

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

OF

2.4GHz Radio Control system

**MODEL No.: ETF4SDL-2.4G** 

Trademark: N/A

FCC ID: 2AAIZETF4SDL

**REPORT NO: ES130926216E** 

**ISSUE DATE: October 16, 2013** 

Prepared for SHENZHEN ART-TECH R/C HOBBY CO., LTD. DONGGUAN BRANCH

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# **VERIFICATION OF COMPLIANCE**

Applicant:	SHENZHEN ART-TECH R/C HOBBY CO., LTD. DONGGUAN
	BRANCH
	ART-TECH Aviation Science Park, Industrial Road, Langzhou Village,
	ChangPing Town, DongGuan City, China
Manufacturer:	SHENZHEN ART-TECH R/C HOBBY CO., LTD. DONGGUAN
	BRANCH
	ART-TECH Aviation Science Park, Industrial Road, Langzhou Village,
	ChangPing Town, DongGuan City, China
Product Description:	2.4GHz Radio Control system
Model Number:	ETF4SDL-2.4G
Date of Test:	September 26, 2013 to October 14, 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:	September 26, 2013 to October 14, 2013		
Prepared by :	Jack. Li		
	Jack Li/Editor		
Reviewer :	Tune XIVE		
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Approve & Authorized Signer :			
	Lisa Wang/Manager		



# **Table of Contents**

1.	GENERAL INFORMATION	5
1.1.	PRODUCT DESCRIPTION	5
1.2.	RELATED SUBMITTAL(S) / GRANT (S)	
1.3.	TEST METHODOLOGY	5
1.4.	SPECIAL ACCESSORIES	5
1.5.	EQUIPMENT MODIFICATIONS	5
1.6.	MEASUREMENT UNCERTAINTY	6
1.7.	TEST FACILITY	6
2.	SYSTEM TEST CONFIGURATION	7
2.1.	EUT CONFIGURATION	7
2.2.	EUT Exercise	7
2.3.	TEST PROCEDURE	7
2.4.	DESCRIPTION OF TEST MODES	8
3.	SUMMARY OF TEST RESULTS	9
3.1.	CONFIGURATION OF TESTED SYSTEM	9
3.2.	DESCRIPTION OF SUPPORT UNITS	
4.	CONDUCTED EMISSIONS TEST	10
4.1.	MEASUREMENT PROCEDURE:	10
4.2.	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
4.3.	MEASUREMENT EQUIPMENT USED:	
4.4.	CONDUCTED EMISSION LIMIT	
4.5.	MEASUREMENT RESULT:	
5.	RADIATED EMISSION TEST	11
5.1.	MEASUREMENT PROCEDURE	11
5.2.	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	12
5.3	MEASUREMENT EQUIPMENT USED:	13
5.4	RADIATED EMISSION LIMIT	13
5.5	MEASUREMENT RESULT	15
6.	BANDWIDTH TEST	21
6.1.	MEASUREMENT PROCEDURE	21
6.2.	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	21
6.3.	MEASUREMENT EQUIPMENT USED:	21
6.4.	MEASUREMENT RESULTS:	21
7.	BAND EDGE TEST	24
7.1.	MEASUREMENT PROCEDURE	24
7.2.	TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
7.3.	MEASUREMENT EQUIPMENT USED:	
7.4.	MEASUREMENT RESULTS:	24

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8.	ANTENNA APPLICATION	25
8.1	Antenna Requirement	25
8.2	Result	25



# 1. GENERAL INFORMATION

# 1.1. Product Description

SHENZHEN ART-TECH R/C HOBBY CO., LTD. DONGGUAN BRANCH

Model: 2.4GHz Radio Control system (referred to as the EUT in this report) ETF4SDL-2.4G, 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: 2430MHz~2474MHz

B). Modulation: GFSK

C). Number of Channels: 45

D). Channel space: 1MHz

E). Antenna Type: PCB antenna

F). Antenna Gain: 0dBi

G). Power Supply: 6.0V DC(Supplied by 4\*1.5V AAA Battery)

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

This submittal(s) (test report) is intended for FCC ID: 2AAIZETF4SDL 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	Calculated
		Level (%)	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 (2.4GHz Radio Control system) 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. The 3 channels of lower, medium and higher were chosen for test.

Pretest Mode	Description
Mode 1	Low – 2430MHz
Mode 2	Middle – 2452MHz
Mode 3	High -2474MHz

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

For Radiated Test		
Mode 1	Low – 2430MHz	
Mode 2	Middle – 2452MHz	
Mode 3	High -2474MHz	



# 3. SUMMARY OF TEST RESULTS

FCC Part15, Subpart C (15.249)&Canada RSS-Gen:2010				
Standard Section Test Item Resu				
FCC	Test Item	Kesuit		
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

EUT

# 3.2. DESCRIPTION OF SUPPORT UNITS

Equipment	Mfr/Brand	Model/Type No.	FCC ID / IC	Series No.	Note
2.4GHz Radio Control system	N/A	ETF4SDL-2.4G	2AAIZETF4SDL	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 6V battery.



# 5. RADIATED EMISSION TEST

#### **5.1.** Measurement Procedure

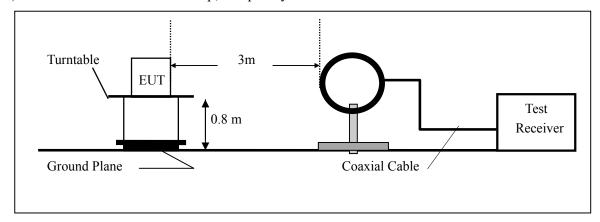
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 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.

TRF No: FCC 15.249/A Page 11 of 25 Report No ES130926216E

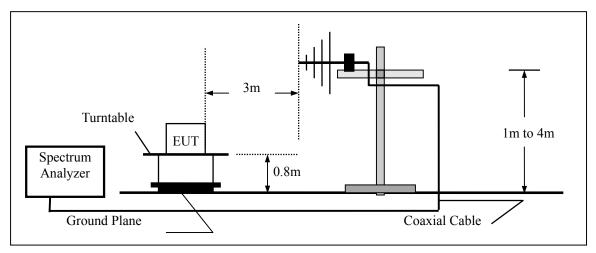


# **5.2. Test SET-UP (Block Diagram of Configuration)**

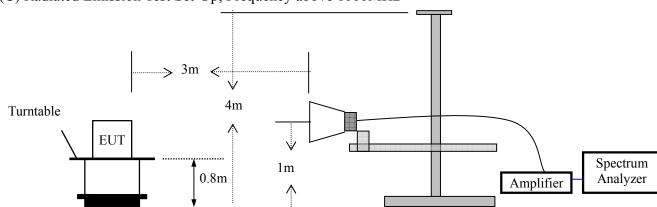
# (A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



TRF No: FCC 15.249/A Page 12 of 25 Report No ES130926216E



# **5.3** Measurement Equipment Used:

EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
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	Field Strength (micorvolts/meter)	Measurement Distance
(MHz)	(IIIICOI VOITS/IIICTCI)	(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).

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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: CH1: 2430MHz Test Date: October 14, 2013

FCC Part: 15.249(a) Temperature: 24°C Test Result: PASS Humidity: 55 % Measured Distance: 3m Test By: WOLF

Test Method Used: As detailed in ANSI C63.4 Section 8 and relevant annexes

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit		Over(dB)	
(MHz)				3m(dBuV/m)			
	H/V	PK	AV	PK	AV	PK	AV
2430	V	91.89	50.27	114	94	-22.11	-43.73
2430	Н	91.39	50.07	114	94	-22.61	-43.93

Operation Mode: CH23: 2452MHz Test Date: October 14, 2013

FCC Part: 15.249(a) Temperature : 24°C Test Result: PASS Humidity : 55 % Measured Distance: 3m Test By: WOLF

Test Method Used: As detailed in ANSI C63.4 Section 8 and relevant annexes

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit		Over(dB)	
(MHz)				3m(dBuV/m)			
	H/V	PK	AV	PK	AV	PK	AV
2452	V	91.52	50.59	114	94	-22.48	-43.41
2452	Н	93.76	52.84	114	94	-20.24	-41.16

Operation Mode: CH45: 2474MHz Test Date: October 14, 2013

FCC Part: 15.249(a) Temperature:  $24^{\circ}$ C Test Result: PASS Humidity:  $55^{\circ}$  Measured Distance: 3m Test By: WOLF

Test Method Used: As detailed in ANSI C63.4 Section 8 and relevant annexes

Freq.	Ant.Pol.	Emission Level(dBuV/m)		Limit		Over(dB)	
(MHz)				3m(dBuV/m)			
	H/V	PK	AV	PK	AV	PK	AV
2474	V	91.37	49.71	114	94	-22.63	-44.29
2474	Н	94.02	53.25	114	94	-19.98	-40.75



Operation Mode: TX Test Date: October 14, 2013

Frequency Range: 9KHz~30MHz Temperature: 24°C Test Result: PASS Humidity: 55 % Measured Distance: 3m Test By: WOLF

Freq. (MHz)	Ant.Pol.	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
(IVII IZ)		(dDd v/III) 	(dDd v/III)	

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: 2430MHz Test Date: October 14, 2013

Frequency Range:  $30\sim1000 \text{MHz}$  Temperature:  $24^{\circ}\text{C}$  Test Result: PASS Humidity:  $55^{\circ}\text{M}$  Measured Distance: 3m Test By: KL

Freq.	Ant.Pol.	Emission Level	Limit 3m	Margin	Note
(MHz)	H/V	(dBuV/m)	(dBuV/m)	(dB)	
56.43	V	14.90	40.00	-25.10	PK
73.53	V	17.61	40.00	-22.39	PK
95.29	V	17.16	43.50	-26.34	PK
160.58	V	19.81	43.50	-23.69	PK
471.47	V	20.83	46.00	-25.17	PK
699.98	V	24.71	46.00	-21.29	PK
50.21	Н	14.32	40.00	-25.68	PK
103.06	Н	14.24	43.50	-29.26	PK
308.25	Н	17.66	46.00	-28.34	PK
452.82	Н	20.05	46.00	-25.95	PK
609.82	Н	23.57	46.00	-22.43	PK
692.21	Н	25.40	46.00	-20.60	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.

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Operation Mode: 2452MHz Test Date: October 14, 2013

Frequency Range:  $30\sim1000 \text{MHz}$  Temperature:  $24^{\circ}\text{C}$  Test Result: PASS Humidity:  $55^{\circ}\text{M}$  Measured Distance: 3m Test By: KL

Freq.	Ant.Pol.	Emission Level	Limit 3m	Margin	Note
(MHz)	H/V	(dBuV/m)	(dBuV/m)	(dB)	
42.44	V	14.56	40.00	-25.44	PK
95.29	V	17.19	43.50	-26.31	PK
160.58	V	20.18	43.50	-23.32	PK
358.00	V	18.01	46.00	-27.99	PK
420.18	V	21.00	46.00	-25.00	PK
653.35	V	24.50	46.00	-21.50	PK
37.77	Н	14.22	40.00	-25.78	PK
101.51	Н	14.33	43.50	-29.17	PK
281.83	Н	16.76	46.00	-29.24	PK
421.73	Н	19.80	46.00	-26.20	PK
665.79	Н	24.70	46.00	-21.30	PK
813.46	Н	25.44	46.00	-20.56	PK

Operation Mode: 2474MHz Test Date: October 14, 2013

Frequency Range:  $30\sim1000 \text{MHz}$  Temperature:  $24^{\circ}\text{C}$  Test Result: PASS Humidity:  $55^{\circ}$  Measured Distance: 3m Test By: KL

Freq.	Ant.Pol.	Emission Level	Limit 3m	Margin	Note
(MHz)	H/V	(dBuV/m)	(dBuV/m)	(dB)	
54.87	V	14.59	40.00	-25.41	PK
73.53	V	18.10	40.00	-21.90	PK
96.84	V	15.73	43.50	-27.77	PK
160.58	V	19.54	43.50	-23.96	PK
460.59	V	20.09	46.00	-25.91	PK
667.34	V	25.20	46.00	-20.80	PK
47.10	Н	14.41	40.00	-25.59	PK
106.17	Н	14.24	43.50	-29.26	PK
224.31	Н	15.66	46.00	-30.34	PK
348.67	Н	18.45	46.00	-27.55	PK
452.82	Н	20.05	46.00	-25.95	PK
676.67	Н	24.78	46.00	-21.22	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.

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Operation Mode: 2430MHz Test Date: October 14, 2013

Frequency Range: 1-25GHz Temperature:  $24^{\circ}$ C Test Result: PASS Humidity: 55 % Measured Distance: 3m Test By: Andy

Freq.	Ant.Pol.	Emission L	evel(dBuV/m)	Limit 3m(c	dBuV/m)	Margi	n(dB)
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4860.00	V	57.40	31.31	74.00	54.00	-16.60	-22.69
7290.00	V	58.03	33.39	74.00	54.00	-15.97	-20.61
9720.00	V	57.09	34.34	74.00	54.00	-16.91	-19.66
12150.00	V	61.10	34.30	74.00	54.00	-12.90	-19.70
14580.00	V	60.10	33.14	74.00	54.00	-13.90	-20.86
17010.00	V	64.23	35.21	74.00	54.00	-9.77	-18.79
4860.00	Н	57.60	32.71	74.00	54.00	-16.40	-21.29
7290.00	Н	57.60	30.87	74.00	54.00	-16.40	-23.13
9720.00	Н	59.80	32.25	74.00	54.00	-14.20	-21.75
12150.00	Н	59.83	33.56	74.00	54.00	-14.17	-20.44
14580.00	Н	61.26	33.12	74.00	54.00	-12.74	-20.88
17010.00	Н	64.80	33.42	74.00	54.00	-9.20	-20.58

**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.

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Operation Mode: 2452MHz Test Date: October 14, 2013

Frequency Range: 1-25GHz Temperature: 24°C Test Result: PASS Humidity: 55 % 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
4904.00	V	57.18	30.79	74.00	54.00	-16.82	-23.21
7356.00	V	57.45	29.36	74.00	54.00	-16.55	-24.64
9808.00	V	59.26	30.90	74.00	54.00	-14.74	-23.10
12260.00	V	60.55	32.50	74.00	54.00	-13.45	-21.50
14712.00	V	60.56	33.94	74.00	54.00	-13.44	-20.06
17164.00	V	66.56	35.21	74.00	54.00	-7.44	-18.79
4904.00	Н	55.80	34.49	74.00	54.00	-18.20	-19.51
7356.00	Н	57.56	29.13	74.00	54.00	-16.44	-24.87
9808.00	Н	61.51	29.57	74.00	54.00	-12.49	-24.43
12260.00	Н	60.27	32.38	74.00	54.00	-13.73	-21.62
14712.00	Н	60.57	31.27	74.00	54.00	-13.43	-22.73
17164.00	Н	65.07	33.62	74.00	54.00	-8.93	-20.38

#### 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.

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Operation Mode: 2474MHz Test Date: October 14, 2013

Frequency Range: 1-25GHz Temperature: 24°C Test Result: PASS Humidity: 55 % 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
4948.00	V	58.56	28.11	74.00	54.00	-15.44	-25.89
7422.00	V	57.98	28.69	74.00	54.00	-16.02	-25.31
9896.00	V	60.08	32.54	74.00	54.00	-13.92	-21.46
12370.00	V	60.09	33.59	74.00	54.00	-13.91	-20.41
14844.00	V	61.17	43.05	74.00	54.00	-12.83	-10.95
17318.00	V	65.50	32.25	74.00	54.00	-8.50	-21.75
4948.00	Н	57.30	29.91	74.00	54.00	-16.70	-24.09
7422.00	Н	57.83	29.66	74.00	54.00	-16.17	-24.34
9896.00	Н	57.92	30.32	74.00	54.00	-16.08	-23.68
12370.00	Н	60.40	31.62	74.00	54.00	-13.60	-22.38
14844.00	Н	61.19	30.49	74.00	54.00	-12.81	-23.51
17318.00	Н	64.41	30.27	74.00	54.00	-9.59	-23.73

#### 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)

EUT		Spectrum Analyzer
-----	--	-------------------

**6.3.** Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
TILE		MONIDER	NONDER	C/1L.	
Spectrum Analyzer	Agilent	E4407B	88156318	05/29/2013	05/28/2014

#### **6.4. Measurement Results:**

20dB Bandwidth test data Chart:

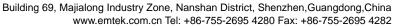
Refer to attached data chart.

Spectrum Detector: PK Test Date: October 14, 2013

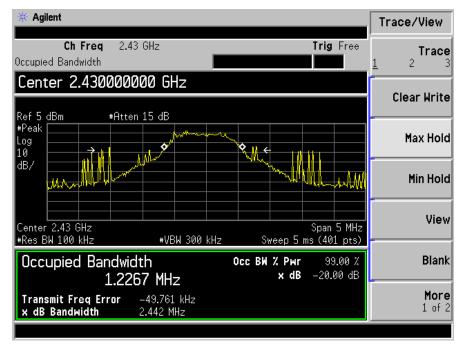
Test By: Andy Temperature:  $24^{\circ}$ C Test Result: PASS Humidity:  $55^{\circ}$ %

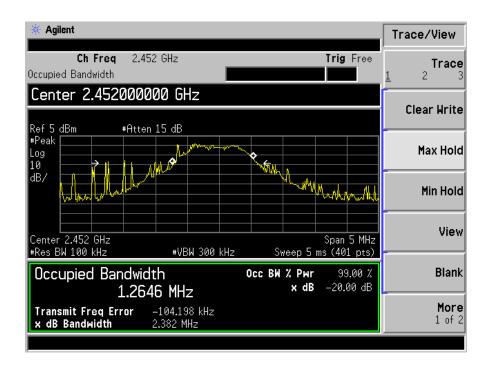
Modulation: GFSK

Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
CH1	2430	2442.00
CH23	2452	2382.00
CH45	2474	2476.00





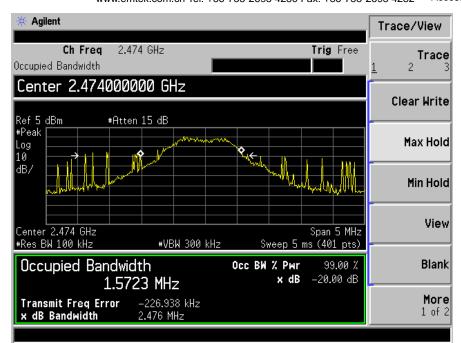




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# 7. BAND EDGE TEST

#### 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:

Spectrum Detector: PK/AV Test Date: October 14, 2013

Test By: Andy Temperature :  $24^{\circ}$ C Test channel: CH1(2430MHz) Humidity : 55 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390.00	Н	41.84	38.59	74	54
2390.00	V	44.27	39.12	74	54

Spectrum Detector: PK/AV Test Date: October 14, 2013

Test By: Andy Temperature : 24℃ Test channel: CH3(2474MHz) Humidity : 55 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2483.50	Н	46.65	40.33	74	54
2483.50	V	47.81	40.96	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.

#### 8.2 Result

The EUT'S antenna is PCB Antenna. The antenna's gain is 0dBi and meets the requirement.

TRF No: FCC 15.249/A Page 25 of 25 Report No ES130926216E