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

OF

Smart Light Bulb

MODEL No.: GE Link A19 / PSB19-SW27

FCC ID: ZKJ-12WA19

REPORT NO.: ES140504003E

ISSUE DATE: May 15, 2014

Prepared for

GE Appliance & Lighting
AP35-1403-02 Appliance Park Louisville Kentucky 40225 United States

Prepared by

SHENZHEN EMTEK CO., LTD.

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VERIFICATION OF COMPLIANCE

Applicant:	GE Appliance & Lighting AP35-1403-02 Appliance Park Louisville Kentucky 40225 United States
Manufacturer:	GE Appliance & Lighting AP35-1403-02 Appliance Park Louisville Kentucky 40225 United States
Product Description:	Smart Light Bulb
Model Number:	GE Link A19 / PSB19-SW27
File Number:	ES140504003E
Date of Test:	May 04, 2014 to May 12, 2014

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.

Date of Test : May 04, 2014 to May 12, 2014

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

A major technical descriptions of EUT is described as following:

A). Standards: IEEE 802.15.4
B). Operation Frequency: ZigBee: 2405-2480MHz;
C). Number of channel:16
D). Channel spacing:5MHz
E). Modulation: QPSK
F).Conducted Power:0.287dBm Max
G) Antenna Gain: 0.79dBi Max
H). Antenna Type: PCB Antenna

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405	7	2435	13	2465
2	2410	8	2440	14	2470
3	2415	9	2445	15	2475
4	2420	10	2450	16	2480
5	2425	11	2455		
6	2430	12	2460		

Note:
1. This device is Smart Light Bulb and in compliance with IEEE 802.15.4
2. Transceiver function.
3. Test of channel was included the lowest middle and highest frequency in lowest 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: ZKJ-12WA19 filing to comply with Section 15.247 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 C63.4 (2009) and FCC Public Notice DA 00-705. 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, 2013.10.29
The certificate is valid until 2016.10.28
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 4480A-2.

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 30 MHz 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 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

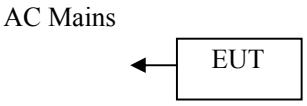


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	IC	Note
1.	Smart Light Bulb	N/A	GE Link A19 / PSB19-SW27	ZKJ-12WA19	10229A-12WA19	EUT

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 Smart Light Bulb and powered by host equipment. This is Digital Transmission system(DTS) and have modulation DSSS. According exploratory test, EUT will have maximum output power in those data rate(IEEE 802.15.4), so those data rate were used for all test.
The equipment enables high-speed access without wires to network assets. This adapter uses the IEEE802.15.4 protocol to enable wireless communications between the host and Wireless rooter.

1. For lowest channel : 2405MHz (Channel 1)
2. For middle channel : 2440MHz (Channel 8)
3. For highest channel: 2480MHz (Channel 16)

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.
3. The EUT started to work.

4. Summary of Test Results

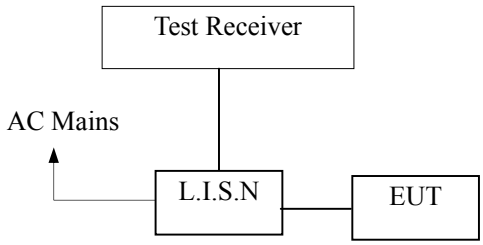
FCC Rules	Description Of Test	Result
§15.247(a)(2)	6dB bandwidth	PASS
§15.247(b)(3)	Max Peak output Power test	PASS
§15.247(e)	Power density	PASS
§15.247(d)	Band edge test	PASS
§15.207	AC Power Conducted Emission	PASS
§15.247(d), §15.209	Radiated Emission	PASS
§15.247(d)	Antenna Port Emission	PASS
§15.247(b)&§15.203	Antenna Application	PASS

5. Conducted Emissions Test

5.1 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.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used

Conducted Emission Test Site					
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.	Schwarzbeck	NNLK8129	8129203	05/29/2013	05/28/2014
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/29/2013	05/28/2014
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/29/2013	05/28/2014
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/29/2013	05/28/2014

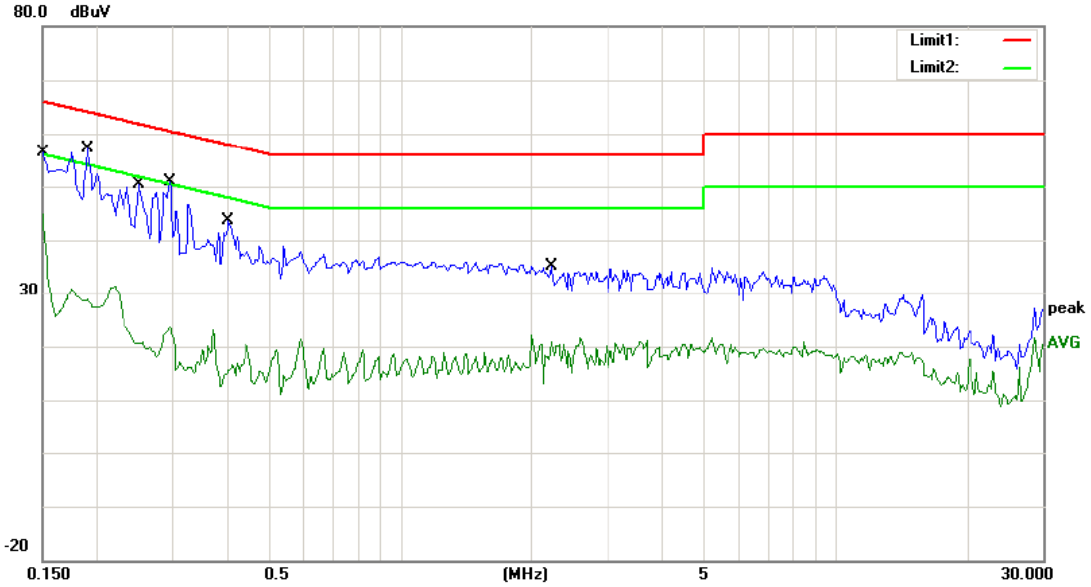
5.4 Conducted Emission Limit

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.

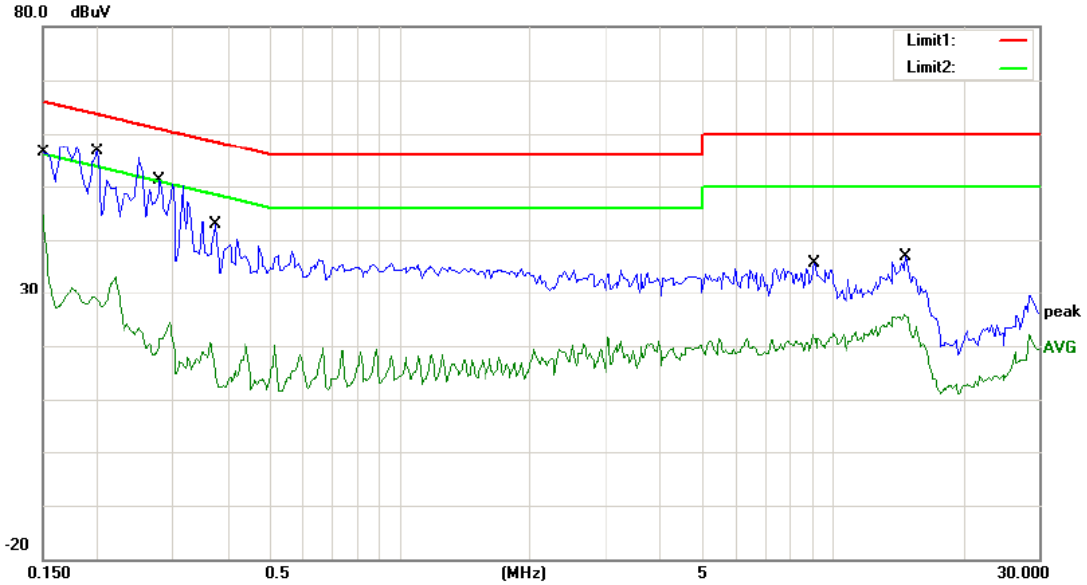
5.5 Measurement Result



Site Conduction #1 Phase: N Temperature: 24
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 53 %
Mode: TX
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	56.40	0.00	56.40	66.00	-9.60	QP	
2		0.1500	44.99	0.00	44.99	56.00	-11.01	AVG	
3	*	0.1900	57.03	0.00	57.03	64.04	-7.01	QP	
4		0.1900	31.42	0.00	31.42	54.04	-22.62	AVG	
5		0.2500	50.35	0.00	50.35	61.76	-11.41	QP	
6		0.2500	21.22	0.00	21.22	51.76	-30.54	AVG	
7		0.2950	50.81	0.00	50.81	60.38	-9.57	QP	
8		0.2950	23.64	0.00	23.64	50.38	-26.74	AVG	
9		0.4000	43.58	0.00	43.58	57.85	-14.27	QP	
10		0.4000	23.20	0.00	23.20	47.85	-24.65	AVG	
11		2.2200	35.04	0.00	35.04	56.00	-20.96	QP	
12		2.2200	20.93	0.00	20.93	46.00	-25.07	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site Conduction #1 Phase: *L1* Temperature: 24

Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 53 %

Mode: TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	56.30	0.00	56.30	66.00	-9.70	QP	
2		0.1500	44.72	0.00	44.72	56.00	-11.28	AVG	
3	*	0.2000	56.62	0.00	56.62	63.61	-6.99	QP	
4		0.2000	33.02	0.00	33.02	53.61	-20.59	AVG	
5		0.2800	51.23	0.00	51.23	60.82	-9.59	QP	
6		0.2800	24.26	0.00	24.26	50.82	-26.56	AVG	
7		0.3750	42.81	0.00	42.81	58.39	-15.58	QP	
8		0.3750	20.66	0.00	20.66	48.39	-27.73	AVG	
9		9.1000	35.58	0.00	35.58	60.00	-24.42	QP	
10		9.1000	22.34	0.00	22.34	50.00	-27.66	AVG	
11		14.7500	36.80	0.00	36.80	60.00	-23.20	QP	
12		14.7500	25.76	0.00	25.76	50.00	-24.24	AVG	

*:Maximum data x:Over limit I:over margin Comment: Factor build in receiver. Operator:

6. Radiated Emission Test

6.1 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.

When spectrum scanned from 30 MHz to 1GHz setting resolution bandwidth 120kHz and video bandwidth 300kHz.

EMI Test Receiver	Setting
Attenuation	Auto
RB	120kHz
VB	300kHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz.

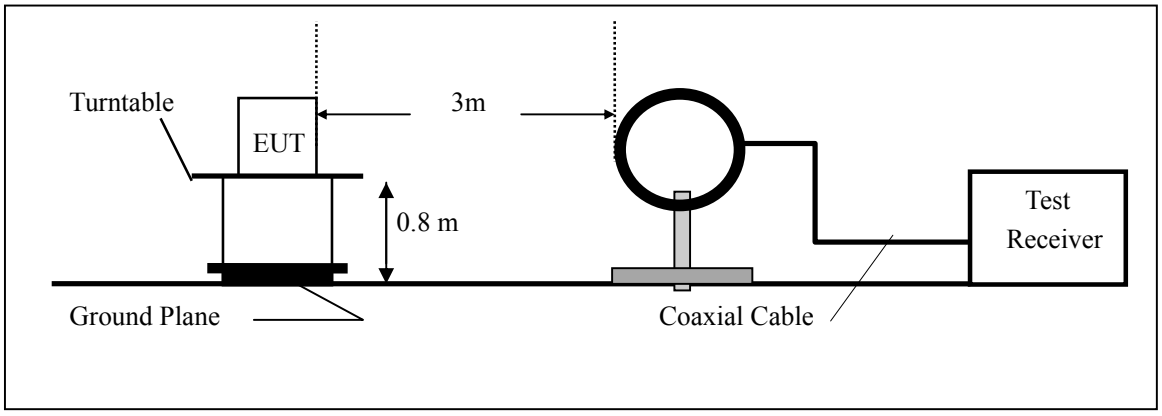
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz.

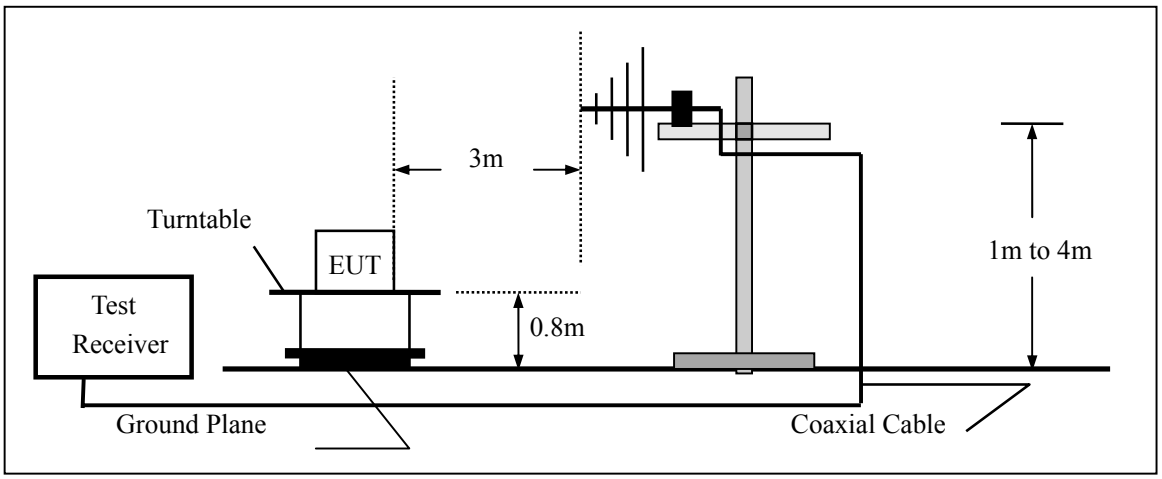
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	AVG
Trace	Max hold

6.2 Test SET-UP (Block Diagram of Configuration)

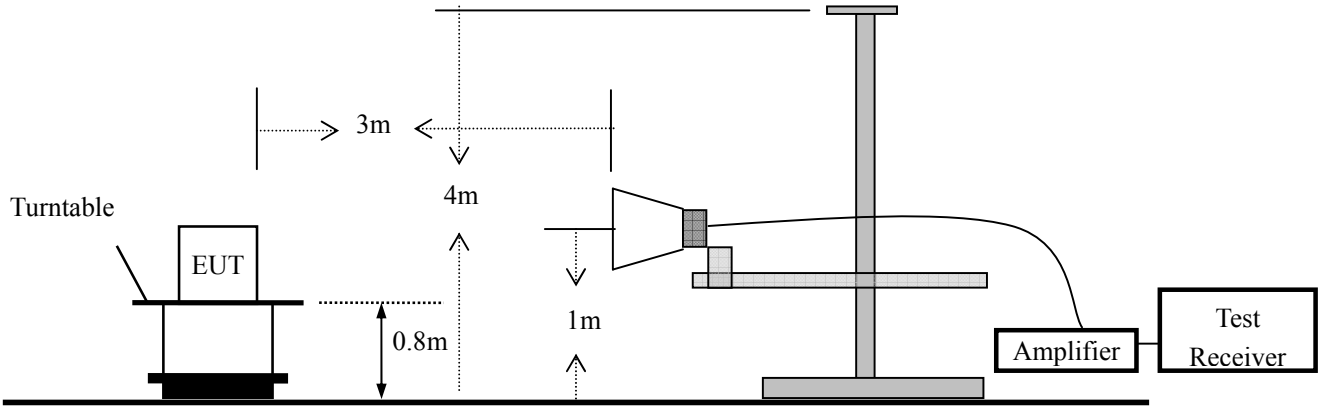
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



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



6.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2013	05/28/2014
Pre-Amplifier	HP	8447D	2944A07999	05/29/2013	05/28/2014
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2013	05/28/2014
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/29/2013	05/28/2014
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	ACRX1	05/29/2013	05/28/2014
Cable	Rosenberger	N/A	FP2RX2	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	CRPX1	05/29/2013	05/28/2014
Cable	Schwarzbeck	AK9513	CRRX2	05/29/2013	05/28/2014

6.4 Radiated Emission Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

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
Above 960	500	3

15.205 Restricted bands of operation

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])

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

6.5 Measurement Result

Operation Mode:	TX Mode	Test Date :	May 12, 2014
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)
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Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Operation Mode:	ZigBee TX Channel 1	Test Date :	May 12, 2014
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)	Over (dB)	Note
92.18	V	26.64	43.50	-16.86	QP
104.62	V	28.95	43.50	-14.55	QP
358.00	V	29.38	46.00	-16.62	QP
378.21	V	29.38	46.00	-16.62	QP
471.47	V	27.03	46.00	-18.97	QP
505.67	V	26.68	46.00	-19.32	QP
92.18	H	21.53	43.50	-21.97	QP
113.94	H	23.26	43.50	-20.24	QP
218.09	H	19.43	46.00	-26.57	QP
297.37	H	26.91	46.00	-19.09	QP
353.33	H	32.87	46.00	-13.13	QP
379.76	H	30.48	46.00	-15.52	QP

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) EUT lying on the table position is the worst case result in the report.

Operation Mode:	ZigBee TX Channel 8	Test Date :	May 12, 2014
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)	Over (dB)	Note
104.62	V	28.79	43.50	-14.71	QP
118.61	V	28.23	43.50	-15.27	QP
322.24	V	24.89	46.00	-21.11	QP
354.89	V	26.27	46.00	-19.73	QP
454.38	V	27.15	46.00	-18.85	QP
508.78	V	26.38	46.00	-19.62	QP
113.94	H	24.27	43.50	-19.23	QP
214.98	H	19.50	43.50	-24.00	QP
351.78	H	26.16	46.00	-19.84	QP
448.16	H	24.56	46.00	-21.44	QP
499.46	H	23.76	46.00	-22.24	QP
673.56	H	25.69	46.00	-20.31	QP

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) EUT lying on the table position is the worst case result in the report.

Operation Mode:	ZigBee TX Channel 16	Test Date :	May 12, 2014
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)	Over (dB)	Note
93.73	V	26.48	43.50	-17.02	QP
104.62	V	28.74	43.50	-14.76	QP
120.16	V	27.50	43.50	-16.00	QP
314.47	V	25.51	46.00	-20.49	QP
361.11	V	27.71	46.00	-18.29	QP
490.13	V	26.50	46.00	-19.50	QP
92.18	H	21.53	43.50	-21.97	QP
113.94	H	23.26	43.50	-20.24	QP
214.98	H	20.52	43.50	-22.98	QP
292.71	H	28.78	46.00	-17.22	QP
353.33	H	32.87	46.00	-13.13	QP
379.76	H	30.48	46.00	-15.52	QP

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) EUT lying on the table position is the worst case result in the report.

Operation Mode:	ZigBee Channel 1	Test Date :	May 12, 2014
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) PK	Emission Level(dBuV) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) AV
4814.10	V	70.41	47.50	74.00	54.00	-3.59	-6.50
7211.54	V	59.66	43.15	74.00	54.00	-14.34	-10.85
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4814.10	H	64.60	43.76	74.00	54.00	-9.40	-10.24
7211.54	H	59.07	39.41	74.00	54.00	-14.93	-14.59

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:	ZigBee Channel 8	Test Date :	May 12, 2014
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)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4868.59	V	67.00	43.26	74.00	54.00	-7.00	-10.74
7320.51	V	57.19	39.97	74.00	54.00	-16.81	-14.03
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--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
4868.59	H	58.16	37.20	74.00	54.00	-15.84	-16.80
7320.51	H	58.04	36.60	74.00	54.00	-15.96	-17.40

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:	ZigBee Channel 16	Test Date :	May 12, 2014
Frequency Range:	Above 1GHz	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %
Measured Distance:	3m	Test By:	WOLF

Freq.	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	PK	AV	PK	AV
4950.32	V	70.46	45.72	74.00	54.00	-3.54	-8.28
7620.19	V	56.23	38.72	74.00	54.00	-17.77	-15.28
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
4950.32	H	62.81	42.35	74.00	54.00	-11.19	-11.65
7620.19	H	57.30	38.41	74.00	54.00	-16.70	-15.59

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

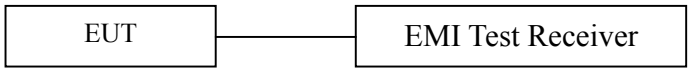
Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength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

7. Occupied Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in QPSK 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

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESCI	101045	05/29/2013	05/28/2014

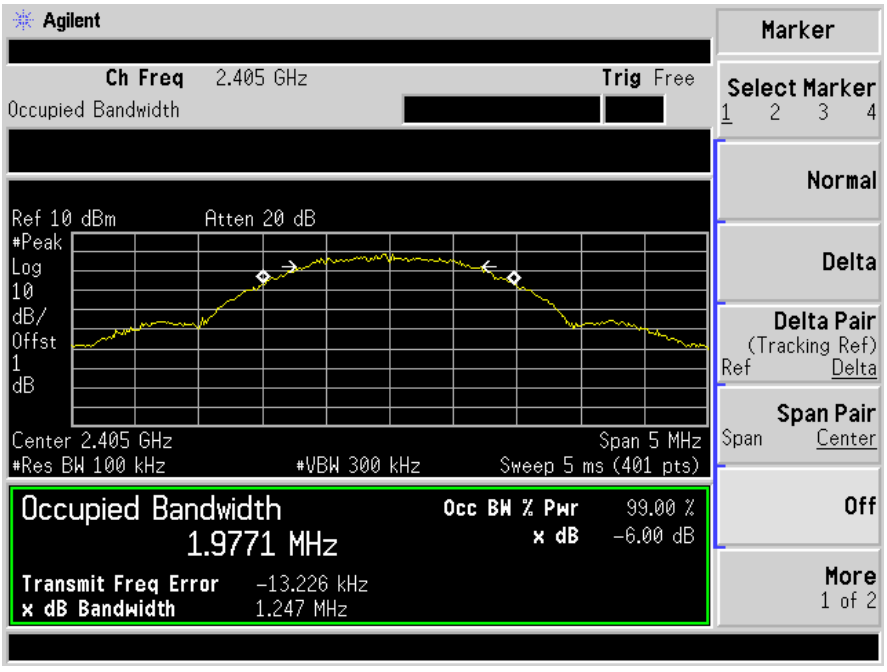
7.4 Measurement Results

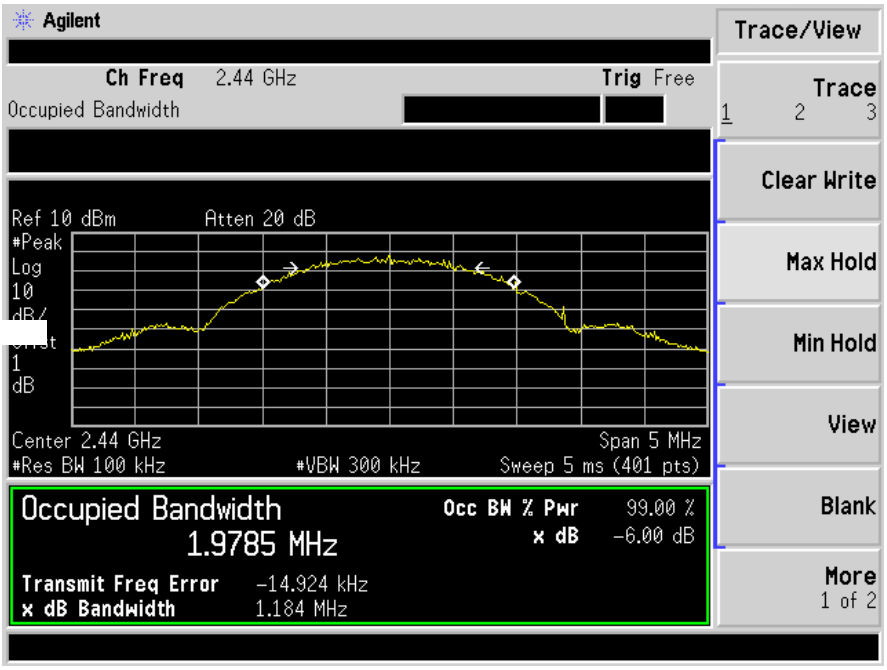
6 dB Bandwidth Test Data Chart:
Refer to attached data chart.

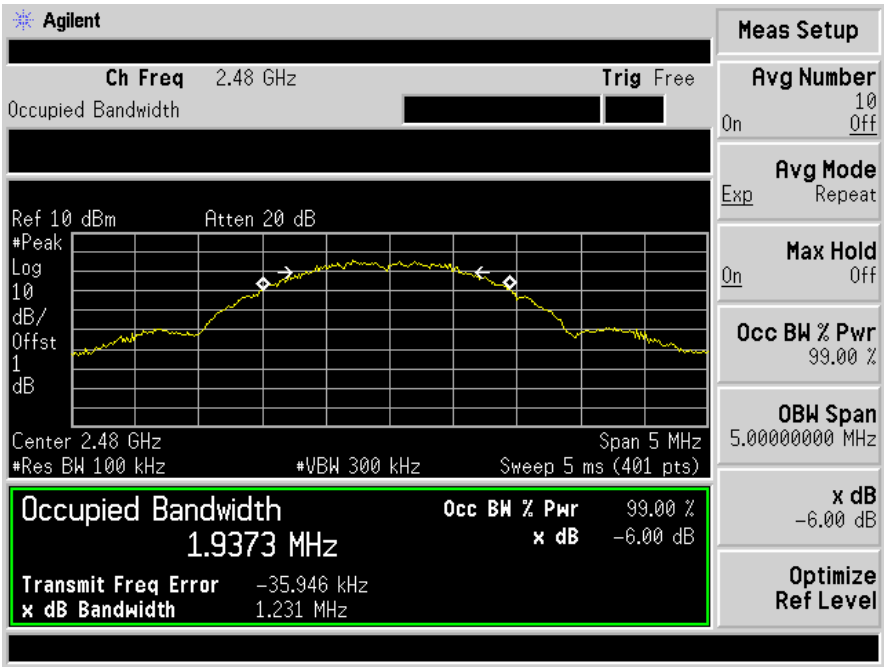
Spectrum Detector:	PK	Test Date :	May 05, 2014
Test By:	Andy	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %

Operation Mode: QPSK

Channel number	Channel frequency (MHz)	Measurement level (MHz)	Required Limit (kHz)
1	2405	1.247	>500
8	2440	1.184	>500
16	2480	1.231	>500




Agilent
Ch Freq 2.44 GHz
Trig Free
Occupied Bandwidth
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
1
dB
Center 2.44 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.9785 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -14.924 kHz
x dB Bandwidth 1.184 MHz
Trace/View
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2

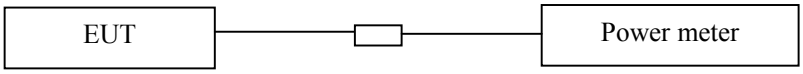

Agilent
Ch Freq 2.48 GHz
Trig Free
Occupied Bandwidth
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
1
dB
Center 2.48 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.9373 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -35.946 kHz
x dB Bandwidth 1.231 MHz
Meas Setup
Avg Number
10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
5.00000000 MHz
x dB
-6.00 dB
Optimize
Ref Level

8. Maximum Peak Output Power Test

8.1 Measurement Procedure

a. The Transmitter output (antenna port) was connected to the power meter.
b. Turn on the EUT and power meter and then record the peak power value.
c. Repeat above procedures on all channels needed to be tested.

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power meter	Boonton	4232A	29001	05/29/2013	05/28/2014
Power sensor	Boonton	51011-EMC	31184	05/29/2013	05/28/2014

8.4 Peak Power output limit

The maximum peak power shall be less 1Watt.

8.5 Measurement Results

Spectrum Detector:	PK	Test Date :	May 05, 2014
Test By:	Andy	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %

Operation Mode: QPSK

Channel number	Channel Frequency(MHz)	Peak Power output(dBm)	Peak Power Limit(W)	Pass/Fail
1	2405	0.289	1W(30dBm)	PASS
8	2440	-0.725	1W(30dBm)	PASS
16	2480	-1.786	1W(30dBm)	PASS

9. Band Edge Test

9.1 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.

9.2 Test SET-UP (Block Diagram of Configuration)

As 6.2 Test set up (B) and (C)

9.3 Measurement Equipment Used

Same as 6.3 Radiated Emission Measurement.

9.4 Measurement Results

Test mode: QPSK

Spectrum Detector:	PK/AV	Test Date :	May 05, 2014
Test By:	Andy	Temperature :	28 ℃
Test channel:	1	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2390	H	45.46	34.41	74	54
2390	V	43.38	31.82	74	54

Spectrum Detector:	PK/AV	Test Date :	May 05, 2014
Test By:	Andy	Temperature :	28 ℃
Test channel:	16	Humidity :	65 %

Frequency (MHz)	Polarity	Level (dBuV/m)		Limited (dBuV/m)	
		PK	AV	PK	AV
2483.5	H	44.58	33.58	74	54
2483.5	V	44.36	32.41	74	54

10. Power Density

10.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESCI	101045	05/29/2013	05/28/2014

10.2 Measuring Instruments and Setting

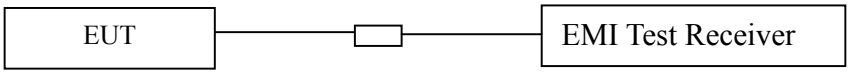
The following table is the setting of spectrum analyzer.

Spectrum analyzer	Setting
Attenuation	Auto
Span Frequency	300kHz
RB	3kHz
VB	10kHz
Detector	Peak
Trace	Max hold
Sweep Time	100s

10.3 Test Procedures

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 3 kHz and VBW to 30 kHz, Set Detector to Peak, Trace to Max Hold.
c. Mark the frequency with maximum peak power as the center of the display of the spectrum.
d. Set the span to 300 kHz and the sweep time to 100s and record the maximum peak value.

10.4 Block Diagram of Test Setup



10.5 Limit

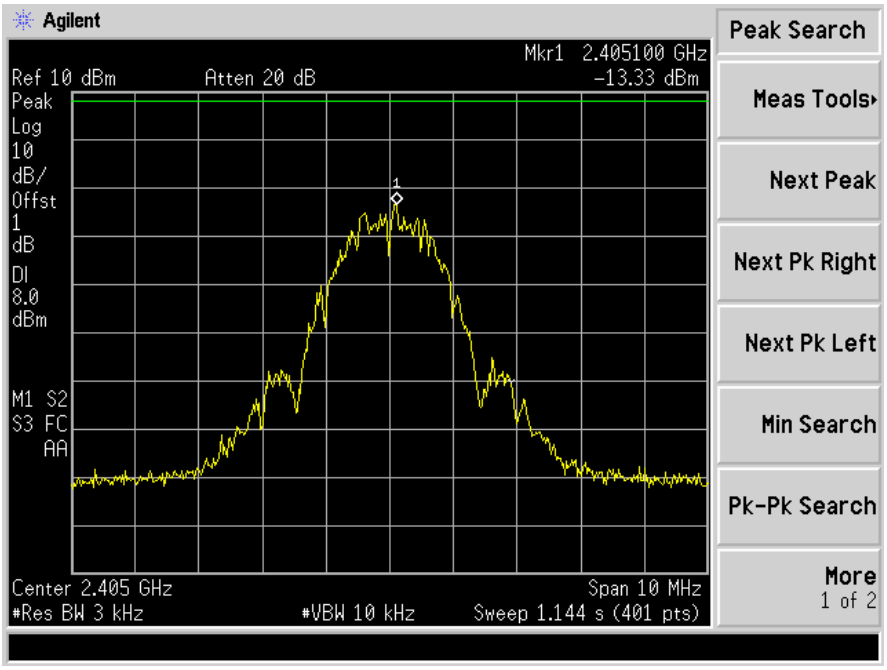
The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3 kHz bandwidth.

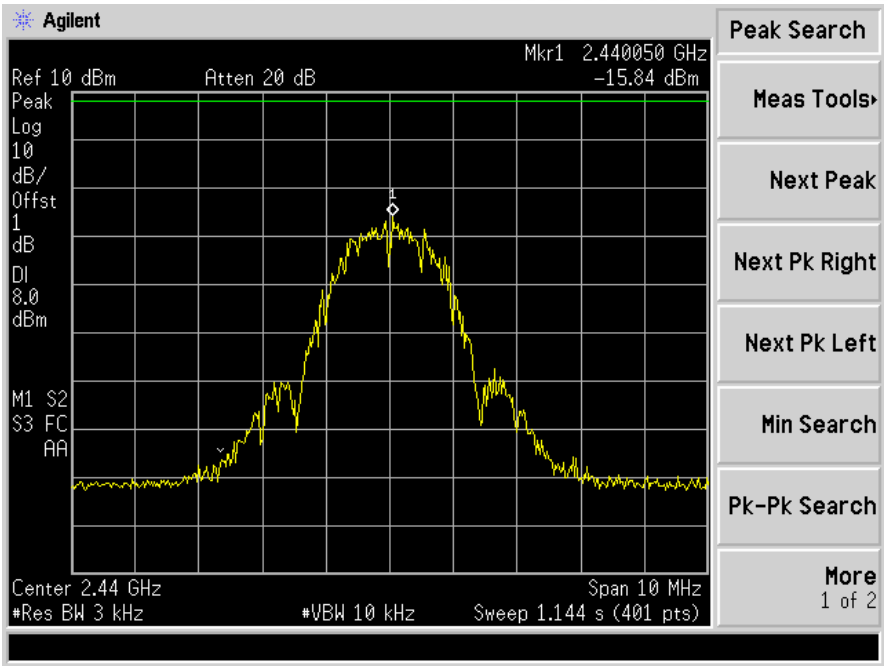
10.6 Test Result

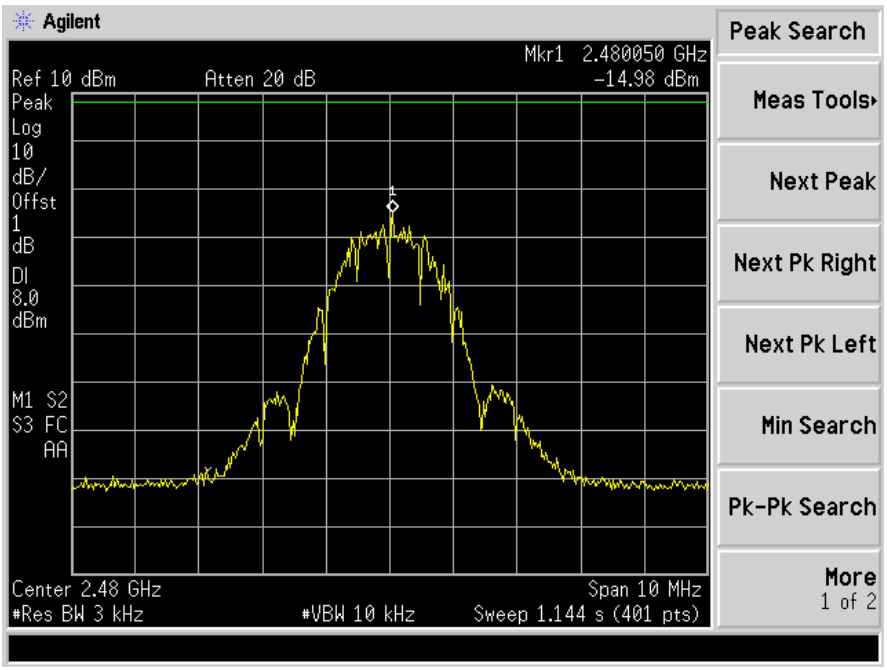
Spectrum Detector:	PK	Test Date :	May 05, 2014
Test By:	Andy	Temperature :	28℃
Test Result:	PASS	Humidity :	65 %

Operation Mode: QPSK

Channel	Measurement Level (dBm)	Required Limit (dBm)	Result
1	-13.33	<8dBm	PASS
8	-15.48	<8dBm	PASS
16	-14.98	<8dBm	PASS




Agilent
Mkr1 2.440050 GHz
Ref 10 dBm
Atten 20 dB
-15.84 dBm
Peak
Log
10
dB/
Offst
1
dB
Dl
8.0
dBm
M1 S2
S3 FC
AA
Center 2.44 GHz
Span 10 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 1.144 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
Mkr1 2.480050 GHz
Ref 10 dBm
Atten 20 dB
-14.98 dBm
Peak
Log
10
dB/
Offst
1
dB
Dl
8.0
dBm
M1 S2
S3 FC
AA
Center 2.48 GHz
Span 10 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 1.144 s (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

11. Antenna Port Emission

11.1 Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2013	05/28/2014

11.2 Measuring Instruments and Setting

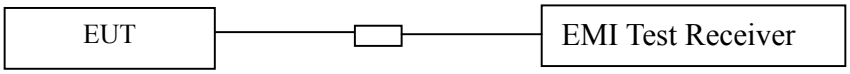
The following table is the setting of spectrum analyzer.

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

11.3 Test Procedures

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

11.4 Block Diagram of Test setup

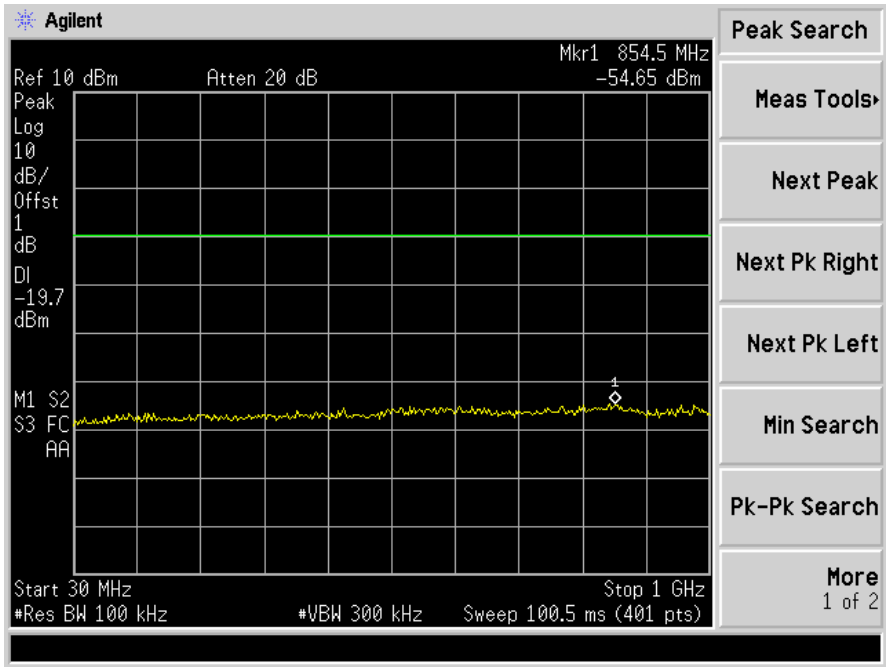


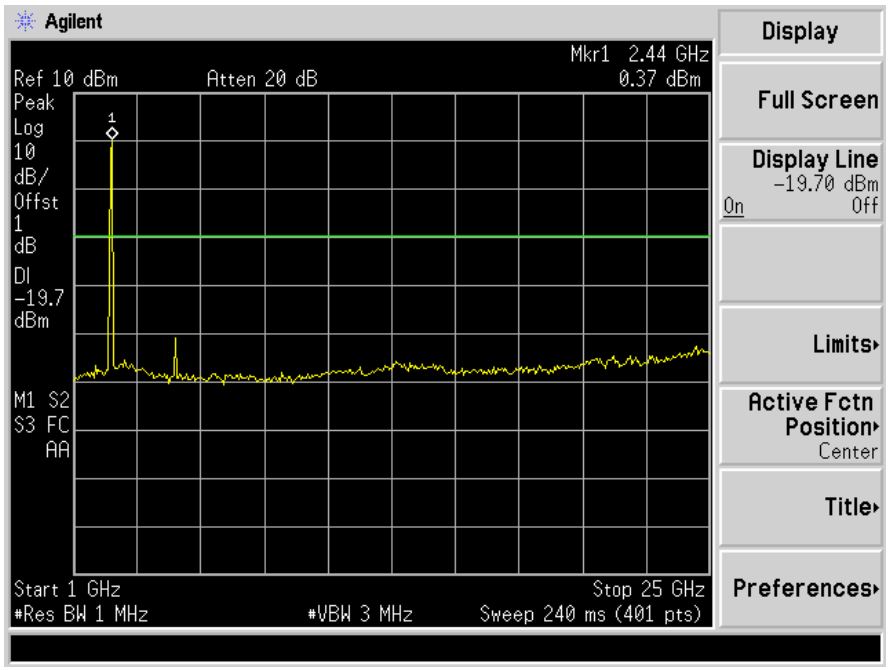
11.5 Test Result

PASS.

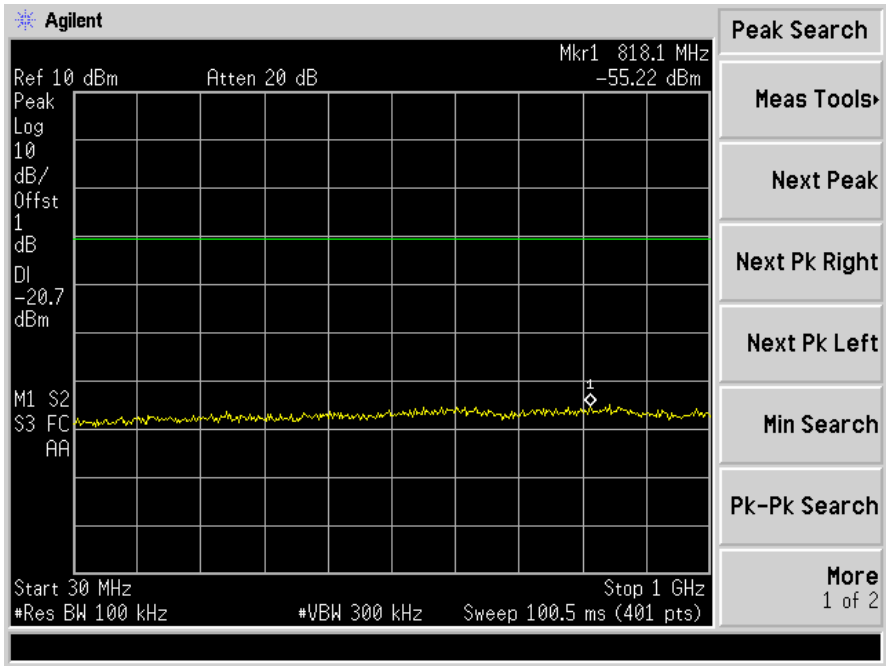
All the modes QPSK have been tested, the result was recorded in the following pages.

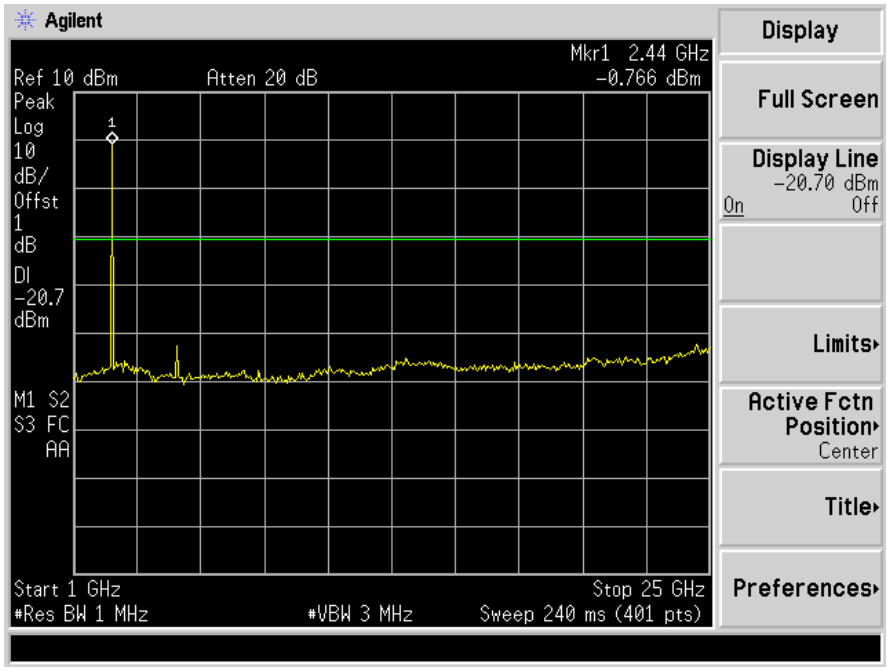
Low channel


Agilent
Mkr1 854.5 MHz
Ref 10 dBm
Atten 20 dB
-54.65 dBm
Peak
Log
10
dB/
Offst
1
dB
Dl
-19.7
dBm
M1 S2
S3 FC
AA
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

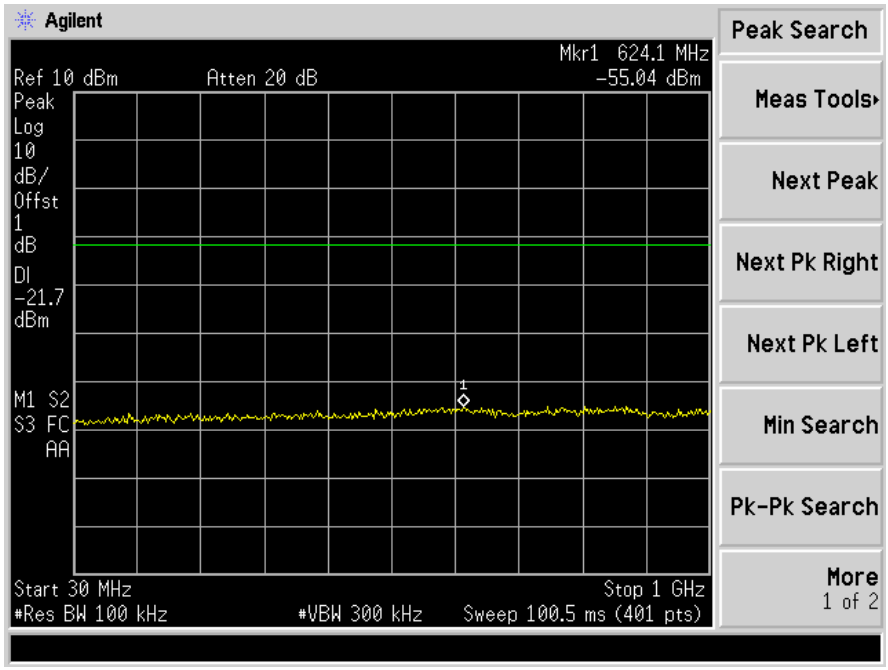

Agilent
Mkr1 2.44 GHz
Ref 10 dBm
Atten 20 dB
0.37 dBm
Peak
Log
10
dB/
Offst
1
dB
Dl
-19.7
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 25 GHz
Sweep 240 ms (401 pts)
Display
Full Screen
Display Line
-19.70 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences

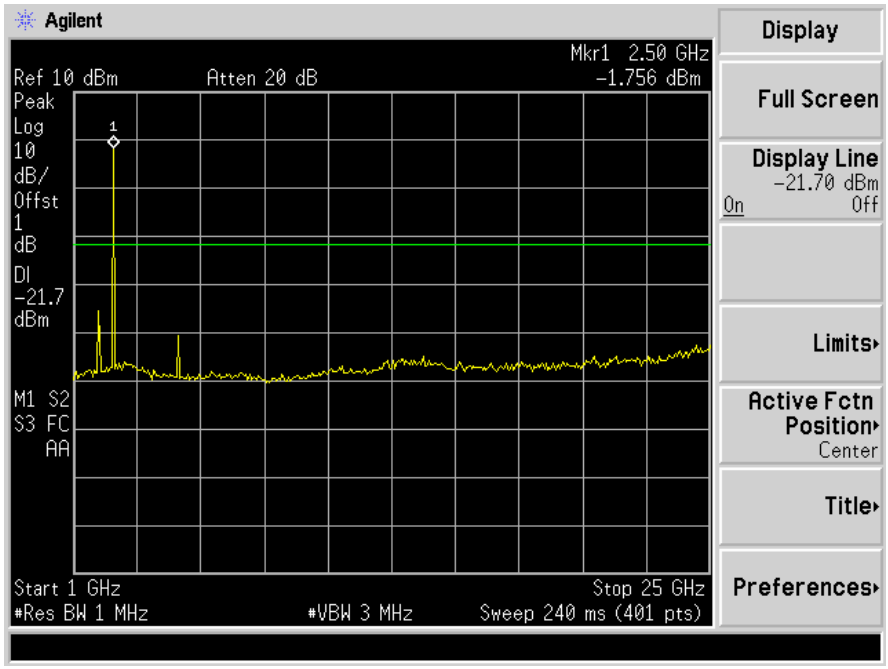
Middle channel





High channel





12. Antenna Application

12.1 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.

12.2 Result

The EUT'S antenna is external antenna. The antenna's gain is 0.79dBi max and meets the requirement.