

TEST REPORT

FCC ID: 2AEIGKNNS0002

Applicant : Firelands Group, LLC
Address : 1214 Dorchester Dr, 2919 Crossing Court, Suite 2, Champaign, IL
61822

Equipment Under Test (EUT):

Name	:	IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System
Model	:	KNNS0002

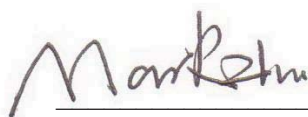
In Accordance with: FCC PART 15, SUBPART C : 2014 (Section 15.247)

Report No : T1850867 05
Date of Test : July 16- July 24, 2015
Date of Issue : July 27, 2015

Test Result: **PASS**

In the configuration tested, the EUT complied with the standards specified above

Authorized Signature



(Mark Zhu)

General Manager

The manufacture should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Alpha Product Testing Co., Ltd Or test done by Shenzhen Alpha Product Testing Co., Ltd Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Alpha Product Testing Co., Ltd Approvals in writing.

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1. General Information

1.1. Description of Device (EUT)

EUT	: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System
Model No.	: KNNS0002
DIFF.	: N/A
Trade mark	: N/A
Power supply	: DC 6V from battery, 4*1.5V AA battery
Radio	: 2.4G ISM Band
Technology	
Operation frequency	: 2405-2478MHz
Modulation	: FHSS(FSK)
Antenna Type	: Integrated Antenna, max gain 2.5dBi.
Applicant	: Firelands Group, LLC
Address	: 1214 Dorchester Dr, 2919 Crossing Court,Suite 2, Champaign, IL 61822
Manufacturer	KATUMFEI INDUSTRY LIMITED(HK)
Address	FuCheng Industrial Town,Hong Tian,ShaJing,ShenZhen

1.2. Accessories of device (EUT)

Accessories	: N/A
Model	N/A
Input	N/A
Output	N/A
Accessories2	: N/A
Model	N/A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,
Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.4 :2014	PASS
Bandwidth	FCC Part 15: 15.215 ANSI C63.4 :2014	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.4 :2014	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.4 :2014	PASS
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.4 :2014	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.4 :2014	N/A
Antenna requirement	FCC Part 15: 15.203	PASS

2.2. Assistant equipment used for test

Description	:	N/A
Manufacturer	:	N/A
Model No.	:	N/A

2.3. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was set into test mode before test.



2.4. Test mode

EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
FHSS(FSK)	Low :CH1	2405
	Middle: CH37	2441
	High: CH74	2478

Remark: New battery is used during all test

2.5. Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last Cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2015.01.19	1 Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2015.01.19	1 Year
Receiver	R&S	ESCI	101165	2015.01.19	1 Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2015.01.21	2 Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2015.01.21	2 Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2015.01.21	2 Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2015.01.19	1 Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2015.01.19	1 Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2015.01.19	1 Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2015.01.19	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	2015.01.19	1 Year
Power sensor	Anritsu	ML2491A	32516	2015.01.19	1 Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2015.01.19	1 Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2015.01.19	1 Year

3. Maximum Peak Output power

3.1. Limit

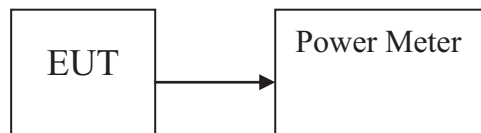
Please refer section 15.247.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System					
M/N: KNNS0002					
Test date: 2015-07-22		Test site: RF site		Tested by: Peter	
Mode	Freq (MHz)	PK Output Power (dBm)	PK Output Power (mW)	Limit (dBm)	Margin (dB)
FHSS(FSK)	2405	16.34	43.053	30	13.660
	2441	16.71	46.881	30	13.290
	2478	17.09	51.168	30	12.910
Conclusion: PASS					

4. Bandwidth

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

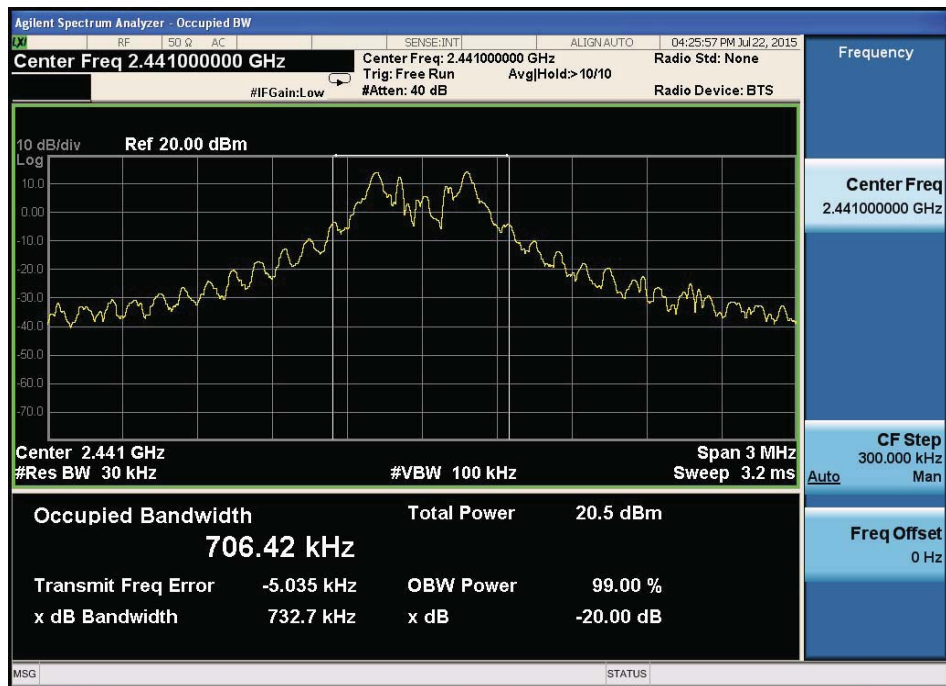
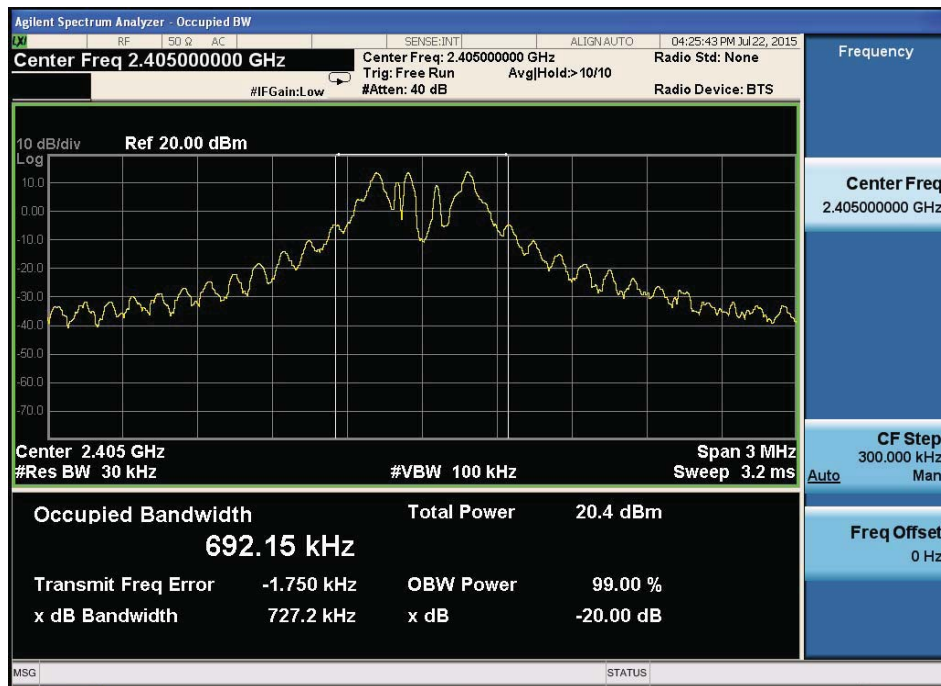
4.2. Test Procedure

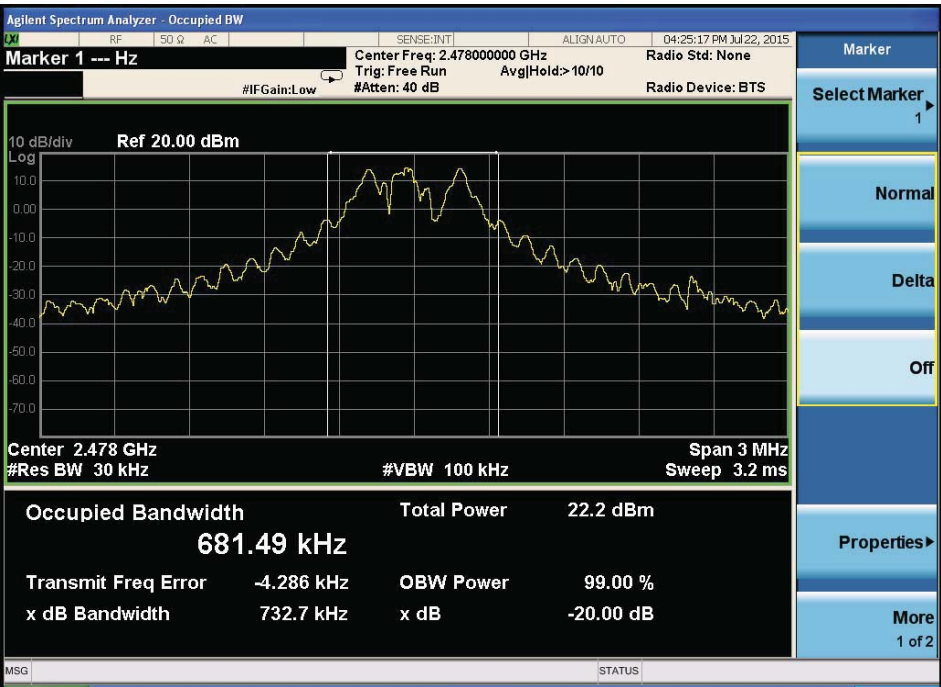
The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 30kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System				
M/N: KNNS0002				
Test date: 2015-07-22		Test site: RF site		Tested by: Peter
Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
FHSS(FSK)	2405	727.2	/	PASS
	2441	732.7	/	PASS
	2478	732.7	/	PASS

Original Test data For 20dB bandwidth
FHSS(FSK):





5. Carrier Frequency Separation

5.1. Limit

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

5.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The carrier frequency was measured by spectrum analyzer with 30kHz RBW and 30kHz VBW.

5.3. Test Result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System M/N: KNNS0002				
Test date: 2015-07-22		Test site: RF site		Tested by: Simple
Mode/Channel	Channel separation (KHz)	20dB Bandwidth (KHz)	Limit (KHz) 2/3 20dB bandwidth	Conclusion
FHSS(FSK)	1002	732.7	488.467	PASS

Original test data for channel separation
FHSS(FSK)



6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

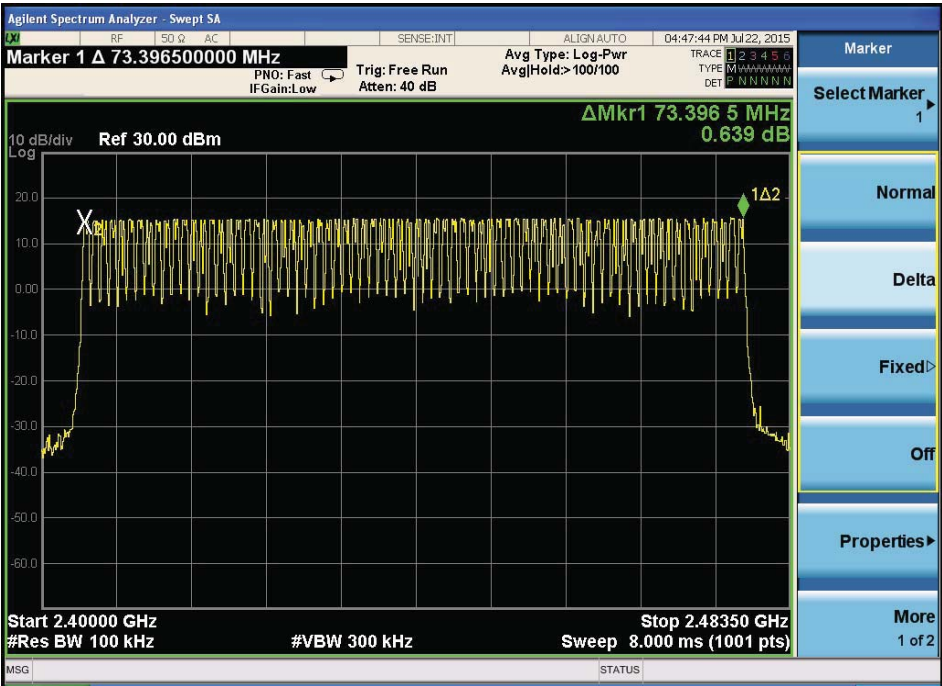
6.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW.

6.3. Test Result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System			
M/N: KNNS0002			
Test date: 2015-07-22		Test site: RF site	Tested by: Peter
Mode	Number of hopping channel	Limit	Conclusion
FHSS(FSK)	74	>15	PASS

Original test data for hopping channel number
FHSS(FSK)



7. Dwell Time

7.1. Test limit

Please refer section 15.247

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

7.2. Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

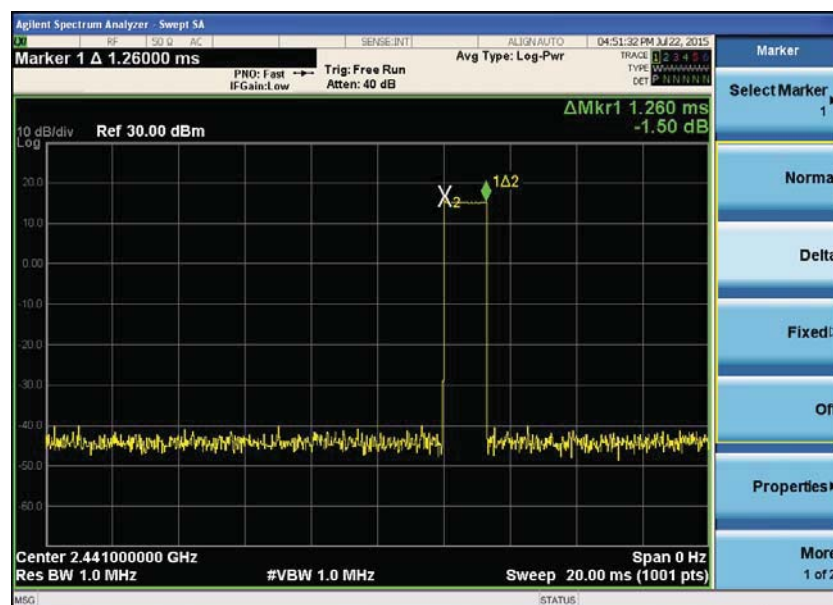
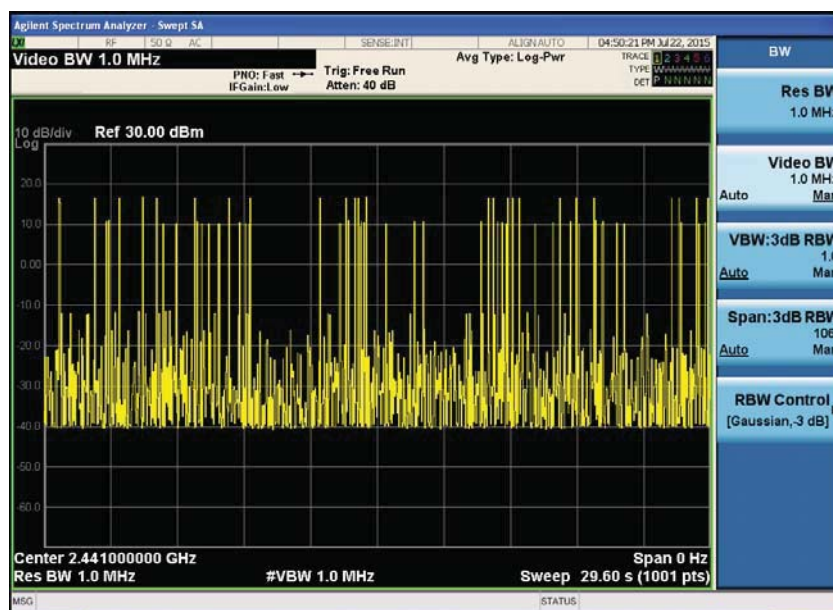
7.3. Test Results

PASS.

Detailed information please see the following page.

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System					
M/N: KNNS0002					
Test date: 2015-07-22	Test site: RF site Tested by: Peter				
Mode	Frequency (MHz)	Total Pulse Duration (ms)	Total Dwell Time (s)	Limit (s)	Conclusion
FHSS(FSK)	2441	57*1.260=71.82	0.07182	<0.4	PASS
Note1: A period time = 0.4 (s) * 74 = 29.6(s)					

FHSS(FSK)



8. Radiated emissions

8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

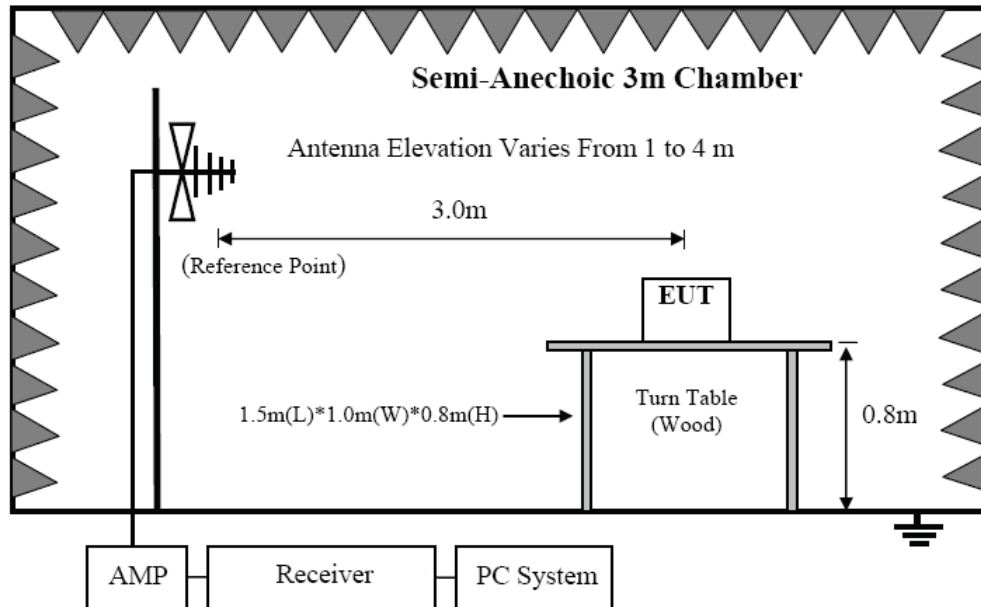
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

15.209 Limit

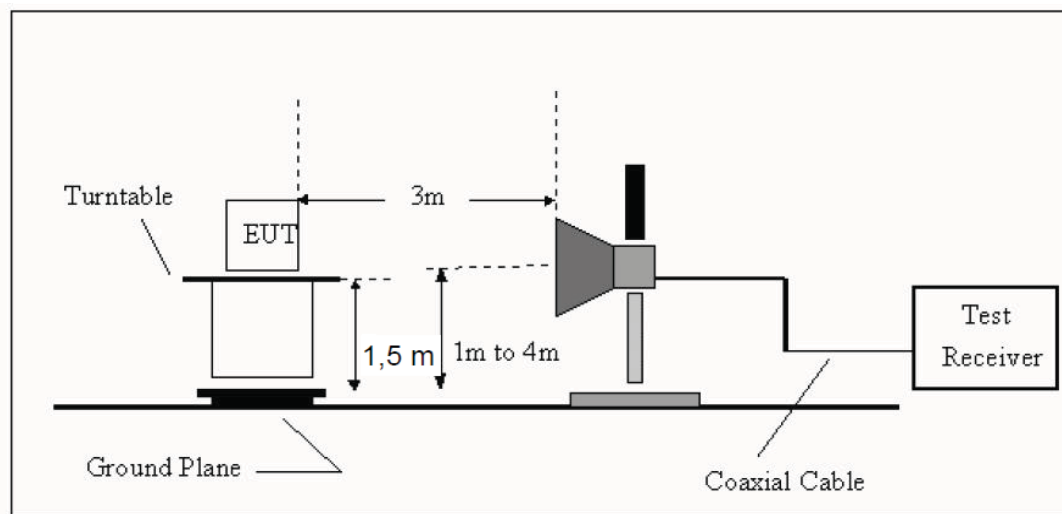
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz test, and 150 cm above the ground plane for above 1GHz test.
- (2) Setup EUT and simulator as shown in section 1.4 and 6.1
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan

-
- procedure was first performed in order to find prominent radiated emissions.
- (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
 - (4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
 - (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on Radiated Emission test.
 - (6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

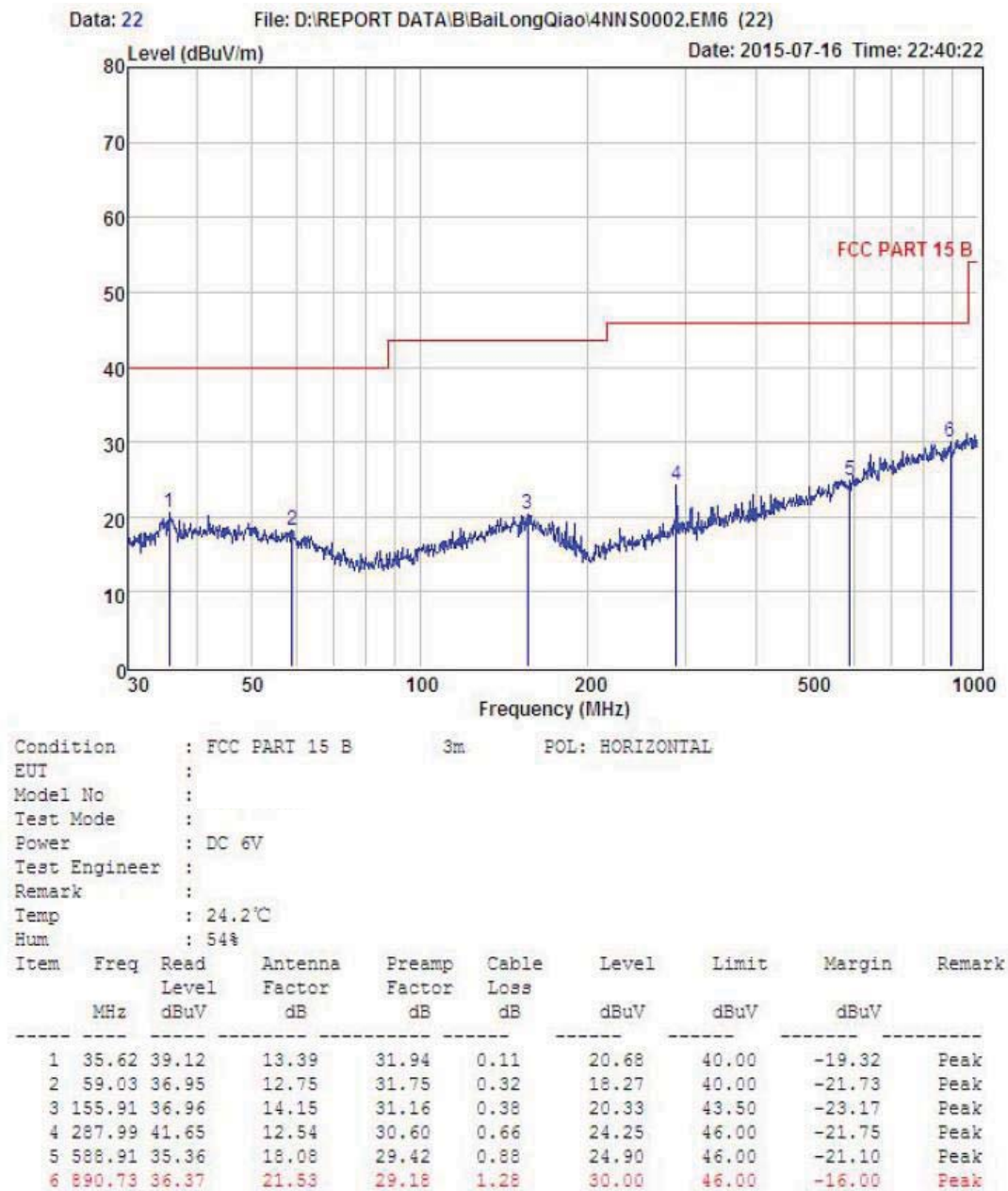
8.4. Test Result

We have scanned the 10th harmonic from 9KHz to the EUT.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

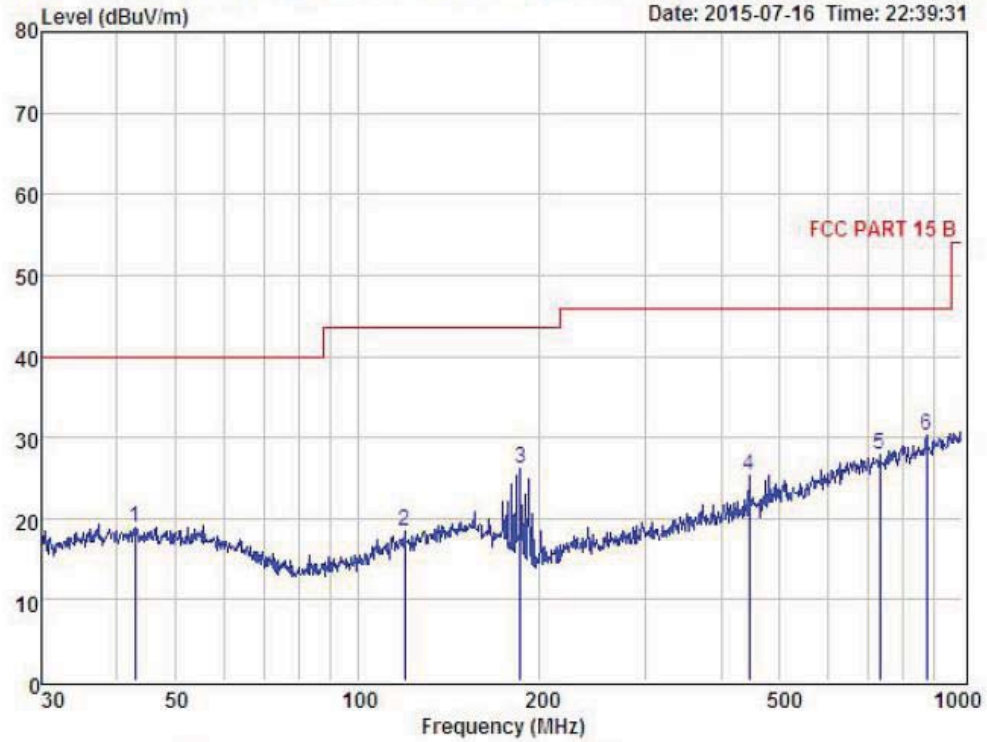
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

From 30MHz to 1000MHz: Conclusion: PASS



Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Data: 21 File: D:\REPORT DATA\B\BaiLongQiao\4NNS0002.EM6 (22) Date: 2015-07-16 Time: 22:39:31



Condition : FCC PART 15 B 3m POL: VERTICAL
 EUT :
 Model No :
 Test Mode :
 Power : DC 6V
 Test Engineer :
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamplifier Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	42.90	36.78	13.79	31.87	0.14	18.84	40.00	-21.16	Peak
2	119.86	37.27	12.06	31.31	0.36	18.38	43.50	-25.12	Peak
3	185.79	45.56	10.95	31.00	0.57	26.08	43.50	-17.42	Peak
4	444.85	38.72	15.87	30.07	0.76	25.28	46.00	-20.72	Peak
5	731.92	35.66	20.06	29.23	1.33	27.82	46.00	-18.18	Peak
6	875.25	36.48	21.32	29.17	1.52	30.15	46.00	-15.85	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Remark: All modes have been tested, and only worst data of FHSS(FSK) mode, Channel 2405MHz was listed in this report.

1GHz—25GHz Radiated emission Test result

EUT: IKONNIK	ET4	4Ch	2.4GHz	Xenon	(Xe)	AW	Radio	System
M/N: KNNS0002								

Power: DC 3.7V From battery

Test date: 2015-07-16 Test site: 3m Chamber Tested by: Peter

Test mode: FHSS(FSK) Tx CH1 2405MHz

Antenna polarity: Vertical

No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4810	51.64	31.25	5.7	34.2	54.39	74	19.61	PK
2	4810	40.96	31.25	5.7	34.2	43.71	54	10.29	AV
3	7215	/							
4	/	/							
5	/	/							

Antenna Polarity: Horizontal

1	4810	54.38	31.25	5.7	34.2	57.13	74	16.87	PK
2	4810	42.46	31.25	5.7	34.2	45.21	54	8.79	AV
3	7215	/							
4	/	/							
5	/	/							

Note:

1, Measuring frequency from 1GHz to 25GHz

2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,
Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emission Test result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System

M/N: KNNS0002

Power: DC 3.7V From battery

Test date: 2015-07-22 Test site: 3m Chamber Tested by: Peter

Test mode: FHSS(FSK) Tx CH40 2441MHz

Antenna polarity: Vertical

No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	4882	51.87	31.68	5.75	34.29	55.01	74	18.99	PK
2	4882	41.37	31.68	5.75	34.29	44.51	54	9.49	AV
3	7323	/							
4	9764	/							
5	12205	/							

Antenna Polarity: Horizontal

1	4882	54.34	31.68	5.75	34.29	57.48	74	16.52	PK
2	4882	42.64	31.68	5.75	34.29	45.78	54	8.22	AV
3	7323	/							
4	9764	/							
5	12205	/							

Note:

1, Measuring frequency from 1GHz to 25GHz

2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,
Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

$$3, \text{ Result} = \text{Read level} + \text{Antenna factor} + \text{cable loss-Amp factor}$$

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

1GHz—25GHz Radiated emission Test result

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System

M/N: KNNS0002

Power: DC 3.7V From battery

Test date: 2015-07-22 Test site: 3m Chamber Tested by: Peter

Test mode: FHSS(FSK) Tx CH79 2478MHz

Antenna polarity: Vertical

No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	4956	56.18	31.5	5.79	34.06	59.41	74	14.59	PK
2	4956	43.33	31.5	5.79	34.06	46.56	54	7.44	AV
3	7434	/							
4	/	/							
5	/	/							

Antenna Polarity: Horizontal

1	4956	54.01	31.5	5.79	34.06	57.24	74	16.76	PK
2	4956	42.47	31.5	5.79	34.06	45.7	54	8.3	AV
3	7434	/							
4	/	/							
5	/	/							

Note:

1, Measuring frequency from 1GHz to 25GHz

2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,
Detector: PK

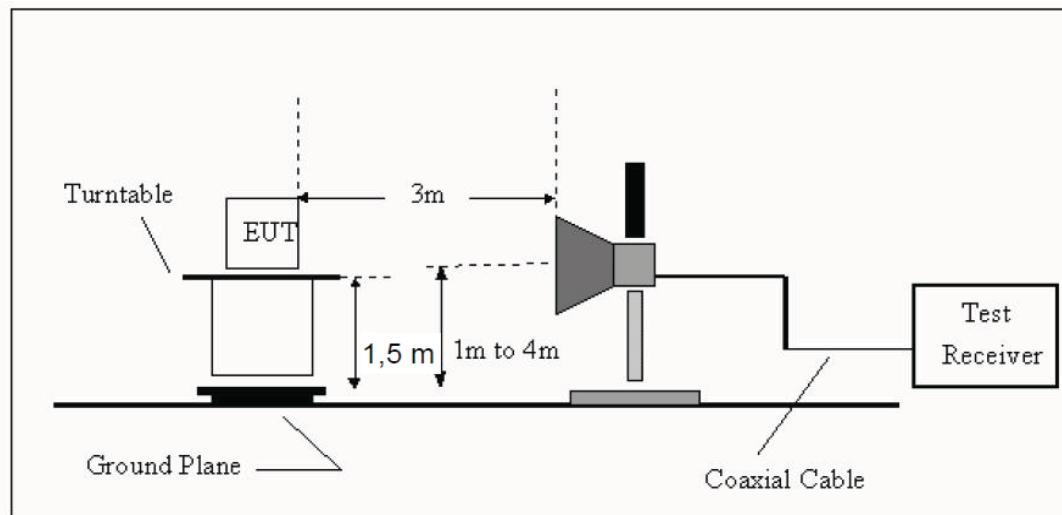
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

9.3. Test Procedure

All restriction band and non- restriction band have been tested , only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

CH LOW :

Band Edge Test result								
EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System								
M/N: KNNS0002								
Power: DC 6.0V From battery								
Test date: 2015-07-16 Test site: 3m Chamber Tested by: Peter								
Test mode: Tx CH1 2405MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	53.76	27.62	3.92	34.97	50.33	74	23.67	PK
2390	/	27.62	3.92	34.97	/	54	/	AV
2400	66.71	27.62	3.94	34.97	63.30	74	10.70	PK
2400	50.46	27.62	3.94	34.97	47.05	54	6.95	AV
Antenna Polarity: Horizontal								
2390	52.54	27.62	3.92	34.97	49.11	74	24.89	PK
2390	/	27.62	3.92	34.97	/	54	/	AV
2400	64.33	27.62	3.94	34.97	60.92	74	13.08	PK
2400	49.27	27.62	3.94	34.97	45.86	54	8.14	AV
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result	
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1
34	1
35	1
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39	1
40	1
41	1
42	1
43	1
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46	1
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76	1
77	1
78	1
79	1
80	1
81	1
82	1
83	1
84	1
85	1
86	1
87	1
88	1
89	1
90	1
91	1
92	1
93	1
94	1
95	1
96	1
97	1
98	1
99	1
100	1

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System

M/N: KNNS0002

Power: DC 6.0V From battery

Test date: 2015-07-16	Test site: 3m Chamber	Tested by: Peter
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Test mode: Tx CH74 2478MHz

Antenna polarity: Vertical

[illegible]

Antenna Polarity: Horizontal

2483.5	61.47	27.59	4.00	34.97	58.09	74	15.91	PK
2483.5	48.32	27.59	4.00	34.97	44.94	54	9.06	AV

Note:

1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,
Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Band Edge Test result								
EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System								
M/N: KNNS0002								
Power: DC 6.0V From battery								
Test date: 2015-07-16 Test site: 3m Chamber Tested by: Peter								
Test mode: Hopping								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	51.67	27.62	3.92	34.97	48.24	74	25.76	PK
2390	/	27.62	3.92	34.97	/	54	/	AV
2400	62.19	27.62	3.94	34.97	58.78	74	15.22	PK
2400	49.38	27.62	3.94	34.97	45.97	54	8.03	AV
Antenna Polarity: Horizontal								
2390	49.67	27.62	3.92	34.97	46.24	74	27.76	PK
2390	/	27.62	3.92	34.97	/	54	/	AV
2400	61.42	27.62	3.94	34.97	58.01	74	15.99	PK
2400	49.33	27.62	3.94	34.97	45.92	54	8.08	AV
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result	
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1
34	1
35	1
36	1
37	1
38	1
39	1
40	1
41	1
42	1
43	1
44	1
45	1
46	1
47	1
48	1
49	1
50	1
51	1
52	1
53	1
54	1
55	1
56	1
57	1
58	1
59	1
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66	1
67	1
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69	1
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74	1
75	1
76	1
77	1
78	1
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81	1
82	1
83	1
84	1
85	1
86	1
87	1
88	1
89	1
90	1
91	1
92	1
93	1
94	1
95	1
96	1
97	1
98	1
99	1
100	1

EUT: IKONNIK ET4 4Ch 2.4GHz Xenon (Xe) AW Radio System

M/N: KNNS0002

Power: DC 6.0V From battery

Test date: 2015-07-16	Test site: 3m Chamber	Tested by: Peter
-----------------------	-----------------------	------------------

Test mode: Hopping

Antenna polarity: Vertical

[illegible]

Antenna Polarity: Horizontal

2483.5	60.67	27.59	4.00	34.97	57.29	74	16.71	PK
2483.5	47.19	27.59	4.00	34.97	43.81	54	10.19	AV

Note:

1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,
Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK

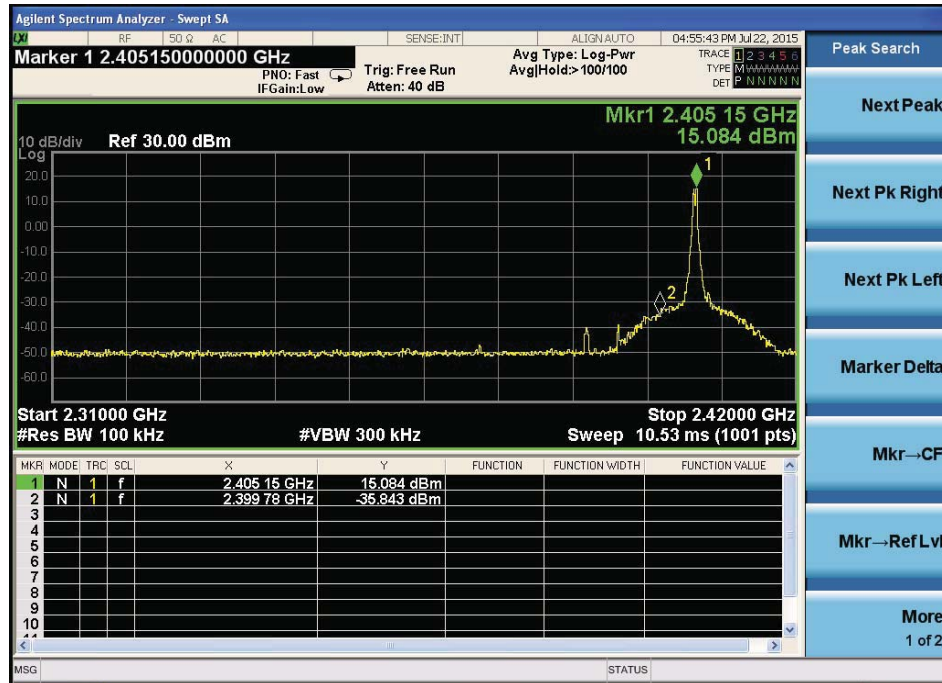
3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

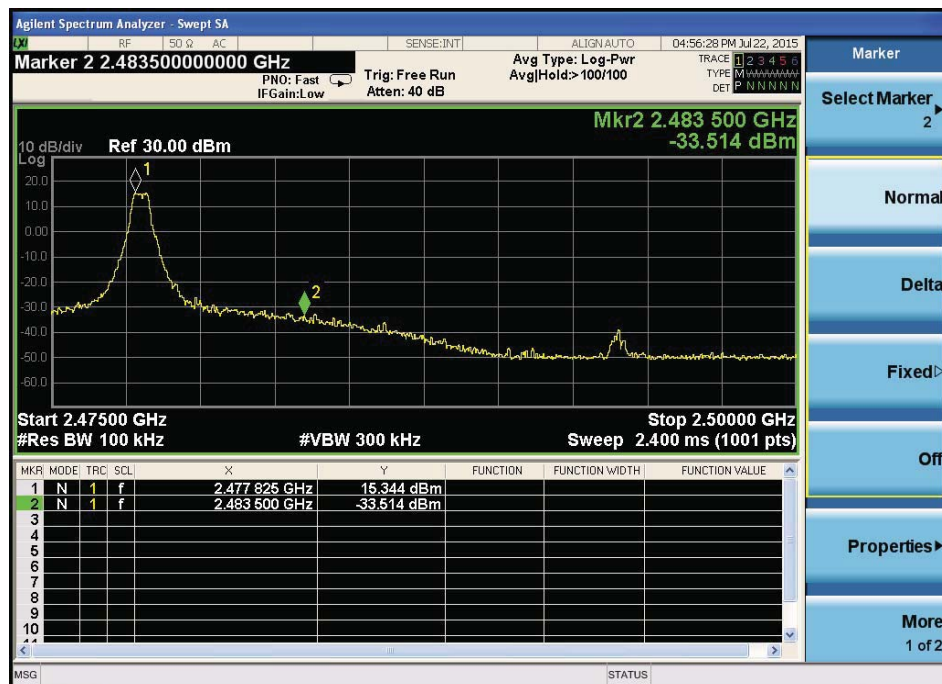
Conducted Method

FHSS(FSK)

CH LOW :



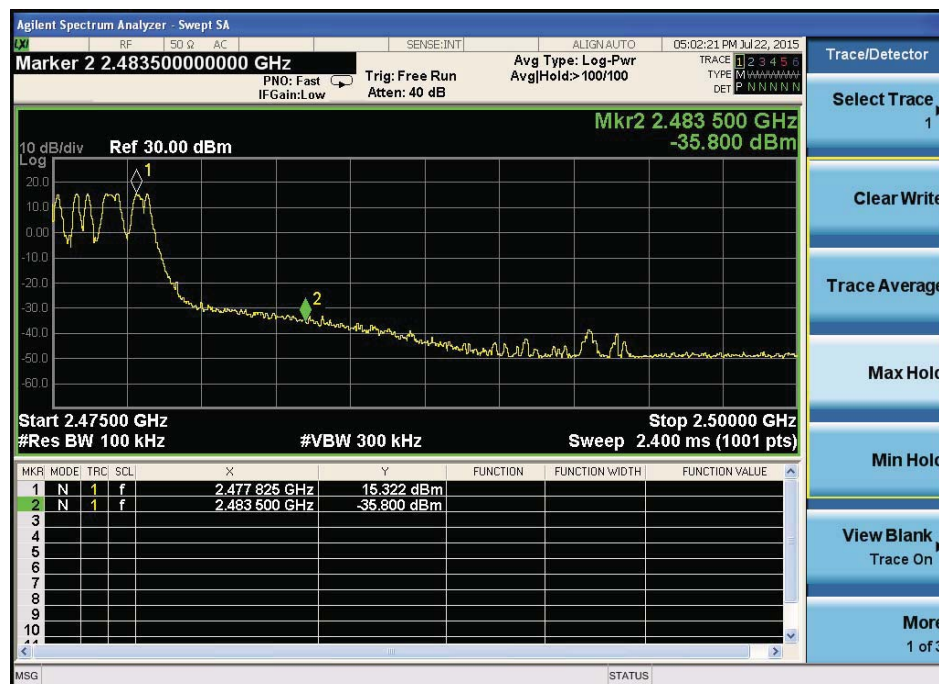
CH High :



Hopping
Low

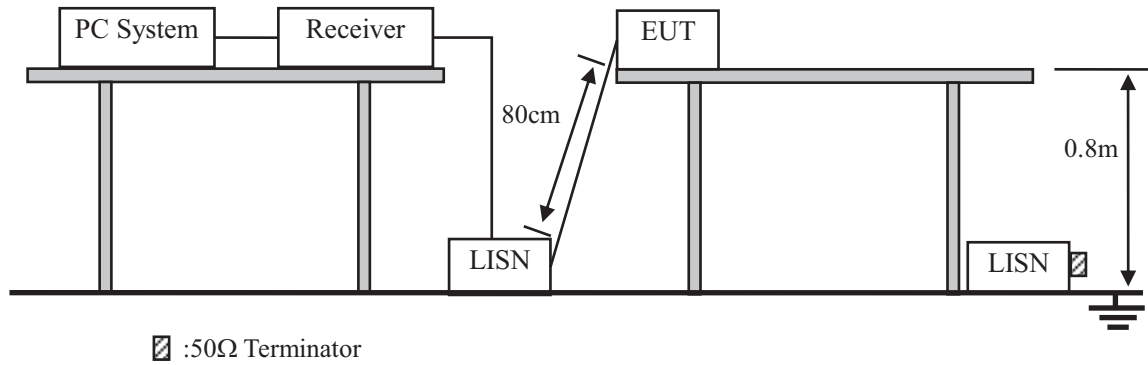


High



10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

10.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

Not Apply to battery operated product.

11. Antenna Requirements

11.1. Limit

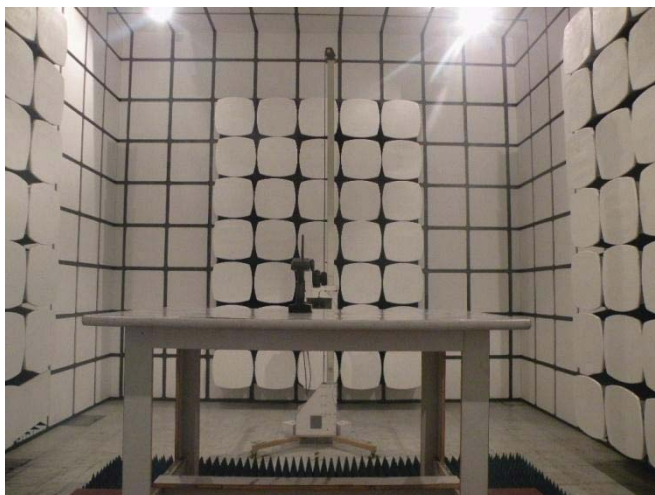
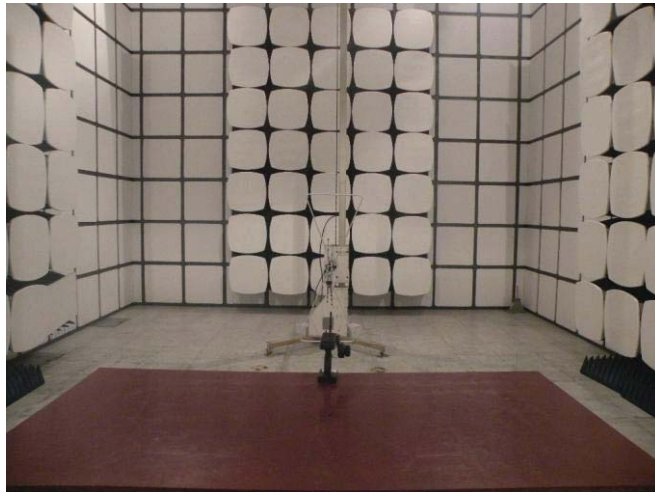
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

11.2. Result

The antenna used for this product is Antenna soldered on PCB, no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 2.5dBi .

12. Test setup photo

Photos of Radiated emission



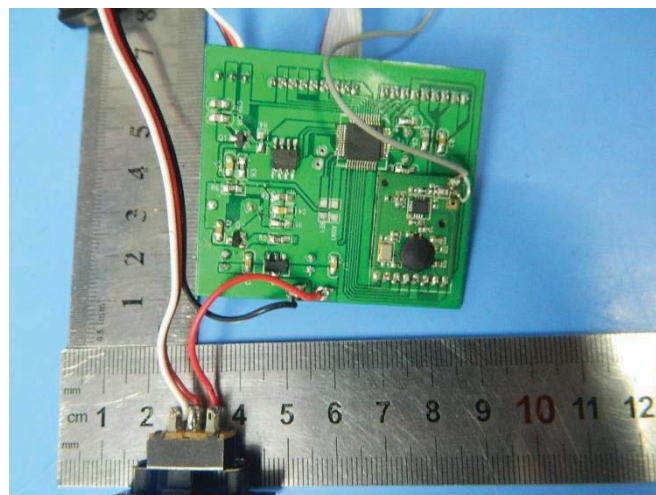
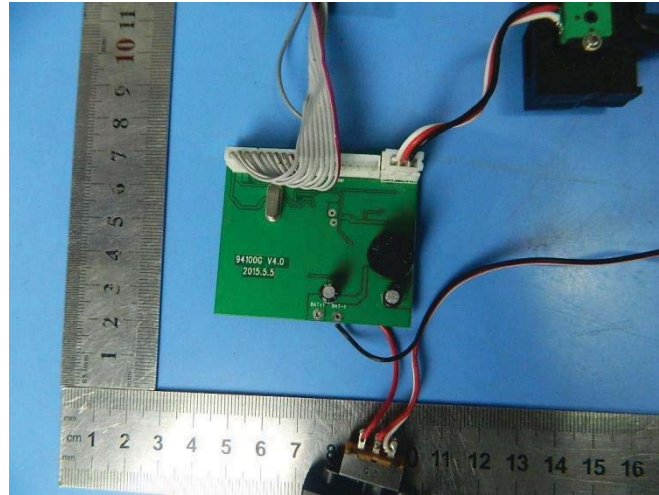
13.Photos of EUT











-----END OF THE REPORT-----