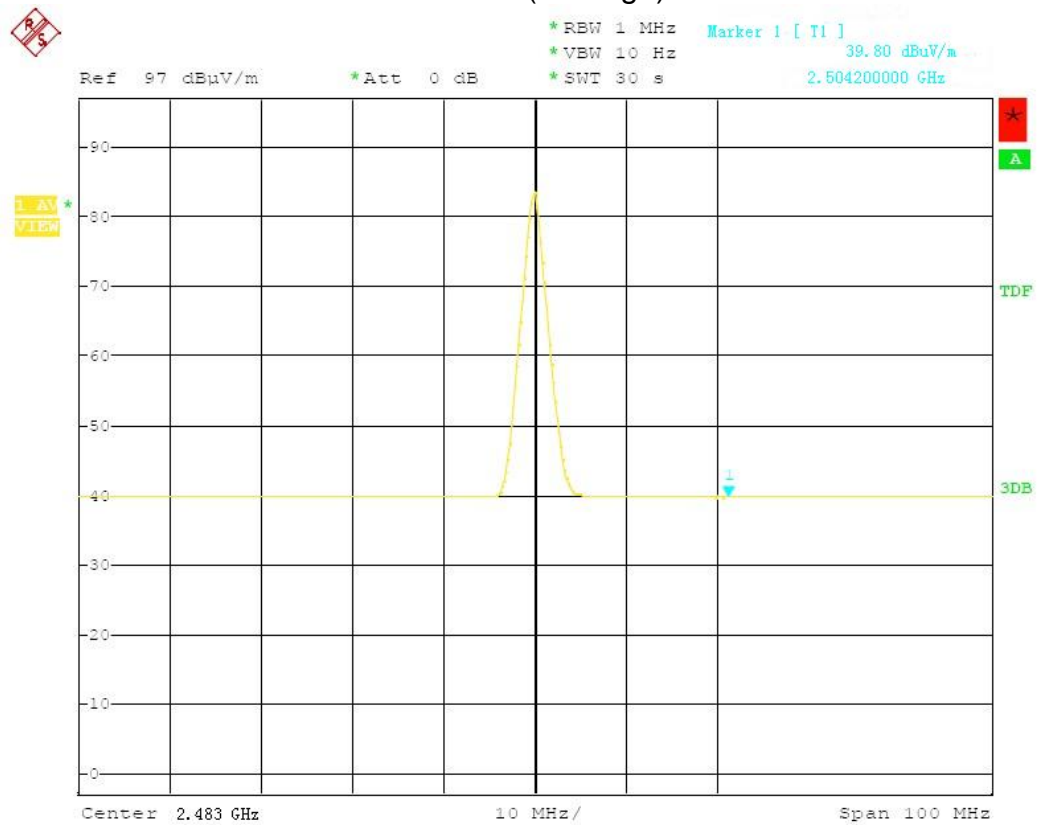


High channel: 2483MHz

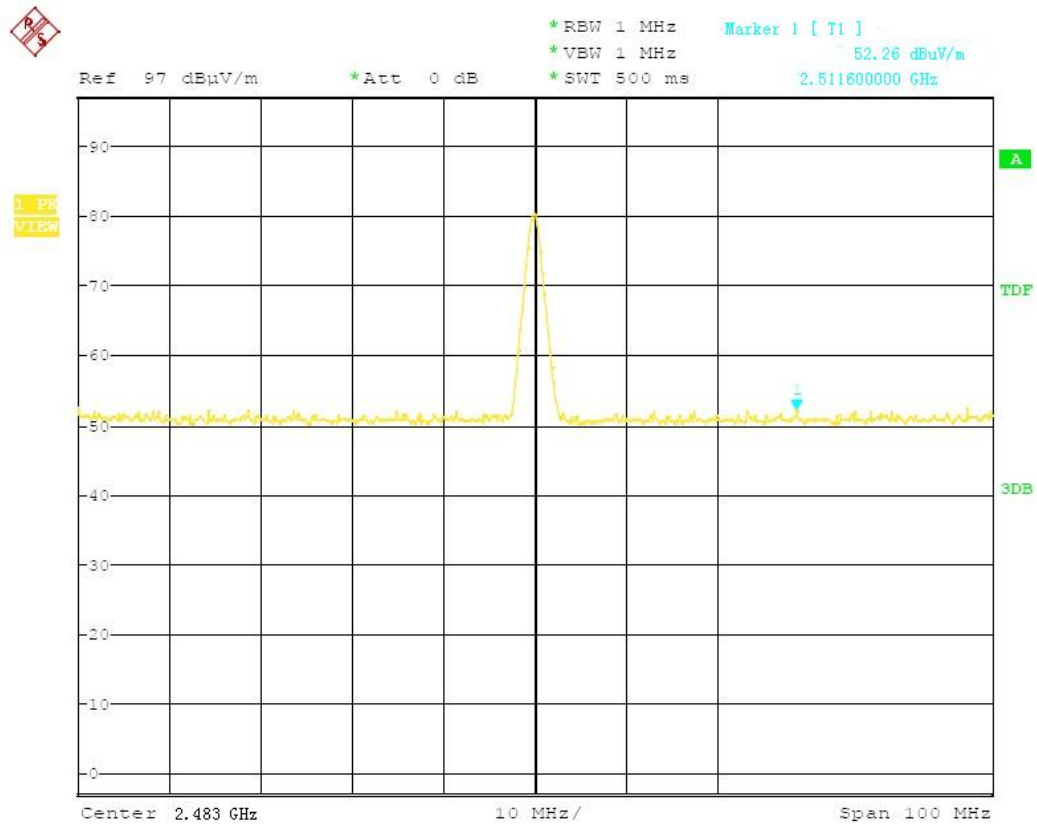
Horizontal (Peak)



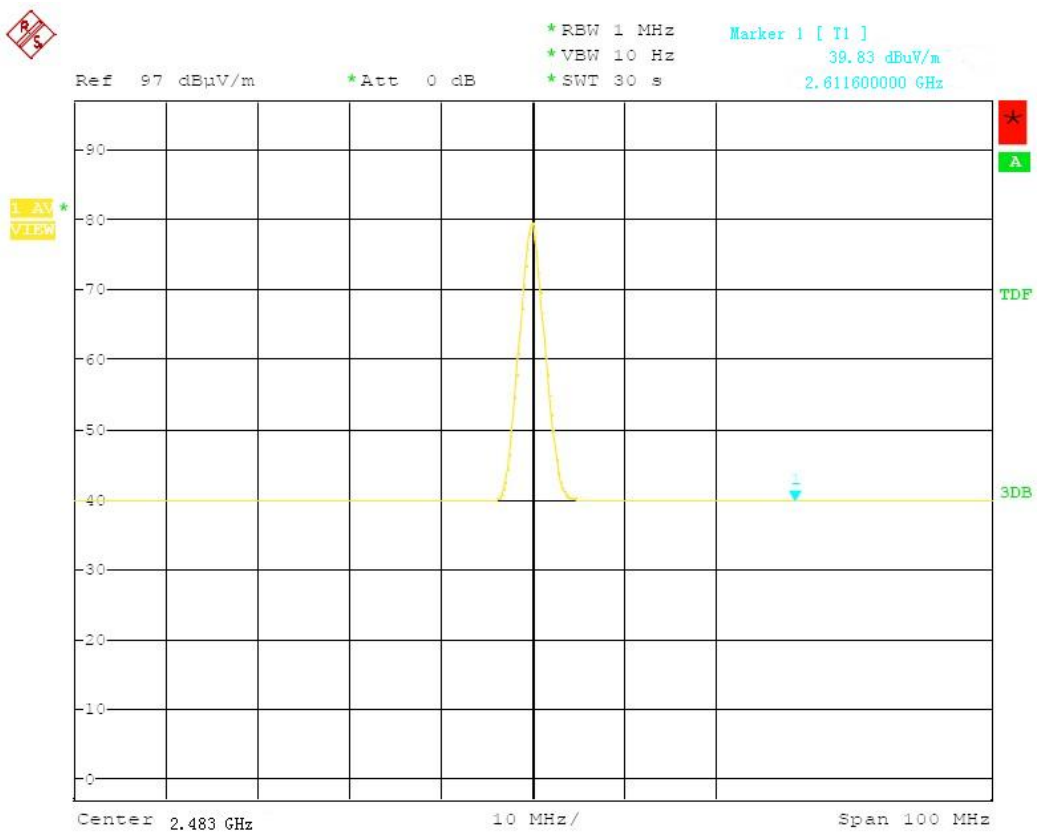
Horizontal (Average)



### Vertical (Peak)



### Vertical (Average)



## 7. 20DB BANDWIDTH

### 7.1.Rules Part No.

15.247(b)

### 7.2.Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 7.3.Test Procedure

The transmitter output is connected to the spectrum analyzer, The spectrum analyzer Center frequency is set to the transmitter frequency, The RBW is set to 10K Hz and VBW is set 30 KHz

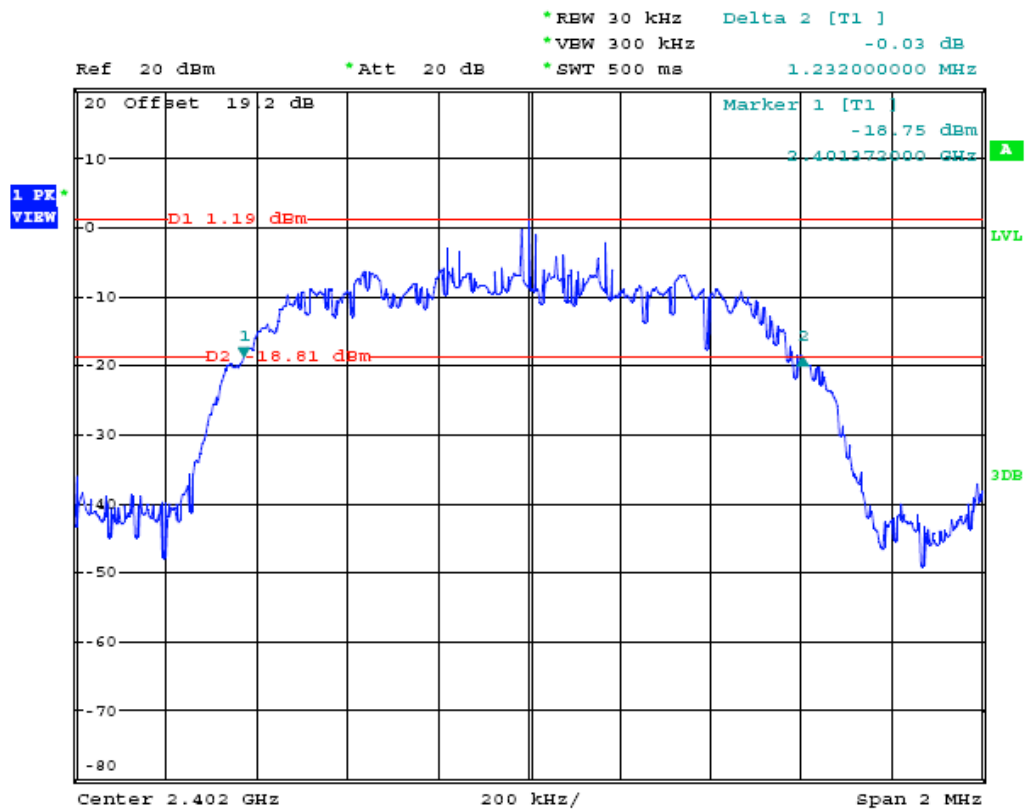
### 7.4.Test Result

**PASS**

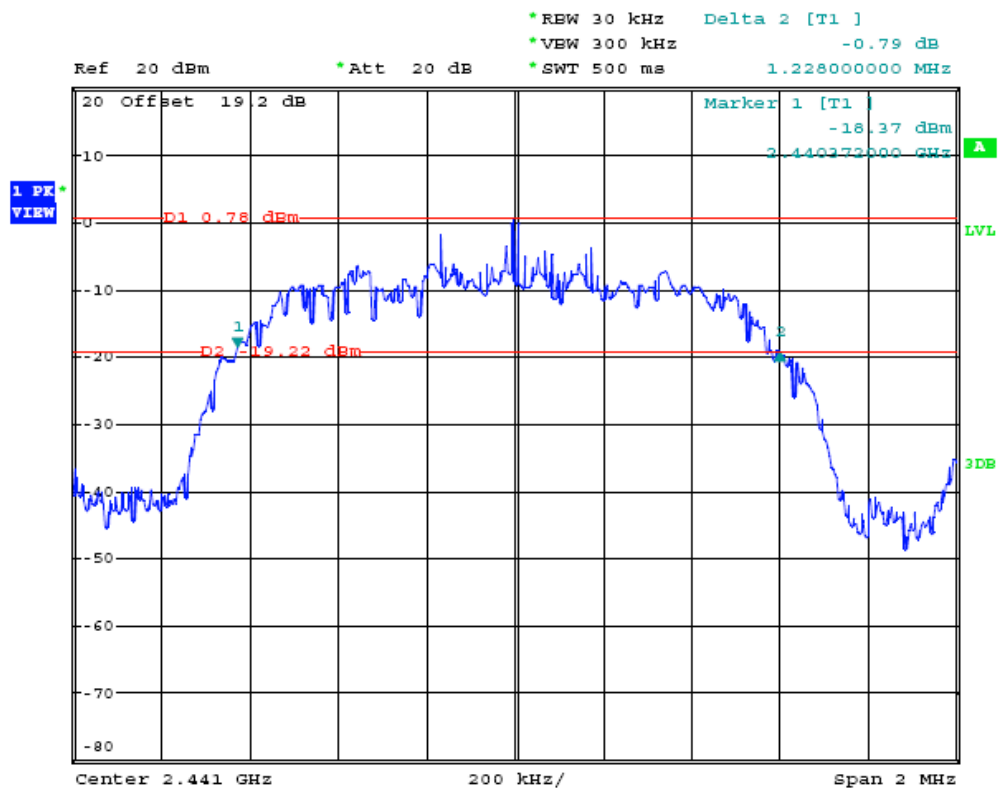
Channel	20dB (kHz)	Hopping Channel Bandwidth (kHz)
Low	2402	1232.00
Middle	2441	1228.00
High	2483	1224.00

Detailed information, Please refer to the following page.

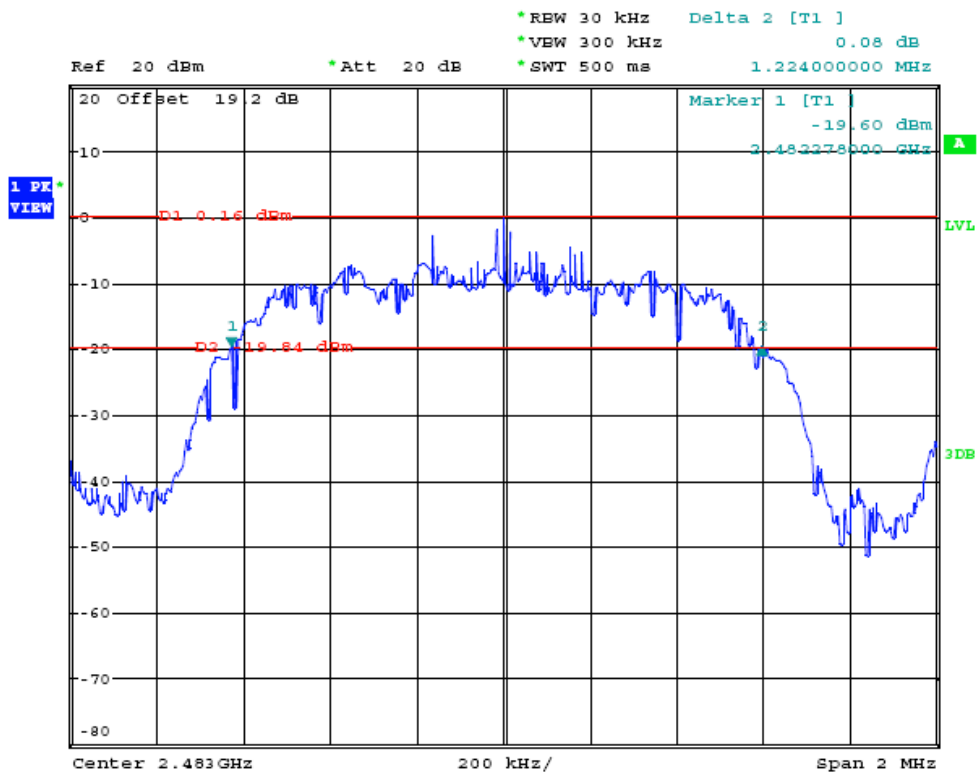
### Low Channel: 2402MHz



### Middle Channel: 2441MHz



High Channel: 2483MHz





## 8. DWELL TIME

### 8.1.Rules Part No.

15.247(a)

### 8.2.Limits

Per 15.247(a) (1)(iii) At least 15 hopping Frequencies. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 8.3.Test Procedure

The transmitter output was connected to EMI receiver with a low lose cable, the band edge was measured and recorded.

### 8.4.Test Result

**PASS**

Channel	Frequency (MHz)	Pulse Width (msec)	Occupied Time (0.4 sec X 79)	Dwell Time (ms)	Limit (sec)
Low	2402	0.440	31.6	139.040	0.4
Middle	2441	0.444	31.6	140.304	0.4
High	2483	0.448	31.6	141.568	0.4

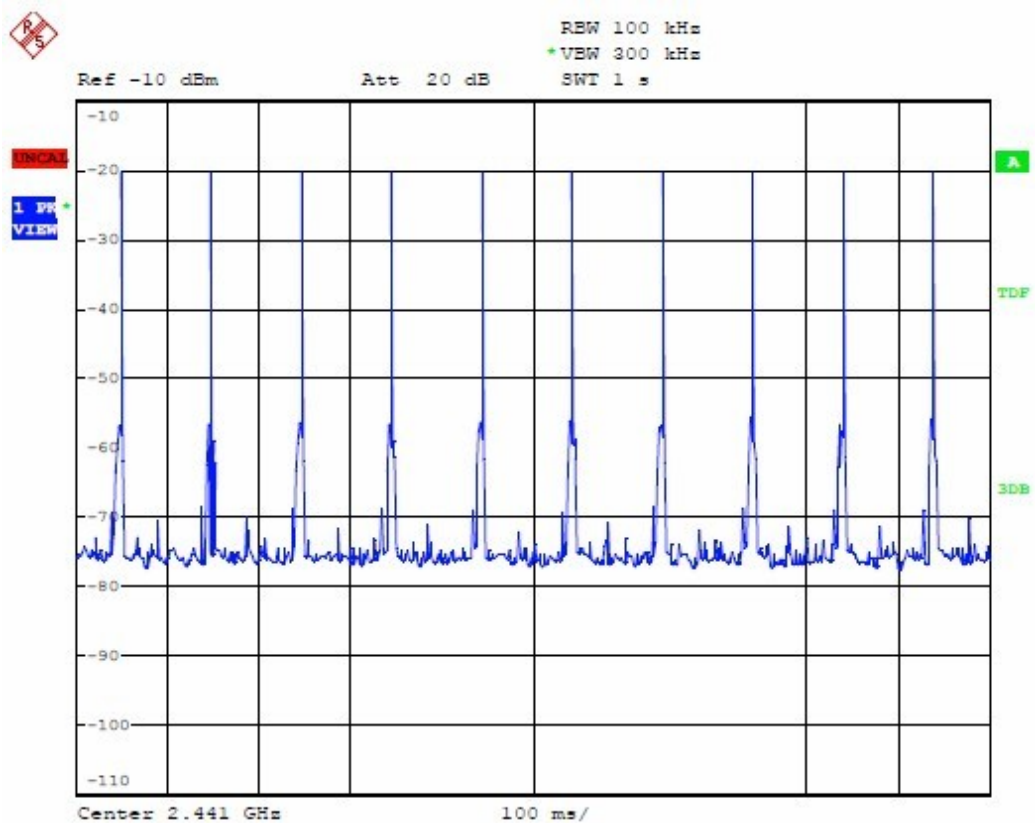
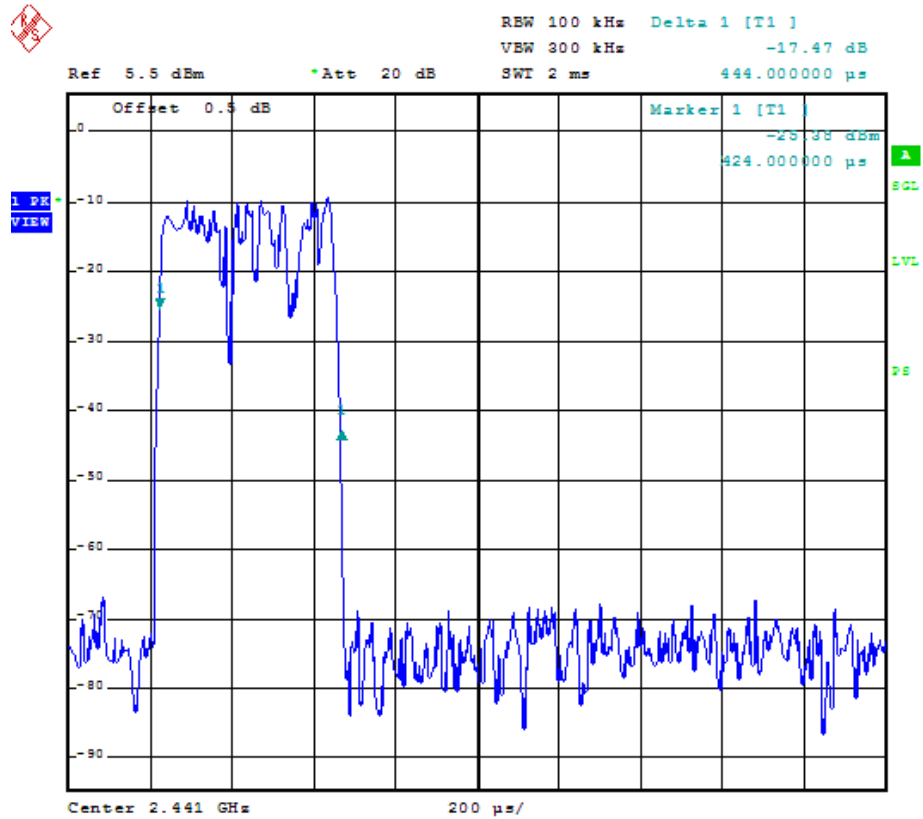
Detailed information, Please refer to the following page.

A period transmit time= $79 \times 0.4 = 31.6s$

Dwell time=Pulse time\*burst (in 1sec) \*31.6

Burst in 1 sec.=10(Bust is 10 times be measured)

Middle Channel: 2441MHz



## 9. RADIATED EMISSION

### 9.1. Rules Part No.

15.209

### 9.2. Limits

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of (MHz)	Emission Field Strength (microvolts/meter)
30 - 88	100 (40)
88 - 216	150 (43.5)
216 - 960	200 (46.0)
Above 960	500 (54.0)

### 9.3. Test Procedure

#### **ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:**

The EUT is placed on a turned table that is 0.8 meter above the ground. The turned table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna that is mounted on the antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (log periodical antenna and horn antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz.

The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

### 9.4. Test Result

#### **PASS**

The frequency range from 30MHz to 25GHz is investigated.

Detailed information, Please refer to the following page.

## A. Harmonics Radiated Emission Data

### Low Channel: 2402MHz

Frequency (MHz)	Peak (dBuV/m)	Limit (dBuV/m) Peak	Margin (dBuV/m) Peak	Horizontal/Vertical
4804	50.80	74.00	-23.20	Horizontal
4804	51.16	74.00	-22.84	Vertical
7206	48.26	74.00	-25.74	Horizontal
7206	47.63	74.00	-26.37	Vertical
9608	46.35	74.00	-27.65	Horizontal
9608	45.39	74.00	-28.61	Vertical
24020	45.60	74.00	-28.40	Horizontal
24020	45.80	74.00	-28.20	Vertical

### Middle Channel: 2441MHz

Frequency (MHz)	Peak (dBuV/m)	Limit (dBuV/m) Peak	Margin (dBuV/m) Peak	Horizontal/Vertical
4882	51.80	74.00	-22.20	Horizontal
4882	51.50	74.00	-22.50	Vertical
7323	49.26	74.00	-24.74	Horizontal
7323	48.53	74.00	-25.47	Vertical
9764	46.37	74.00	-27.63	Horizontal
9764	45.89	74.00	-28.11	Vertical
24410	45.90	74.00	-28.10	Horizontal
24410	45.50	74.00	-28.50	Vertical

### High Channel:2483MHz

Frequency (MHz)	Peak (dBuV/m)	Limit (dBuV/m) Peak	Margin (dBuV/m) Peak	Horizontal/Vertical
4960	52.00	74.00	-22.00	Horizontal
4960	51.16	74.00	-22.84	Vertical
7440	48.56	74.00	-25.44	Horizontal
7440	48.65	74.00	-25.35	Vertical
9920	47.38	74.00	-26.62	Horizontal
9920	46.95	74.00	-27.05	Vertical
24800	46.60	74.00	-27.40	Horizontal
24800	45.90	74.00	-28.10	Vertical

## B. General Radiated Emission Data

Frequency (MHz)	Peak (dBuV/m)	Limit (dBuV/m) Peak	Margin (dBuV/m) Peak	Horizontal/Vertical
47.46	23.20	40.00	-16.80	Horizontal
55.22	22.60	40.00	-17.40	Horizontal
97.90	25.10	43.50	-18.40	Horizontal
291.90	26.80	46.00	-19.20	Horizontal
551.86	31.00	46.00	-15.00	Horizontal
891.36	37.60	46.00	-8.40	Horizontal
47.46	27.20	40.00	-12.80	Vertical
55.22	22.50	40.00	-17.50	Vertical
107.60	24.60	43.50	-18.90	Vertical
307.42	26.70	46.00	-19.30	Vertical
555.74	30.70	46.00	-15.30	Vertical
850.62	36.50	46.00	-9.50	Vertical

## 10.RESTRICTED BANDS OF OPERATION

Section 15.205:

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
<sup>1</sup> 0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
2. 17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
2. 20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 –	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.52525	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	156.7 – 156.9	3260 – 3267	23.6 – 24.0
12.29 – 12.293	162.0125 – 167.17	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	167.72 – 173.2	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	240 – 285	3600 – 4400	( <sup>2</sup> )
13.36 – 13.41	322 – 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

## 11.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.

Antenna is fixed by PCB, can not be changed except take apart the product. Therefore the EUT complies with Section 15.203 of the FCC rules.

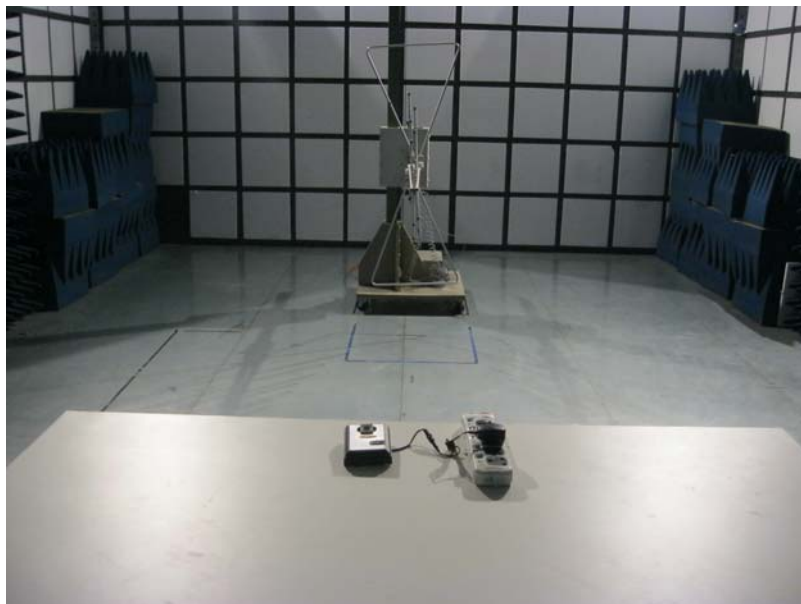
## 12. PHOTOGRAPH OF TEST

### 12.1. Conducted Emission



### 12.2. Radiated Emission

**Below 1GHz**





## Above 1GHz

