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

OF

1/24 2.4G Radio Controlled Tank

MODEL No.: VSTANK

Trademark: N/A

FCC ID: 2AAH2VSTANK24G

REPORT NO: ES130603020E

ISSUE DATE: June 15, 2013

Prepared for
TOYEAST LIMITED

Rm B, 2/F, Mow Hing Factory Buildingg, 205 Wai Yip St., Kwun Tong, HongKong

Prepared by
SHENZHEN EMTEK CO., LTD

Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, China
TEL: 86-755-26954280
FAX: 86-755-26954282

VERIFICATION OF COMPLIANCE

Applicant:	TOYEAST LIMITED Rm B, 2/F, Mow Hing Factory Buildingg, 205 Wai Yip St., Kwun Tong, HongKong
Manufacturer:	TOYEAST LIMITED Rm B, 2/F, Mow Hing Factory Buildingg, 205 Wai Yip St., Kwun Tong, HongKong
Product Description:	1/24 2.4G Radio Controlled Tank
Model Number:	VSTANK
Serial Number:	N/A
Trademark:	N/A
File Number:	ES130603020E
Date of Test:	June 2, 2013 to June 6, 2013

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 15.249.

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

Date of Test : June 2, 2013 to June 6, 2013

Prepared by : Joe Xia

Joe Xia/Editor

Reviewer : June Xie

June Xie /Supervisor

Approve & Authorized Signer :

Lisa Wang/Manager

Table of Contents

1. GENERAL INFORMATION

1.1. Product Description

TOYEAST LIMITED
Model: VSTANK (referred to as the EUT in this report) 1/24 2.4G Radio Controlled Tank, It is designed by way of utilizing the GFSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2410-2470MHz
B). Modulation: GFSK
C). Number of Channel: 16
D). Channel space: 4MHz
E). Antenna Type: PCB antenna
F). Antenna Gain: -2dBi
G).Power Supply: 9V DC(Supplied by 6*1.5V AA Battery)

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AAH2VSTANK24G filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3. Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (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. Measurement Uncertainty

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.00dB
Fundamental Fieldstrength	Not Applicable	95%	±2.94dB
Transmitter 20 dB Bandwidth	Not Applicable	95%	±0.92PPm
Radiated Spurious Emissions	30 MHz to 40 GHz	95%	±3.00dB

1.7. 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 : SHENZHEN EMTEK CO., LTD

Site Location : 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 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.

2.4. Description of test modes

The EUT (1/24 2.4G Radio Controlled Tank) has been tested under normal operating condition. Pre-scanned tests, X, Y, Z in the three orthogonal panels, were conducted to determine the final configuration from all possible combinations. Let EUT transmit with highest power, and the worst result was reported with modulation GFSK.1The 3 channels of lower, medium and higher were chosen for test.

Pretest Mode	Description
Mode 1	Low – 2410MHz
Mode 2	Middle – 2442MHz
Mode 3	High -2470MHz

For Conducted Test	
Final Test Mode	Description
--	” N/A” denotes test is not applicable in this test report.

For Radiated Test	
Mode 1	Low – 2410MHz
Mode 2	Middle – 2442MHz
Mode 3	High -2470MHz

Channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2410	13	2458
2	2414	14	2462
3	2418	15	2466
4	2422	16	2470
5	2426		
6	2430		
7	2434		
8	2438		
9	2442		
10	2446		
11	2450		
12	2454		

Note:

1. Test of channel was included the lowest middle and highest frequency to perform the test, and then record on this report.

3. SUMMARY OF TEST RESULTS

FCC Part15, Subpart C (15.249)&Canada RSS-Gen:2010		
Standard Section FCC	**Test Item**	**Result**
15.207	Conducted Emission	N/A
15.209	Radiated Emission	Pass
15.249	Radiated Spurious Emission	Pass
15.249	Band edge test	Pass
15.249	20dB Bandwidth	Pass

Note: (1)"N/A" denotes test is not applicable in this test report.

3.1. CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System

3.2. DESCRIPTION OF SUPPORT UNITS

Equipment	Mfr/Brand	Model/Type No.	FCC ID / IC	Series No.	Note
1/24 2.4G Radio Controlled Tank	N/A	VSTANK	2AAH2VSTANK24G	N/A	EUT

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 was complete.

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

4.3. Measurement Equipment Used:

Conducted Emission Test Site # 1					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2013	05/28/2014
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2013	05/28/2014
L.I.S.N	Rohde & Schwarz	ENV216	834549/005	05/29/2013	05/28/2014
50ΩCoaxial Switch	Anritsu	MP59B	M20531	05/29/2013	05/28/2014

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:

Note: Not applicable, the EUT power supply from DC 9V battery.

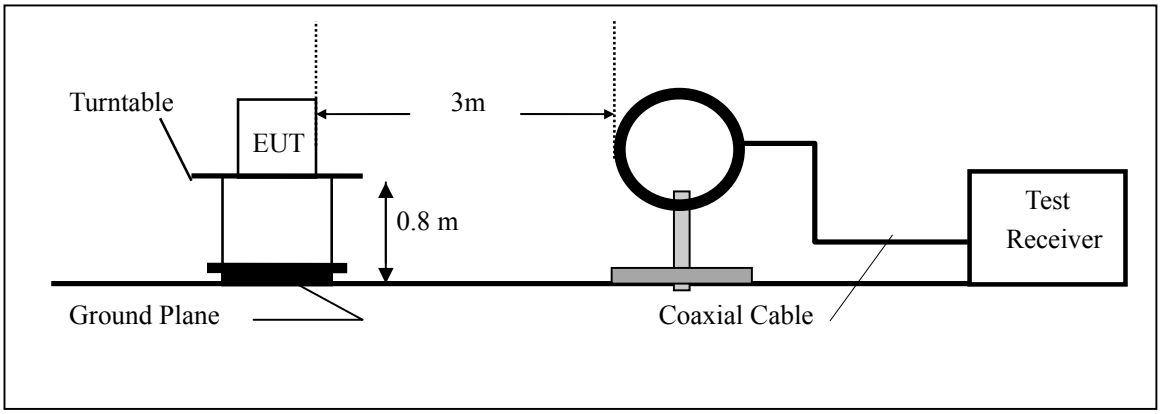
5. RADIATED EMISSION TEST

5.1. Measurement Procedure

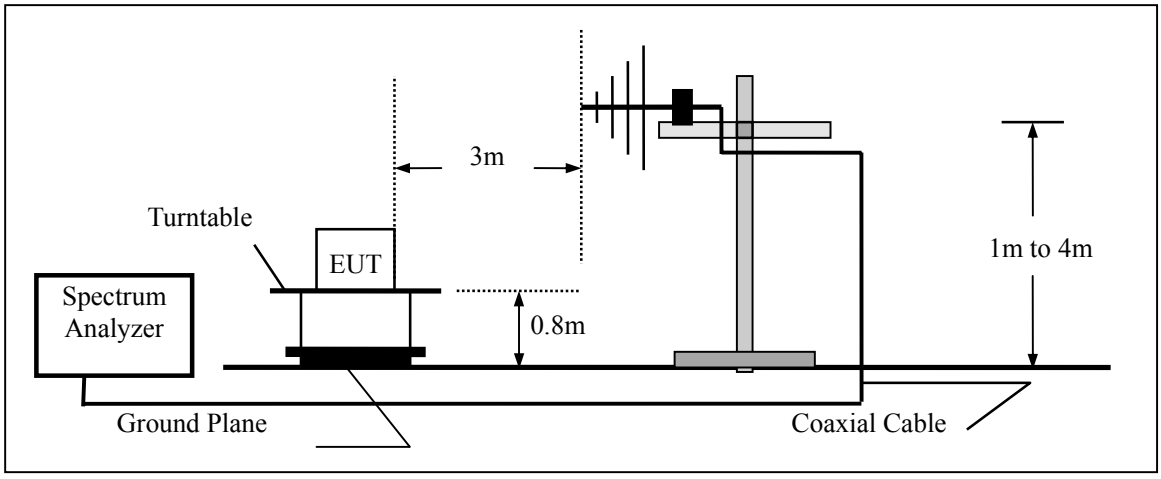
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test Antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector Mode pre-scanning the measurement frequency range. Significant peaks are then marked and then AV detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

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

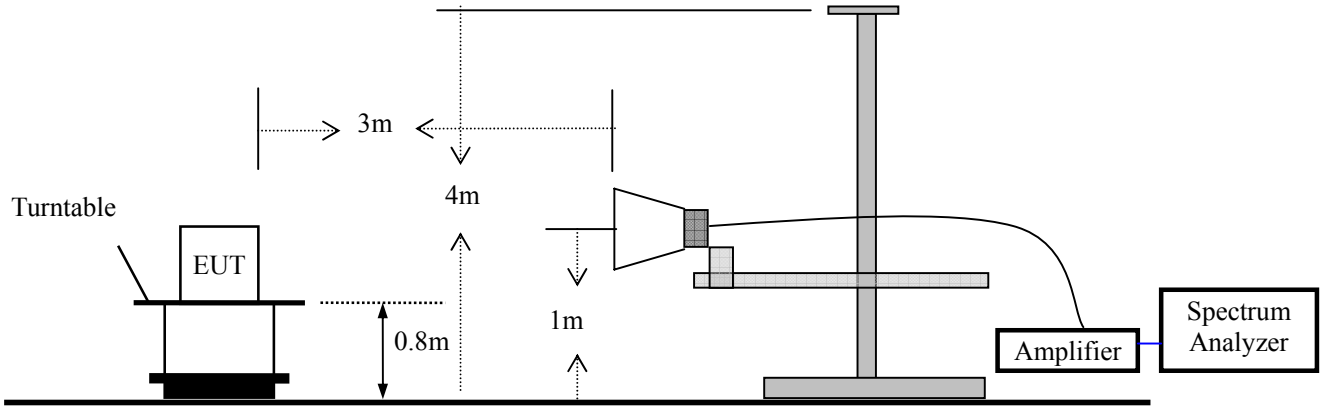
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(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	05/29/2013	05/28/2014
Spectrum Analyzer	HP	E4407B	839840481	05/29/2013	05/28/2014
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2013	05/28/2014
Pre-Amplifier	HP	8447D	2944A07999	05/29/2013	05/28/2014
Bilog Antenna	Schwarzbeck	VULB9163	142	05/14/2013	05/13/2014
Loop Antenna	ARA	PLA-1030/B	1029	05/14/2013	05/13/2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/14/2013	05/13/2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/14/2013	05/13/2014

5.4 Radiated Emission Limit

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions 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 comply with the radiated emissions limits specified in section 1 5.209(a) limit in the table below has to be followed.

Note:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

Limits of radiated emission measurement (FCC 15.209)

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:
(1) The limit for radiated test was performed according to FCC PART 15C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m) =20log Emission level (uV/m).

Limits of radiated emission measurement (FCC 15.249)

FCC Part15 (15.249) , Subpart C	
Limit	Frequency Range (MHz)
Field strength of fundamental 50000uV/m (94 dBV/m) @ 3 m	2400-2483.5
Field strength of harmonics 500uV/m (54 dBV/m) @ 3 m	Above 2483.5

5.5 Measurement Result

Transmitter Fundamental Field Strength

Operation Mode:	CH01: 2410MHz	Test Date :	June 2, 2013
FCC Part:	15.249(a)	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	AV	Limit 3m(dBuV/m) PK	AV	Over(dB) PK	AV
2410.00	V	91.49	90.62	114.00	94.00	-22.51	-3.38
2410.00	H	93.15	90.12	114.00	94.00	-20.85	-3.88

Operation Mode:	CH9: 2442MHz	Test Date :	June 2, 2013
FCC Part:	15.249(a)	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	AV	Limit 3m(dBuV/m) PK	AV	Over(dB) PK	AV
2442.00	V	91.52	90.43	114.00	94.00	-22.48	-3.57
2442.00	H	93.76	89.85	114.00	94.00	-20.24	-4.15

Operation Mode:	CH16: 2470MHz	Test Date :	June 2, 2013
FCC Part:	15.249(a)	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	AV	Limit 3m(dBuV/m) PK	AV	Over(dB) PK	AV
2470.00	V	90.56	89.20	114.00	94.00	-23.44	-4.80
2470.00	H	92.47	89.52	114.00	94.00	-21.53	-4.48

Operation Mode:	TX	Test Date :	June 2, 2013
Frequency Range:	9KHz~30MHz	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Operation Mode:	2410MHz	Test Date :	June 2, 2013
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/m)	Limit 3m (dBuV/m)	Margin (dB)	Note
43.99	V	14.98	40.00	-25.02	PK
103.06	V	15.48	43.50	-28.02	PK
247.63	V	15.35	46.00	-30.65	PK
449.71	V	18.99	46.00	-27.01	PK
598.94	V	22.89	46.00	-23.11	PK
721.75	V	24.27	46.00	-21.73	PK
42.44	H	14.85	40.00	-25.15	PK
101.51	H	15.03	43.50	-28.47	PK
242.96	H	22.43	46.00	-23.57	PK
415.51	H	20.76	46.00	-25.24	PK
575.63	H	26.51	46.00	-19.49	PK
608.27	H	27.19	46.00	-18.81	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.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Operation Mode:	2442MHz	Test Date :	June 2, 2013
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/m)	Limit 3m (dBuV/m)	Margin (dB)	Note
47.10	V	14.19	40.00	-25.81	PK
103.06	V	13.81	43.50	-29.69	PK
350.22	V	15.66	46.00	-30.34	PK
542.98	V	19.61	46.00	-26.39	PK
681.33	V	22.16	46.00	-23.84	PK
726.41	V	23.16	46.00	-22.84	PK
45.55	H	14.72	40.00	-25.28	PK
104.62	H	13.58	43.50	-29.92	PK
242.96	H	21.29	46.00	-24.71	PK
448.16	H	19.07	46.00	-26.93	PK
608.27	H	22.45	46.00	-23.55	PK
746.62	H	24.13	46.00	-21.87	PK

Operation Mode:	2470MHz	Test Date :	June 2, 2013
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/m)	Limit 3m (dBuV/m)	Margin (dB)	Note
45.55	V	14.55	40.00	-25.45	PK
103.06	V	14.27	43.50	-29.23	PK
334.68	V	16.09	46.00	-29.91	PK
546.09	V	20.67	46.00	-25.33	PK
636.25	V	22.85	46.00	-23.15	PK
799.47	V	23.73	46.00	-22.27	PK
45.55	H	15.18	40.00	-24.82	PK
99.95	H	13.74	43.50	-29.76	PK
242.96	H	21.61	46.00	-24.39	PK
415.51	H	19.91	46.00	-26.09	PK
575.63	H	26.14	46.00	-19.86	PK
608.27	H	26.73	46.00	-19.27	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.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Operation Mode:	2410MHz	Test Date :	June 2, 2013
Frequency Range:	1-25GHz	Temperature :	28 ℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	Andy

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4820.49	V	61.84	36.95	74.00	54.00	-12.16	-17.05
7232.28	V	60.25	35.16	74.00	54.00	-13.75	-18.84
9640.04	V	56.64	34.54	74.00	54.00	-17.36	-19.46
12052.51	V	53.95	33.05	74.00	54.00	-20.05	-20.95
--	--	--	--	--	--	--	--
4821.67	H	62.41	38.26	74.00	54.00	-11.59	-15.74
7229.94	H	61.58	35.95	74.00	54.00	-12.42	-18.05
9642.15	H	59.31	33.88	74.00	54.00	-14.69	-20.12
12049.90	H	56.95	32.77	74.00	54.00	-17.05	-21.23

Operation Mode:	2442MHz	Test Date :	June 2, 2013
Frequency Range:	1-25GHz	Temperature :	28 ℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	Andy

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4885.63	V	59.49	35.01	74.00	54.00	-14.51	-18.99
7322.26	V	58.56	33.20	74.00	54.00	-15.44	-20.80
9761.90	V	55.44	31.08	74.00	54.00	-18.56	-22.92
12203.78	V	58.83	29.14	74.00	54.00	-15.17	-24.86
--	--	--	--	--	--	--	--
4890.77	H	58.40	36.55	74.00	54.00	-15.60	-17.45
7320.44	H	55.54	33.24	74.00	54.00	-18.46	-20.76
9780.73	H	52.96	32.56	74.00	54.00	-21.04	-21.44
12209.90	H	52.83	31.33	74.00	54.00	-21.17	-22.67

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.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Operation Mode:	2470MHz	Test Date :	June 2, 2013
Frequency Range:	1-25GHz	Temperature :	28 ℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	Andy

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4949.91	V	58.98	34.72	74.00	54.00	-15.02	-19.28
7430.60	V	58.78	32.96	74.00	54.00	-15.22	-21.04
9895.09	V	57.63	31.06	74.00	54.00	-16.37	-22.94
12374.92	V	53.34	30.29	74.00	54.00	-20.66	-23.71
--	--	--	--	--	--	--	--
4949.22	H	59.29	37.66	74.00	54.00	-14.71	-16.34
7425.06	H	58.12	35.76	74.00	54.00	-15.88	-18.24
9889.92	H	56.37	32.94	74.00	54.00	-17.63	-21.06
12379.90	H	53.65	32.12	74.00	54.00	-20.35	-21.88

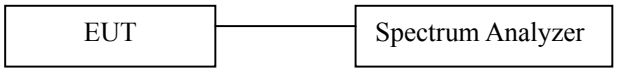
Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

6. BANDWIDTH 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:

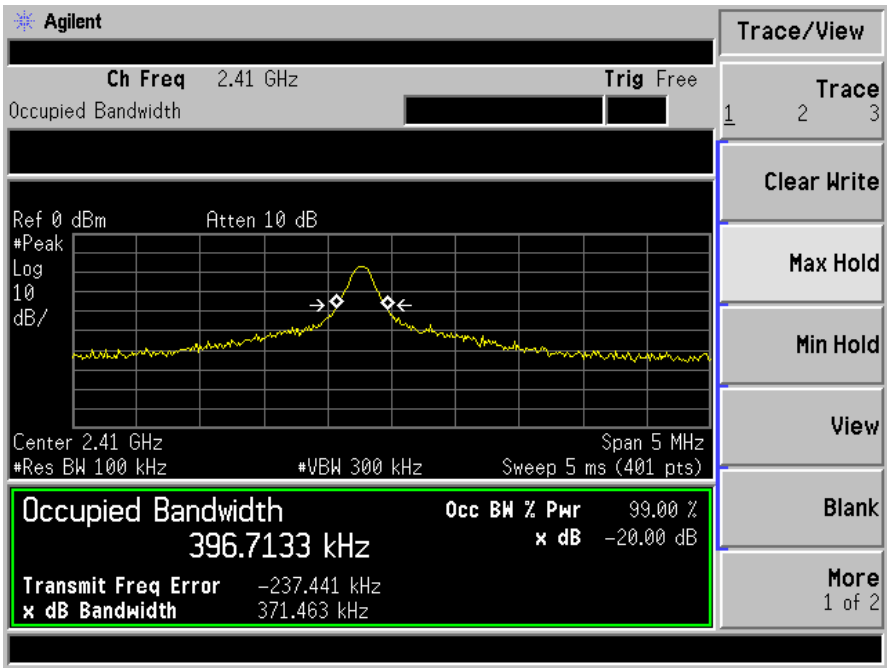
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	88156318	05/29/2013	05/28/2014

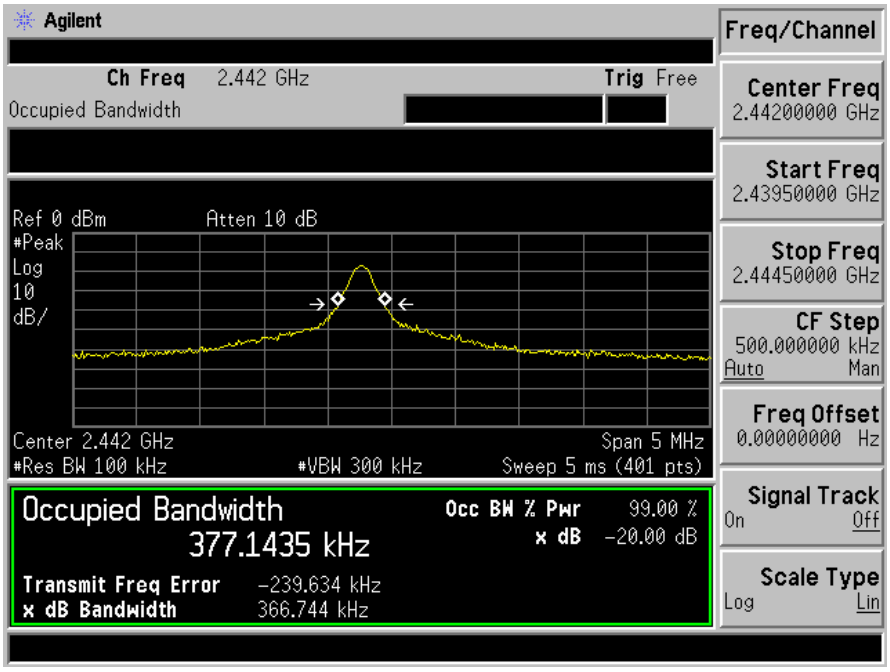
6.4. Measurement Results:

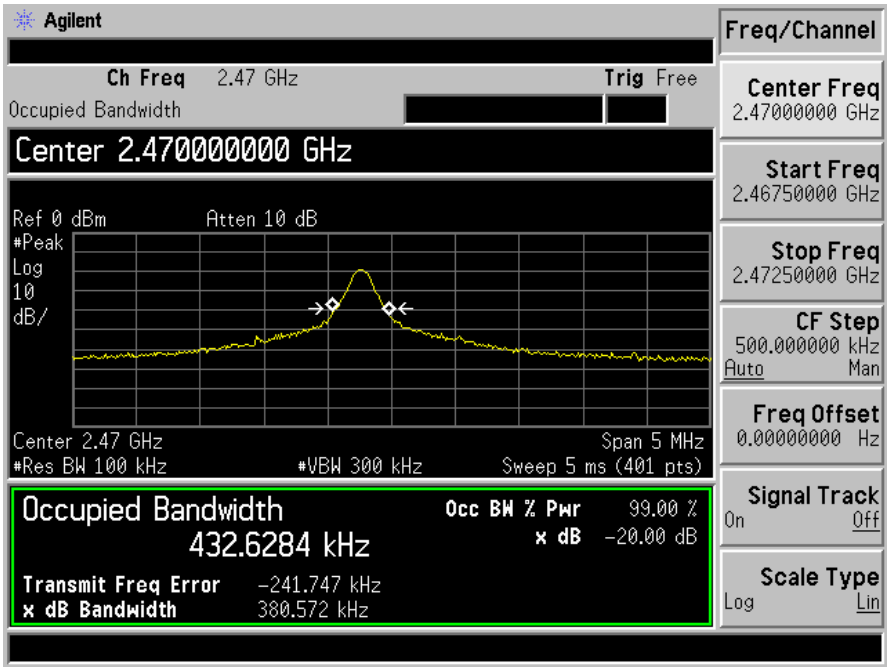
20dB Bandwidth test data Chart:
Refer to attached data chart.

Spectrum Detector:	PK	Test Date:	June 5, 2013
Test By:	Andy	Temperature:	28 ℃
Test Result:	PASS	Humidity:	65 %
Modulation:	GFSK		

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)	99% Down BW(kHz)
CH1	2410	371.463	396.713
CH9	2442	366.744	377.144
CH16	2470	380.572	432.628


Agilent
Trace/View
Ch Freq 2.41 GHz
Trig Free
Occupied Bandwidth
Trace
1 2 3
Clear Write
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Max Hold
Min Hold
View
Center 2.41 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
396.7133 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -237.441 kHz
x dB Bandwidth 371.463 kHz
Blank
More
1 of 2


Agilent
Freq/Channel
Ch Freq 2.442 GHz
Trig Free
Occupied Bandwidth
Center Freq
2.44200000 GHz
Start Freq
2.43950000 GHz
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Stop Freq
2.44450000 GHz
CF Step
500.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Center 2.442 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Signal Track
On Off
Occupied Bandwidth
377.1435 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -239.634 kHz
x dB Bandwidth 366.744 kHz
Scale Type
Log Lin


Agilent
Ch Freq 2.47 GHz
Trig Free
Occupied Bandwidth
Center 2.470000000 GHz
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 2.47 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
432.6284 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -241.747 kHz
x dB Bandwidth 380.572 kHz
Freq/Channel
Center Freq
2.47000000 GHz
Start Freq
2.46750000 GHz
Stop Freq
2.47250000 GHz
CF Step
500.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin

7. BAND EDGE TEST

7.1. 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.

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

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

7.3. Measurement Equipment Used:

Same as 5.3 Radiated Emission Measurement.

7.4. Measurement Results:

Both GFSK and hopping modes have been tested and the result recorded as below:

Spectrum Detector:	PK/AV	Test Date :	June 6, 2013
Test By:	Andy	Temperature :	28 ℃
Test channel:	CH01	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390.00	H	42.25	39.18	74	54
2390.00	V	45.72	41.75	74	54

Spectrum Detector:	PK/AV	Test Date :	June 6, 2013
Test By:	Andy	Temperature :	28 ℃
Test channel:	CH16	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2483.50	H	41.30	39.48	74	54
2483.50	V	44.74	40.96	74	54

Spectrum Detector:	PK/AV	Test Date :	June 6, 2013
Test By:	Andy	Temperature :	28 ℃
Test mode:	Hopping mode	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390.00	H	43.07	39.25	74	54
2390.00	V	42.06	38.51	74	54
2483.50	H	41.05	39.29	74	54
2483.50	V	42.39	39.38	74	54

8. Antenna Application

8.1 Antenna Requirement

For intentional device, according to FCC 47 CFR 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.2 Result

The EUT'S antenna is PCB Antenna. The antenna's gain is -2dBi and meets the requirement.