

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**I Digital / 2.4G RF DVR Receiver**

**MODEL No.: GT09013**

**FCC ID: XDP-GT09013**

**REPORT NO: ES101009015F**

**ISSUE DATE: March 24, 2011**

*Prepared for*

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## VERIFICATION OF COMPLIANCE

Applicant:	GLOBAL TECH CHINA LTD. Room 12, 14th Floor, Tower 2, Evergain Plaza, 88 Container Port Road, Kwai Chung, HongKong
Manufacturer:	GLOBAL TECH CHINA LTD. Room 12, 14th Floor, Tower 2, Evergain Plaza, 88 Container Port Road, Kwai Chung, HongKong
Product Description:	I Digital / 2.4G RF DVR Receiver
Brand Name:	N/A
Model Number:	GT09013
Serial Number:	N/A
File Number:	ES101009015F
Date of Test:	January 31, 2011 to March 17, 2011

### We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK CO., LTD. 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 (2009) 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 15.247.

The test results of this report relate only to the tested sample identified in this report.

*Approved By*



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**David Lee / Q.A. Manager**  
**SHENZHEN EMTEK CO., LTD.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402-2480MHz
- B). Modulation: GFSK
- C). Number of Channel: 40
- D). Channel space: 2MHz
- E). Rated RF Output Power: 13.07dbm
- F) PCB Gain: 1dBi
- H). Antenna Type: permanent Antenna
- I). Power Supply: DC9.5V with AC Adapter
- J). Adapter: Input: 100-240V~50-60Hz, 150mA  
Output: DC9.5V/500mA

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH01	2402	CH15	2430	CH29	2458
CH02	2404	CH16	2432	CH30	2460
CH03	2406	CH17	2434	CH31	2462
CH04	2408	CH18	2436	CH32	2464
CH05	2410	CH19	2438	CH33	2466
CH06	2412	CH20	2440	CH34	2468
CH07	2414	CH21	2442	CH35	2470
CH08	2416	CH22	2444	CH36	2472
CH09	2418	CH23	2446	CH37	2474
CH10	2420	CH24	2448	CH38	2476
CH11	2422	CH25	2450	CH39	2478
CH12	2424	CH26	2452	CH40	2480
CH13	2426	CH27	2454		
CH14	2428	CH28	2456		

Note:

1. This device is a 2.4GHz transceiver function.
2. Test of channel was included the lowest middle and highest frequency in highest data rate and to perform the test, then record on this report.

## **1.2 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: XDP-GT09013 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## **1.3 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

## **1.4 Special Accessories**

Not available for this EUT intended for grant.

## **1.5 Equipment Modifications**

Not available for this EUT intended for grant.

## 1.6 Test Facility

Site Description  
EMC Lab.

: Accredited by CNAS, 2010.10.29  
The certificate is valid until 2013.10.28  
The Laboratory has been assessed and proved to be in compliance  
with CNAS/CL01:2006(identical to ISO/IEC17025: 2005)  
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen 2010.5.25  
The Laboratory has been assessed according to the requirements  
ISO/IEC 17025

Accredited by FCC, October 28, 2010  
The Certificate Registration Number is 406365.

Accredited by Industry Canada, March 5, 2010  
The Certificate Registration Number is 46405-4480.

Name of Firm  
Site Location

: SHENZHEN EMTEK CO., LTD  
: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2009. and RSS GEN Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and average detector mode**.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. 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 13.1.4.1 of ANSI C63.4-2009 and RSS GEN.

### 2.4 Limitation

#### (1) Channel Separation test

FCC Part 15, Subpart C Section 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 Bandwidth of the hopping channel, whichever is greater.

Frequency Range (MHz)	Limit(kHz)
902-928	>25kHz
2400-2483.5	>25kHz
5725-5850	>25kHz



(2)	20dB Bandwidth					
	Frequency	Limit(kHz)				
	Range(MHz)	Quantity of Hopping Channel	50	25	15	75
	902-928		<250	>250	NA	NA
	2400-2483.5		NA	NA	>1000	<1000

(3) Quantity of Hopping Channel

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	Limit(Quantity of Hopping Channel)			
	20dB bandwidth <250kHz	20dB bandwidth >250kHz	20dB bandwidth <1MHz	20dB bandwidth >1MHz
902-928	50	25	NA	NA
2400-2483.5	NA	NA	75	15
5725-5850	NA	NA	75	NA

(4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	LIMIT(rms)		
	20dB bandwidth <250kHz(50Channel)	20dB bandwidth >250kHz(25Channel)	20dB bandwidth <1MHz(75Channel)
902-928	400(20S)	400(10S)	NA
2400-2483.5	NA	NA	400(30S)
5725-5850	NA	NA	400(30S)

Note: The “( )” is all channel’s average time of occupancy.

(5) Maximum Peak Output Power

FCC Part 15, Subpart C Section 15.247

Frequency Range (MHz)	Quantity of Hopping Channel	LIMIT(W)			
		50	25	15	75
902-928		1(30dBm)	0.125(21dBm)	NA	NA
2400-2483.5		NA	NA	0.125(21dBm)	1(30dBm)
5725-5850		NA	NA	NA	1(30dBm)

**(6) Band edge**

FCC Part15, Subpart C Section 15.247, 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).

Operating Frequency Range(MHz)	Spurious emission frequency	Limit Peak power ration to emission(dBc)	Emission level(dBuV/m)
902-928	<902	>20	NA
	>928	>20	NA
	960-1240	NA	54
2400-2483.5	<2400	>20	NA
	>2483.5-2500	NA	54
5725-5850	<5350-5460	NA	54
	<5725	>20	NA
	>5850	>20	NA

**(7) Conducted Emission**

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

**Note:**

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 0.50MHz.

**(8) Radiated Emission**

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$   
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

**FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000MHz**

Frequency(MHz)	Class A( $\text{dB}\mu\text{V/m}$ )(at 3m)		Class B( $\text{dB}\mu\text{V/m}$ )(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

FCC Part 15, Subpart C Section 15.249 The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**

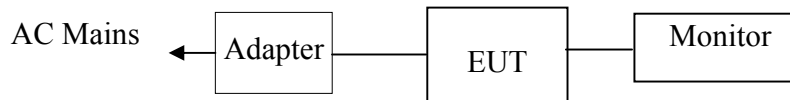


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	I Digital / 2.4G RF DVR Receiver	N/A	GT09013	XDP-GT09013	N/A	<i>EUT</i>
2.	Monitor	JIAYU	TV-1903	N/A	N/A	

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

### **3. Description of test modes**

The transmitter of EUT is a I Digital / 2.4G RF DVR Receiver and powered by host equipment. This is Digital Transmission system (DTS) and have four type of modulation GFSK. The data rates are 100Kbps.

This EUT is a FHSS system, we use blue test to control the EUT with LPT1, Let EUT hopping on and transmit at every channel with highest power, Only output power use conducted method, others are using radiated method. 40 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for best.

1. For lowest channel : 2402MHz(Channel 1)
2. For middle channel : 2440MHz(Channel 20)
3. For highest channel: 2480MHz(Channel 40)

#### **EUT operating conditions:**

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to typical use, The exercise sequence is listed as below:

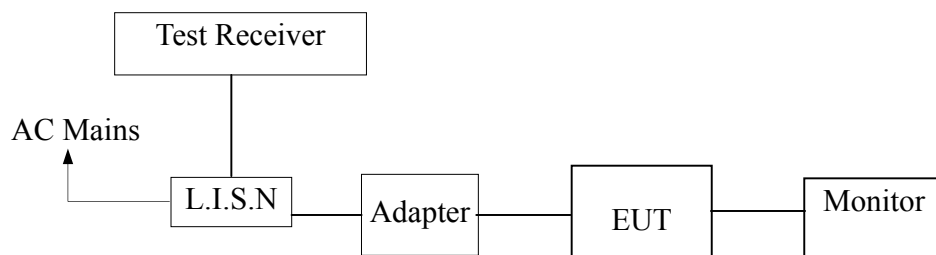
1. Setup the EUT and simulators as shown on 2.4.
2. Turn on the power of all equipments.
3. The EUT Ping with the wireless router.
4. Repeat the above steps.

## 4. Conducted Emissions Test

### 4.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2010	05/29/2011
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2010	05/29/2011
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2010	05/29/2011
50ΩCoaxial Switch	Anritsu	MP59B	M20531	05/29/2010	05/29/2011

### 4.4 Conducted Emission Limit

#### (7) Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

#### Note:

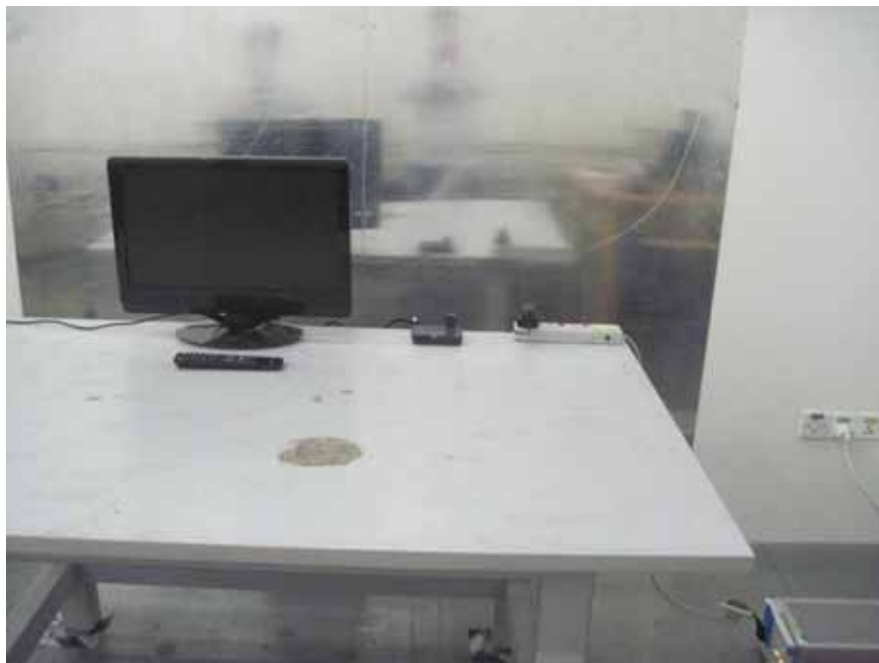
1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 4.5 Measurement Result:

Date of Test:	03/15/2011	Temperature:	22
Frequency Detector:	0.15~30MHz	Humidity:	50%
Test Result:	PASS	Test Mode:	Normal Mode

Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Margin QP dB(μV)	Margin AV dB(μV)
Neutral	0.16	61.25	50.32	65.73	55.73	-4.48	-5.41
	0.19	56.75	47.39	64.02	54.02	-7.27	-6.63
	0.78	51.25	41.35	56.00	46.00	-4.75	-4.65
	2.36	50.89	35.63	56.00	46.00	-5.11	-10.37
	7.88	50.08	36.37	60.00	50.00	-9.92	-13.63
	20.00	48.57	30.08	60.00	50.00	-11.43	-19.92
Line	0.16	58.96	42.10	65.73	55.73	-6.77	-13.63
	0.19	56.60	40.25	64.04	54.04	-7.44	-13.79
	0.26	50.75	38.88	61.43	51.43	-10.68	-12.55
	0.79	49.21	36.78	56.00	46.00	-6.79	-9.22
	1.05	46.75	35.44	56.00	46.00	-9.25	-10.56
	20.00	48.21	37.59	60.00	50.00	-11.79	-12.41

#### 4.6 Conducted Measurement Photos:





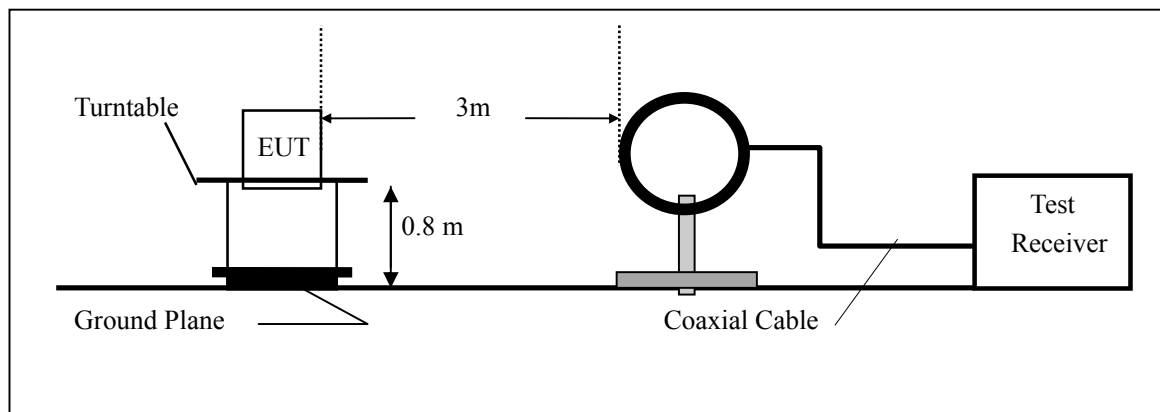
## 5. Radiated Emission Test

### 5.1 Measurement Procedure

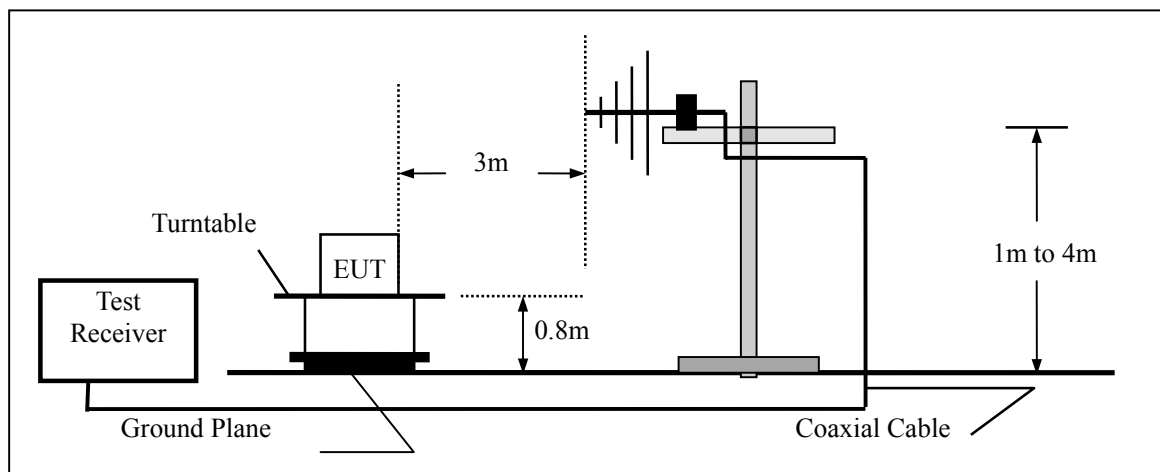
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)

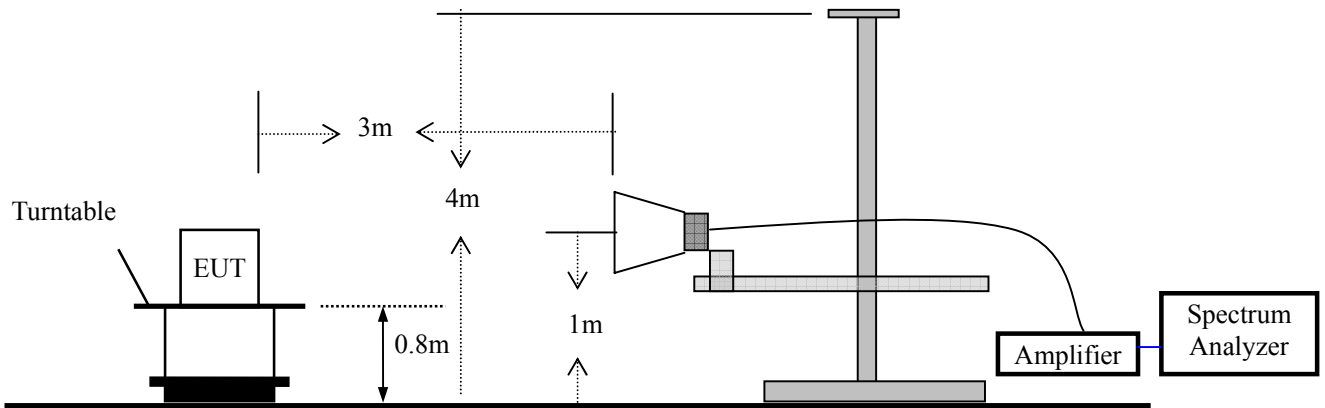
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



5.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/29/2010	05/29/2011
Spectrum Analyzer	HP	E4407B	839840481	05/29/2010	05/29/2011
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2010	05/29/2011
Pre-Amplifier	HP	8447D	2944A07999	05/29/2010	05/29/2011
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2010	05/29/2011
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2010	05/29/2011
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/29/2010	05/29/2011
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2010	05/29/2011

5.4 Radiated emission limit

FCC Class B Limit at 3m

Frequency MHz	Distance Meter	Field Strength uV/m	Field Strength dBuV/m
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
Above 960	3	500	54.0

Note: The frequencies above 1000MHz, as measured using instrumentation with a peak detector function was corresponding to 20dB above maximum permitted average limit.

## 5.5 Measurement Result

Operation Mode: TX Channel 1      Test Date : 03/15/2011  
Frequency Range: 30~1000MHz      Temperature : 28  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: KL

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Over (dB)	Note
50.26	V	21.38	40	-18.62	PK
95.31	V	26.15	43.5	-17.35	PK
210.26	V	23.95	43.5	-19.55	PK
237.05	V	24.75	46	-21.25	PK
365.77	V	22.98	46	-23.02	PK
523.48	V	28.96	46	-17.04	PK
38.05	H	20.73	40	-19.27	PK
100.21	H	22.2	43.5	-21.3	PK
239.78	H	30.64	46	-15.36	PK
396.34	H	24.73	46	-21.27	PK
495.25	H	29.92	46	-16.08	PK
618.31	H	28.49	46	-17.51	PK

**Note:** (1) All Readings are Peak Value.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode:	TX Channel 20	Test Date :	03/15/2011
Frequency Range:	30~1000MHz	Temperature :	28
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
54.76	V	21.59	40	-18.41	PK
94.95	V	25.93	43.5	-17.57	PK
211.50	V	25.97	43.5	-17.53	PK
235.69	V	24.87	46	-21.13	PK
365.02	V	21.93	46	-24.07	PK
523.25	V	28.13	46	-17.87	PK
39.07	H	20.85	40	-19.15	PK
100.06	H	21.99	43.5	-21.51	PK
242.78	H	30.78	46	-15.22	PK
396.29	H	24.61	46	-21.39	PK
493.89	H	29.77	46	-16.23	PK
615.26	H	29.54	46	-16.46	PK

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode:	TX Channel 40	Test Date :	03/15/2011
Frequency Range:	30~1000MHz	Temperature :	28
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
50.47	V	20.33	40	-19.67	PK
93.26	V	26.65	43.5	-16.85	PK
211.38	V	23.32	43.5	-20.18	PK
237.80	V	25.53	46	-20.47	PK
364.56	V	23.09	46	-22.91	PK
522.61	V	29.08	46	-16.92	PK
38.28	H	20.85	40	-19.15	PK
99.75	H	22.43	43.5	-21.07	PK
239.92	H	30.29	46	-15.71	PK
396.22	H	23.49	46	-22.51	PK
495.14	H	29.75	46	-16.25	PK
615.21	H	26.86	46	-19.14	PK

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

Operation Mode: TX Channel 1      Test Date : 03/15/2011  
Frequency Range: Above 1GHz      Temperature : 28  
Test Result: PASS      Humidity : 65 %  
Measured Distance: 3m      Test By: WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4805.26	V	60.05	42.28	74	54	-13.95	-11.72
7206.8	V	60.75	43.5	74	54	-13.25	-10.5
9610.4	V	62.31	48.75	74	54	-11.69	-5.25
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
4805.26	H	59.26	41.02	74	54	-14.74	-12.98
7225.02	H	58.36	38.96	74	54	-15.64	-15.04
9605.26	H	61.75	43.77	74	54	-12.25	-10.23
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	TX Channel 20	Test Date :	03/15/2011
Frequency Range:	Above 1GHz	Temperature :	28
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4841.31	V	60.52	43.51	74	54	-13.48	-10.49
7223.83	V	59.02	46.71	74	54	-14.98	-7.29
9622.91	V	59.3	46.6	74	54	-14.7	-7.4
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
4818.28	H	52.82	33.96	74	54	-21.18	-20.04
7239.33	H	47.71	33.03	74	54	-26.29	-20.97
9623.92	H	60.87	42.96	74	54	-13.13	-11.04
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--

**All emissions not reported were more than 20dB below the specified limit or in the noise floor.**

**Note:** (1) All Readings are Peak Value and AV.  
(2) Emission Level= Reading Level+Probe Factor +Cable Loss  
(3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Operation Mode:	TX Channel 40	Test Date :	03/15/2011
Frequency Range:	Above 1GHz	Temperature :	28
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
5214.5	V	61.72	43.01	74	54	-12.28	-10.99
7251.76	V	59.8	46.39	74	54	-14.2	-7.61
9929.83	V	60.6	46.49	74	54	-13.4	-7.51
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
--	V	--	--	--	--	--	--
7813.57	H	53.87	33.65	74	54	-20.13	-20.35
9503.7	H	48.61	32.77	74	54	-25.39	-21.23
10006.57	H	61.97	42.4	74	54	-12.03	-11.6
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--
--	H	--	--	--	--	--	--

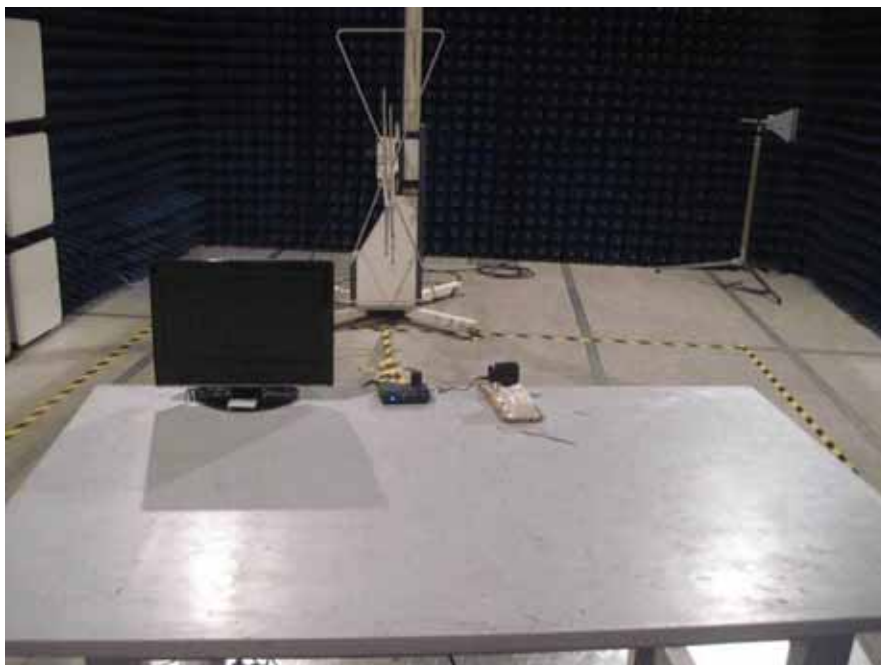
**No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.247.**

**Note:**

- (1) All Readings are Peak Value and AV.
- (2) Emission Level= Reading Level+Probe Factor +Cable Loss
- (3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



## 5.6 Radiated Measurement Photos:

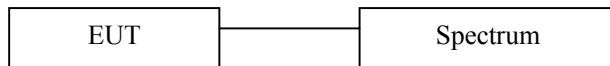


## 6. Channel Separation test

### 6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 6.2 Test SET-UP (Block Diagram of Configuration)



### 6.3 Measurement Equipment Used:

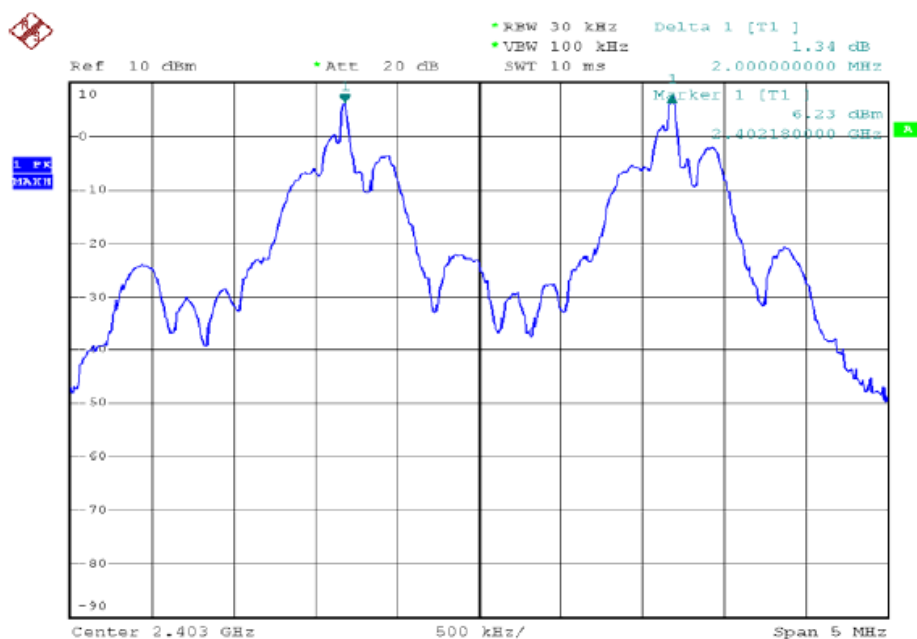
Same as 4.3 Radiated Emission Measurement.

### 6.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	March 15, 2011
Test By:	Andy	Temperature :	28
Test Result:	PASS	Humidity :	65 %

Channel number	Channel frequency (MHz)	Separation Read Value (MHz)	20dB Down BW(MHz)	Separation Limit 2/3 20dB Down BW(MHz)
01	2402	2.00	>1.62	>1.00
20	2440	2.01	>1.69	>1.06
40	2480	2.00	>1.69	>1.06



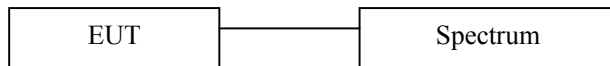


## 7. 20dB Bandwidth test

### 7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 7.2 Test SET-UP (Block Diagram of Configuration)



### 7.3 Measurement Equipment Used:

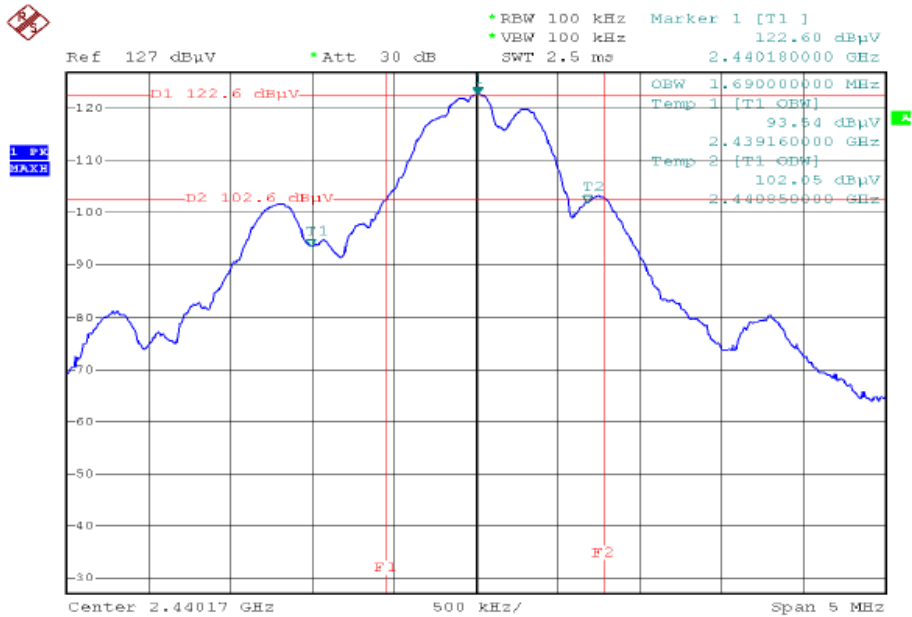
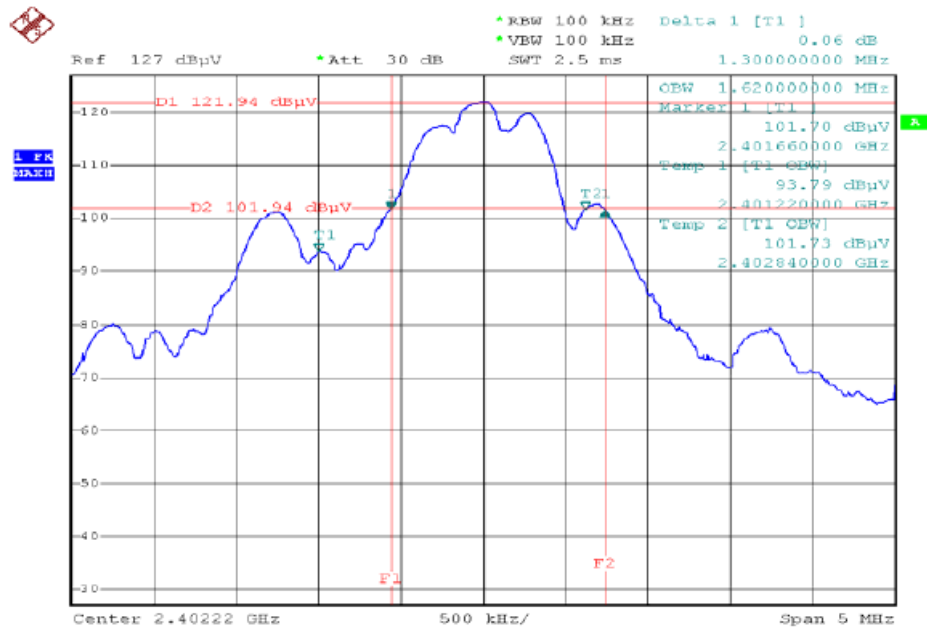
Same as 4.3 Radiated Emission Measurement.

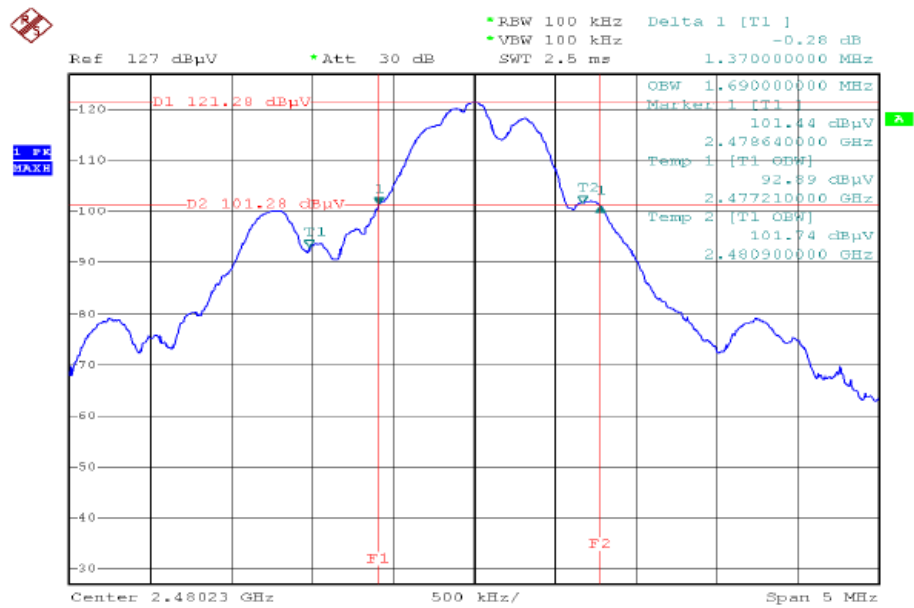
### 7.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	March 15, 2011
Test By:	Andy	Temperature :	28
Test Result:	PASS	Humidity :	65 %

Channel number	Channel frequency (MHz)	20dB Down BW(MHz)
01	2402	1.62
20	2440	1.69
40	2480	1.69



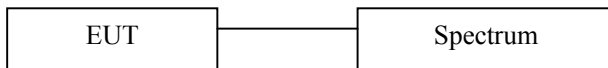


## 8. Quantity of Hopping Channel Test

### 8.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

### 8.2 Test SET-UP (Block Diagram of Configuration)



### 8.3 Measurement Equipment Used:

Same as 4.3 Radiated Emission Measurement.

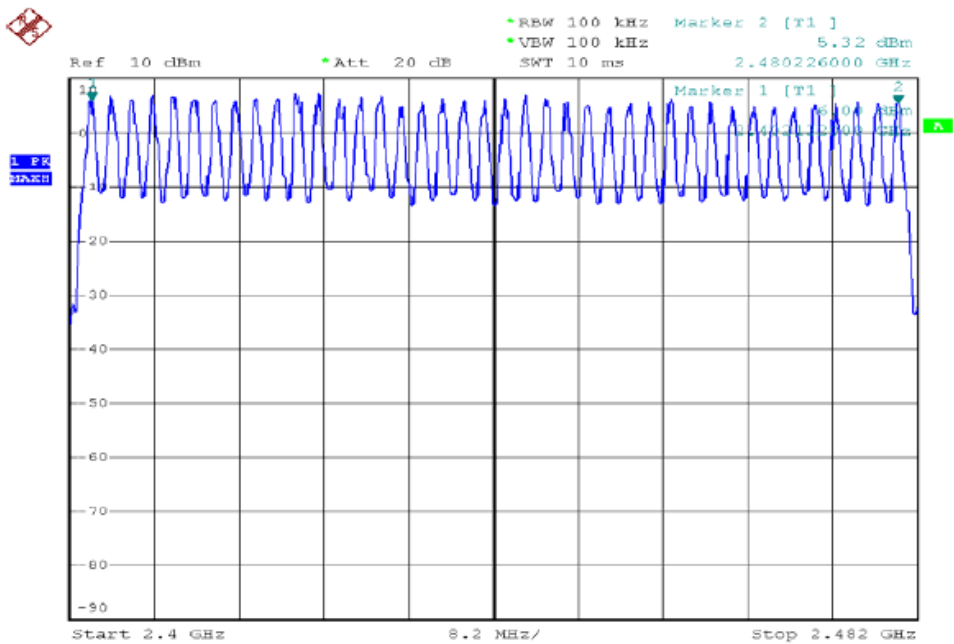
### 8.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	March 15, 2011
Test By:	Andy	Temperature :	28
Test Result:	PASS	Humidity :	65 %

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel(Limit)
2402-2480	40	15



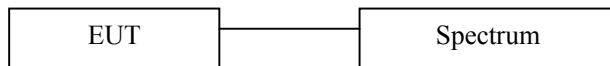


## 9. Time of Occupancy (Dwell Time) test

### 9.1 Measurement Procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement 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.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

### 9.2 Test SET-UP (Block Diagram of Configuration)



### 9.3 Measurement Equipment Used:

Same as 4.3 Radiated Emission Measurement.

#### 9.4 Measurement Results:

Refer to attached data chart.

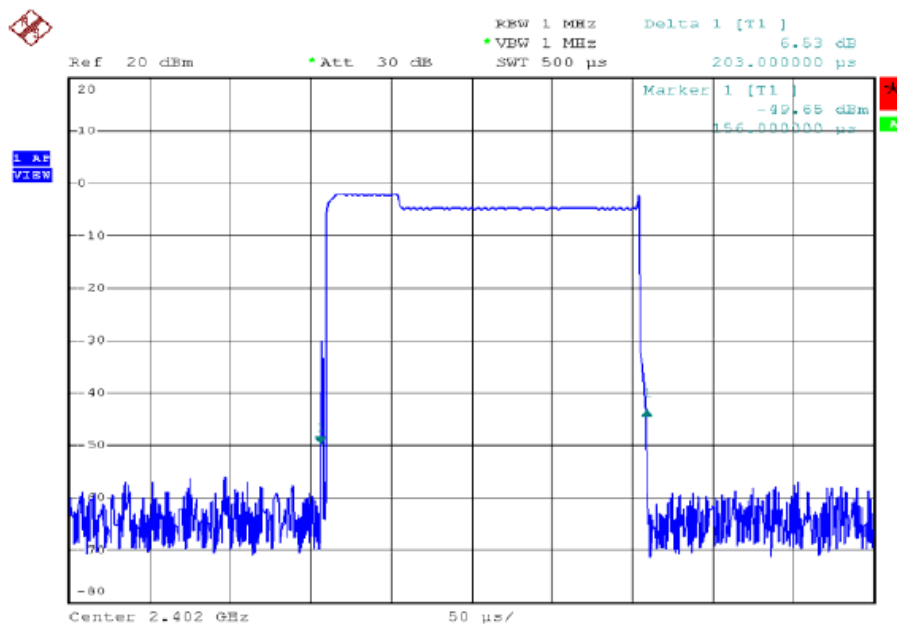
Spectrum Detector:	PK	Test Date :	March 15, 2011
Test By:	Andy	Temperature :	28
Test Result:	PASS	Humidity :	65 %

Mode	Length of transmissions time(S)	Result (S)	Limit (S)
DH1	0.000203*30/0.5S*0.4*40	0.195	0.4
DH3	0.000207*30/0.5S*0.4*40	0.199	0.4
DH5	0.000204*30/0.5S*0.4*40	0.196	0.4

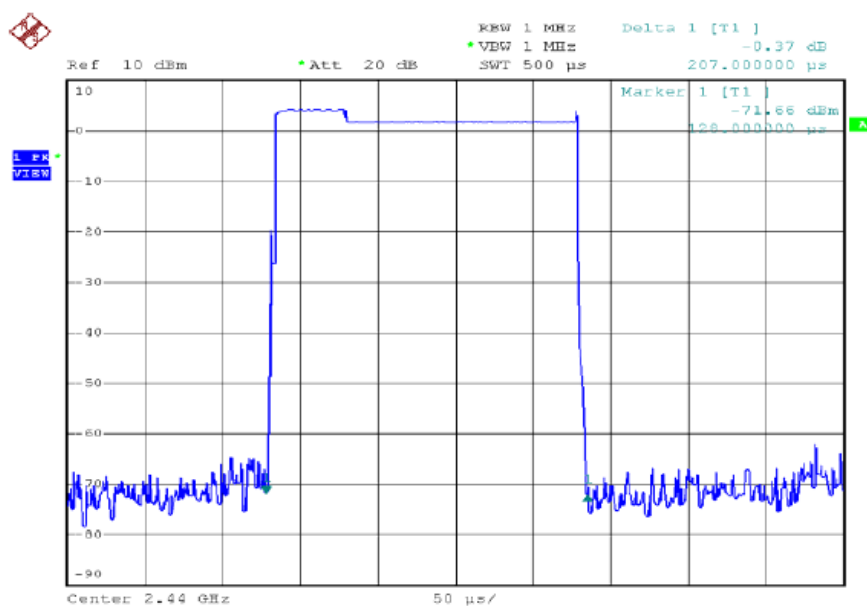
Note: The EUT output antenna port was connected to the spectrum analyzer. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz, and the frequency span to zero span, measure the maximum time duration of one single pulse. So, the Dwell Time can be calculated as follows:

$$T = \text{Ton-time} * \text{Ntimes} / 1S * 0.4 * 40$$

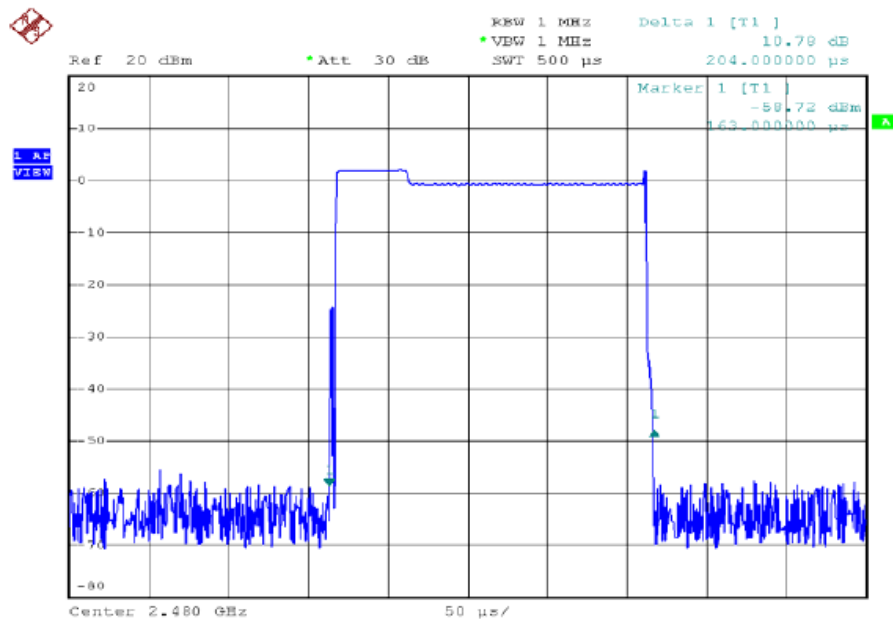
DH1



DH3



DH5

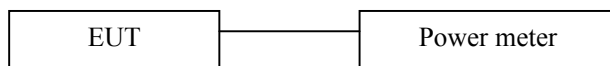


## 10. MAXIMUM PEAK OUTPUT POWER TEST

### 10.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

### 10.2 Test SET-UP (Block Diagram of Configuration)



### 10.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	Boonton	4232A	29001	05/29/2010	05/29/2011
Power sensor	Boonton	51011-EMC	31184	05/29/2010	05/29/2011

### 10.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	March 15, 2011
Test By:	Andy	Temperature :	28
Test Result:	PASS	Humidity :	65 %

Channel number	Channel Frequency (MHz)	Result (dBm)	Result (mW)	Limit (mW)	Pass/Fail
01	2402	12.95	19.72	125	PASS
20	2440	13.07	20.28	125	PASS
40	2480	13.02	20.04	125	PASS

## 11. Band EDGE test

### 11.1 Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

### 11.2 Test SET-UP (Block Diagram of Configuration)

As 5.2 Test set up (B) and (C)

### 11.3 Measurement Equipment Used:

Same as 4.3 Radiated Emission Measurement.

### 11.4 Measurement Results:

Refer to attached data chart.

Spectrum Detector:	PK/AV	Test Date :	03/15/2011
Test By:	Andy	Temperature :	28
Test channel:	Channel 01	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2398.75	H	44.25	38.27	74	54
2398.25	V	43.68	34.31	74	54

Spectrum Detector:	PK/AV	Test Date :	03/15/2011
Test By:	Andy	Temperature :	28
Test channel:	Channel 40	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2481.45	H	45.36	39.65	74	54
2482.39	V	43.05	35.78	74	54

## 12. Antenna Port Emission

### 12.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2010	05/29/2011

### 12.2 Measuring Instruments and setting

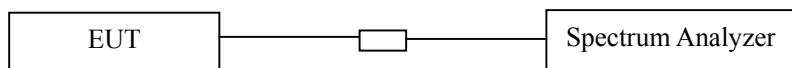
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
RB	100kHz
VB	300kHz
Detector	Peak
Trace	Max hold

### 12.3 Test Procedures

The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels, The limit was determined by attenuation 20dB of the RF peak power output.

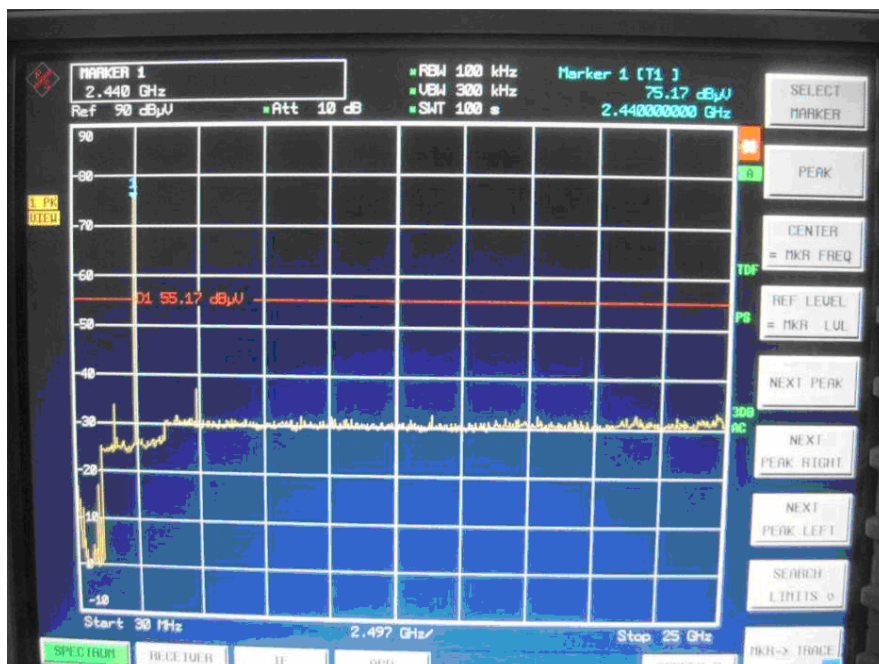
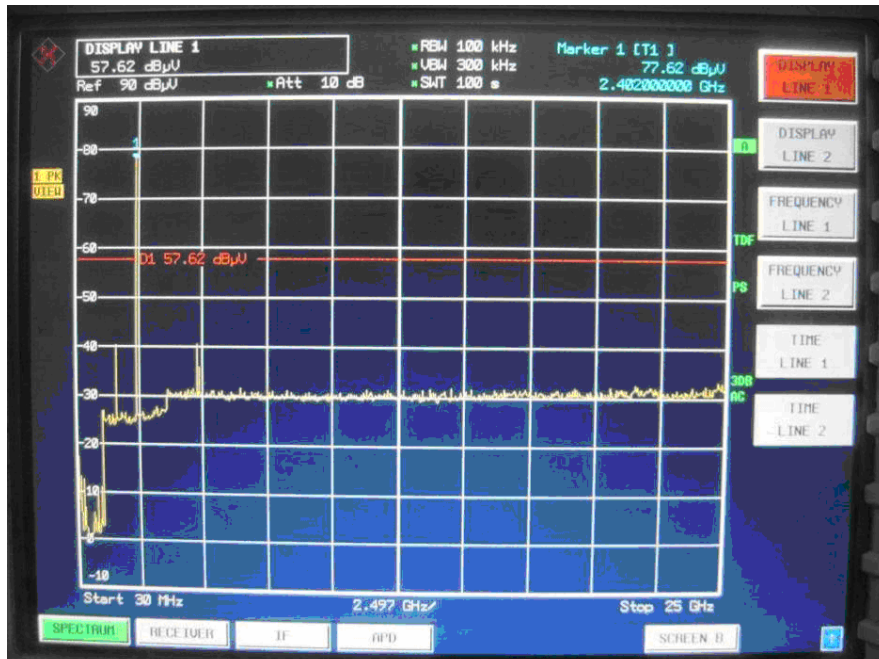
### 12.4 Block Diagram of Test setup

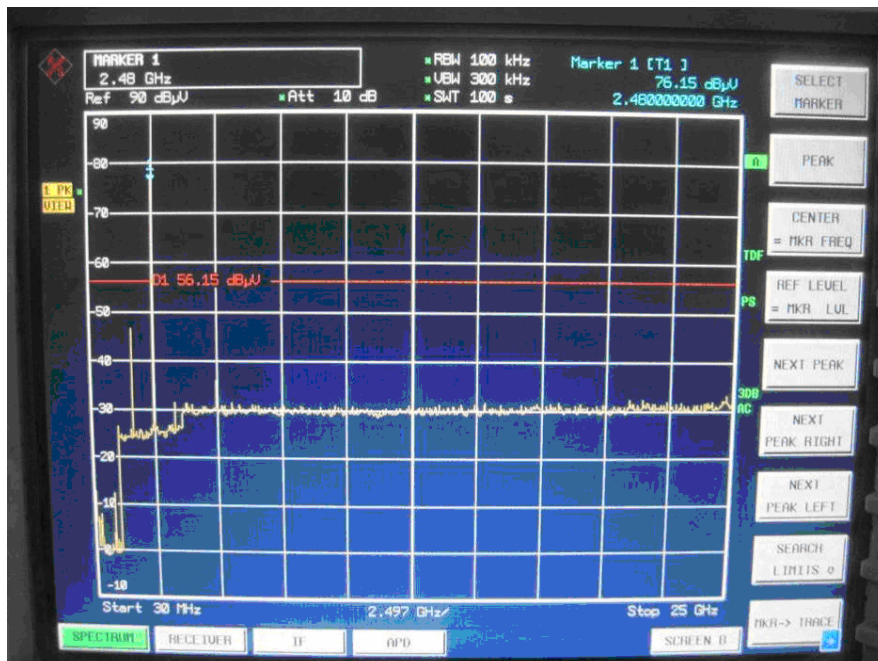


### 12.5 Test Result

PASS.







## 13. Antenna Application

### 13.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.240.

FCC part 15C section 15.247 requirements:

Systems operating in the 2.4GHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### 13.2 Result

The unit is produced with a unique coupling from the transmitter to the permanent antenna. The antenna is not replaceable or user serviceable. The requirements of 15.203 are met; there are no deviations or exceptions to the specification.