ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPARTC REQUIREMENT

OF

Bluetooth Keyboard Case

MODEL No.: BW05002-3, 44041, ABKCi-014, BW05002-5, BW05002-7, BW05002-8, ABKC-014

FCC ID: 2AAOE14BW05002

REPORT NO: EN140904030E

ISSUE DATE: October 21, 2014

Prepared for

Shenzhen B&W Electronics Development Limited
4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China

Prepared by

NINGBO EMTEK CO., LTD.

1F Building 4, 1177#, Lingyun Road, National Hi-Tech Zone, Ningbo, Zhejiang, China
TEL: 0086-574-27907998
FAX: 0086-574-27721538

VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen B&W Electronics Development Limited 4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China
Manufacturer:	Shenzhen B&W Electronics Development Limited 4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China
Product Description:	Bluetooth Keyboard Case
Brand Name:	BAUHN®
Model Number:	NOTE：In this report, we choice the model BW05002-5 to test, and the differences of them please refer to the Annex A.
File Number:	EN140904030E
Date of Test:	September 05, 2014 to October 15, 2014

We hereby certify that:

The above equipment was tested by NINGBO EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

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

Approved By

Andy.wang/Manager
NINGBO EMTEK CO., LTD.

Table of Contents

1. General Information

1.1 Product Description

Shenzhen B&W Electronics Development Limited
Model: BW05002-5 (referred to as the EUT in this report) The EUT (Bluetooth Keyboard Case) is a short range, lower power Device. 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: 2402-2480MHz
B). Modulation: GFSK
C). Number of Channel: 79
D). Channel Space: 1MHz
F). Antenna Type: Internal PCB antenna
G). Antenna Gain: 0dBi
H). Power Supply: DC 5V, Battery: DC 3.7V

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AAOE14BW05002 filing to comply with Section 15.247 of the FCC Part 15 Subpart C Rules.

1.3 Test Methodology

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

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2014.1.21
The certificate is valid until 2017.1.20
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L6666.

Accredited by FCC, June 18, 2014
The Certificate Registration Number is 463622.

Name of Firm : NINGBO EMTEK CO., LTD.
Site Location : 1F Building 4, 1177#, Lingyun Road, Ningbo National Hi-Tech Zone, Ningbo, Zhejiang, China

Radiated emission item Sub-contracted in Shenzhen Emtek:
EMC Lab. The Certificate Registration Number is 709623.
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 13.3 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 Bluetooth Keyboard Case (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.4 of ANSI C63.4-2009.

2.4 Limitation

(1) Channel Separation Test

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

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

(2) 20dB Bandwidth

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

(3) Quantity of Hopping Channel

FCC Part 15, Subpart C Section 15.247

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

(4) Time of Occupancy(Dwell Time)

FCC Part 15, Subpart C Section 15.247

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

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

(5) Maximum Peak Output Power

FCC Part 15, Subpart C Section 15.247

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

(6) Band edge

FCC Part15, Subpart C Section 15.247, In any 100kHz bandwidth outside the frequency band in with the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

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

(7) Conducted Emission

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

Note:

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

(8) Radiated Emission

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

Frequency (MHz)	Field strength μV/m	Distance(m)	Field strength at 3m dBμV/m
0.009~0.490	2400/F(KHz)	300	/
0.490~1.705	2400/F(KHz)	30	/
1.705~30.0	30	30	/
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

2.5 Configuration of Tested System

2.6 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Bluetooth Keyboard Case	N/A	BW05002-5	2AAOE14BW05002	N/A	EUT
2.	Laptop	Lenovo	ThinkPad Edge E435	N/A	EA05545184	/
3.	Mouse	Lenovo	M-UAE119	N/A	LZ10933003P	/

Note:

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

2.7 Description of Test Modes

The EUT (Bluetooth Keyboard Case) has been tested under normal operating condition. This EUT is a FHSS system. Pre-scanned tests, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes have been tested. 79 Channels are provided by EUT. The 3 channels oflower, medium and higher were chosen for test

Channel	Frequency(MHz)
Low channel	2402
Middle channel	2441
High channel	2480

3. Summary of Test Results

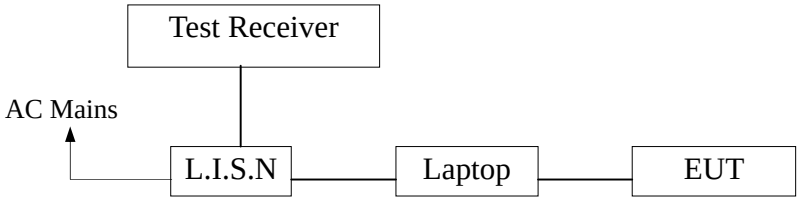
FCC Rules	Description Of Test	Result
FCC Part 15.247(a)(1)	Channel Separation Test	Compliant
FCC Part 15.247(a)(1)	20dB Bandwidth	Compliant
FCC Part 15.247(a)(1)	Quantity of Hopping Channel	Compliant
FCC Part 15.247(a)(1)	Time of Occupancy (Dwell Time)	Compliant
FCC Part 15.247(b)	Max Peak Output Power Test	Compliant
FCC Part 15.247(d)	Band Edge Test	Compliant
FCC Part 15.207	Conducted Emission	Compliant
FCC Part 15.247(d)&15.209	Radiated Emission	Compliant
FCC Part 15.247(d)	Antenna Port Emission	Compliant
FCC Part 15.203&15.247(b)	Antenna Requirement	Compliant

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 three highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

4.2 Test SET-UP (Block Diagram of Configuration)



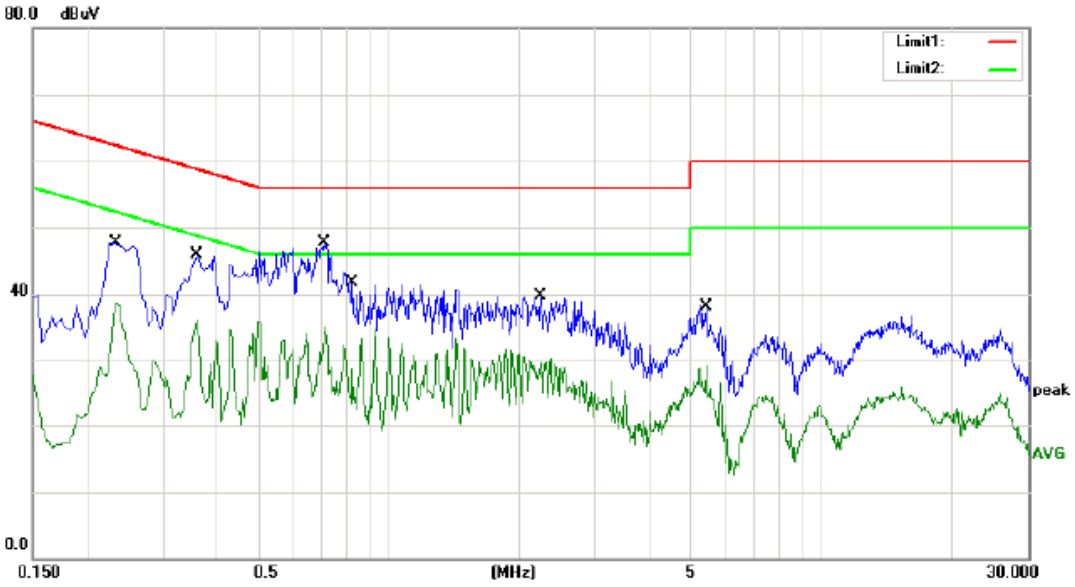
4.3 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Test Receiver	Rohde & Schwarz	ESCI	101108	08/01/2014	08/01/2015
L.I.S.N	Rohde & Schwarz	ENV216	101193	08/01/2014	08/01/2015
L.I.S.N	Schwarzbeck	NSLK 8126	8126-462	08/01/2014	08/01/2015
Pulse Limiter	MTS-systemtechnik	IMP-136	2611115-00 1-0033	08/01/2014	08/01/2015

4.4 Measurement Equipment Used

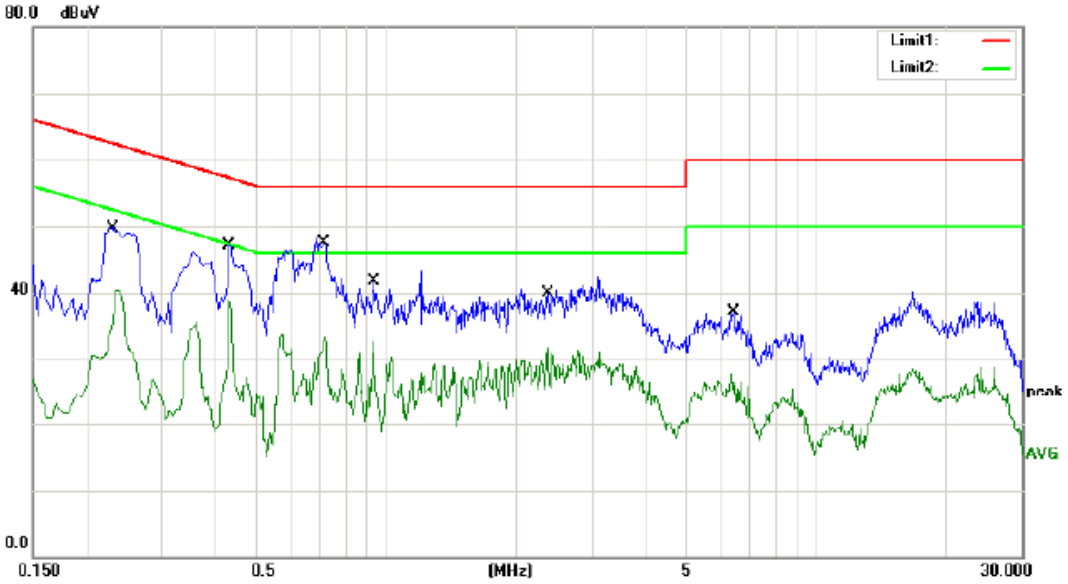
Pass.
Please refer to the following data.

Charging Mode



Site site #1 Phase: N Temperature: 24
Limit: (CE)FCC PART 15 Power: AC 120V/60Hz Humidity: 56 %
Mode: Charging
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2340	36.70	11.00	47.70	62.31	-14.61	QP	
2		0.2340	27.60	11.00	38.60	52.31	-13.71	AVG	
3		0.3580	34.80	11.00	45.80	58.77	-12.97	QP	
4		0.3580	24.60	11.00	35.60	48.77	-13.17	AVG	
5	*	0.7060	36.70	11.00	47.70	56.00	-8.30	QP	
6		0.7060	22.60	11.00	33.60	46.00	-12.40	AVG	
7		0.8220	30.60	11.00	41.60	56.00	-14.40	QP	
8		0.8220	17.60	11.00	28.60	46.00	-17.40	AVG	
9		2.2420	28.60	11.00	39.60	56.00	-16.40	QP	
10		2.2420	18.30	11.00	29.30	46.00	-16.70	AVG	
11		5.4120	27.00	11.00	38.00	60.00	-22.00	QP	
12		5.4120	14.30	11.00	25.30	50.00	-24.70	AVG	



Site site #1 Phase: L1 Temperature: 24
Limit: (CE)FCC PART 15 Power: AC 120V/60Hz Humidity: 56 %
Mode: Charging
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2340	38.00	11.00	49.00	62.31	-13.31	QP	
2		0.2340	29.30	11.00	40.30	52.31	-12.01	AVG	
3		0.4300	36.10	11.00	47.10	57.25	-10.15	QP	
4	*	0.4300	27.80	11.00	38.80	47.25	-8.45	AVG	
5		0.7180	36.20	11.00	47.20	56.00	-8.80	QP	
6		0.7180	22.20	11.00	33.20	46.00	-12.80	AVG	
7		0.9300	30.10	11.00	41.10	56.00	-14.90	QP	
8		0.9300	21.60	11.00	32.60	46.00	-13.40	AVG	
9		2.3660	28.20	11.00	39.20	56.00	-16.80	QP	
10		2.3660	20.60	11.00	31.60	46.00	-14.40	AVG	
11		6.3480	25.70	11.00	36.70	60.00	-23.30	QP	
12		6.3480	16.60	11.00	27.60	50.00	-22.40	AVG	

5. Radiated Emission Test

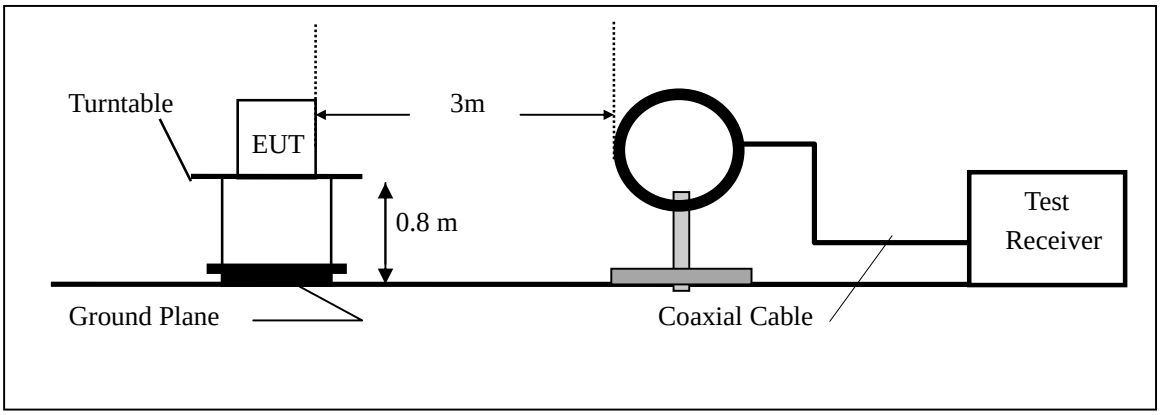
5.1 Measurement Procedure

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

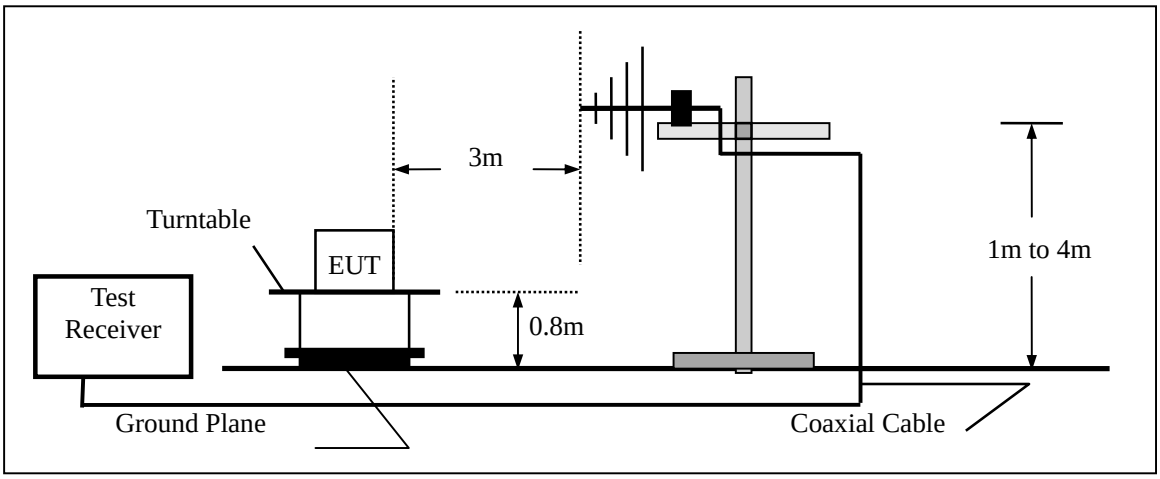
The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector (RBW=100kHz, VBW=300kHz) and all final readings of measurement from Test Receiver are Quasi-Peak values(Quasi Peak detector used with a bandwidth of 120 kHz).
The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

5.2 Test SET-UP (Block Diagram of Configuration)

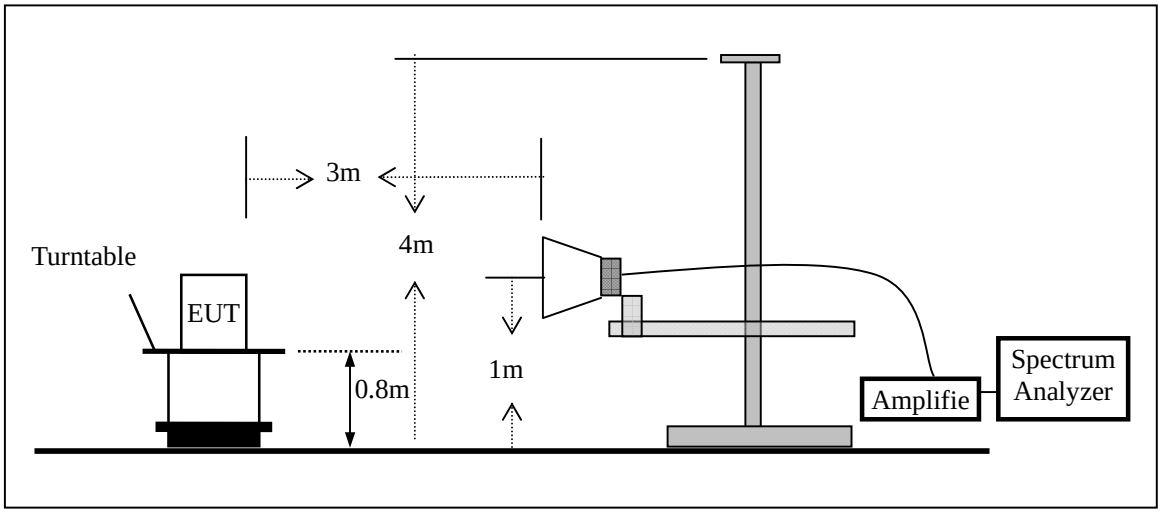
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



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



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



5.3 Measurement Equipment Used

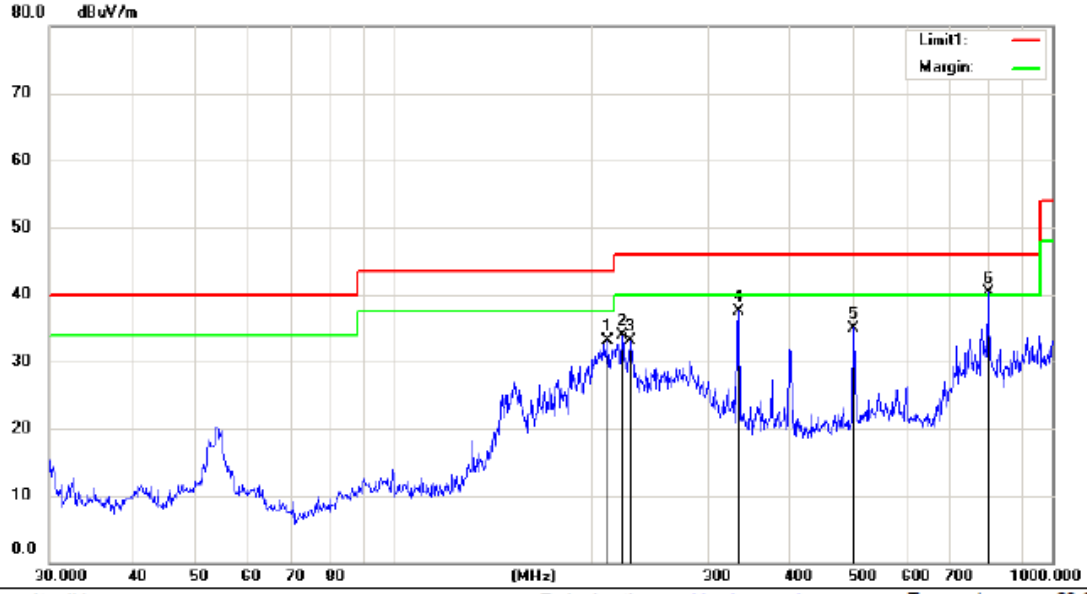
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/17/2014	1 Year
2.	Pre-Amplifier	HP	8447D	2944A07999	05/17/2014	1 Year
3.	Pre-Amplifier	A.H.	PAM-0126	1415261	05/17/2014	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	142	05/17/2014	1 Year
5.	Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	05/17/2014	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/17/2014	1 Year
7.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/17/2014	1 Year
8.	Cable	Schwarzbeck	AK9513	ACRX1	05/17/2014	1 Year
9.	Cable	Rosenberger	N/A	FP2RX2	05/17/2014	1 Year
10.	Cable	Schwarzbeck	AK9513	CRPX1	05/17/2014	1 Year
11.	Cable	Schwarzbeck	AK9513	CRRX2	05/17/2014	1 Year

5.4 Measurement Result

(For range 9KHz~30MHz, The measured value is really too low to be recorded.)

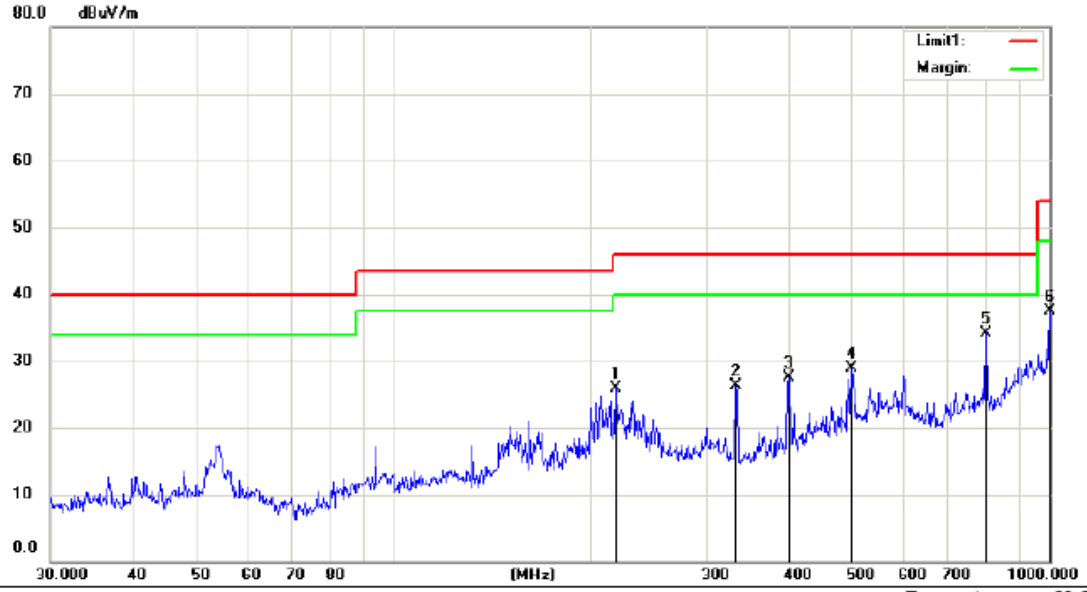
Below 1000MHz:

Charging Mode



Site site #1 Polarization: *Horizontal* Temperature: 23 C
Limit: FCC Part15_3M Radiation Power: DC 5V Humidity: 52 %
Mode:Charging
Note:

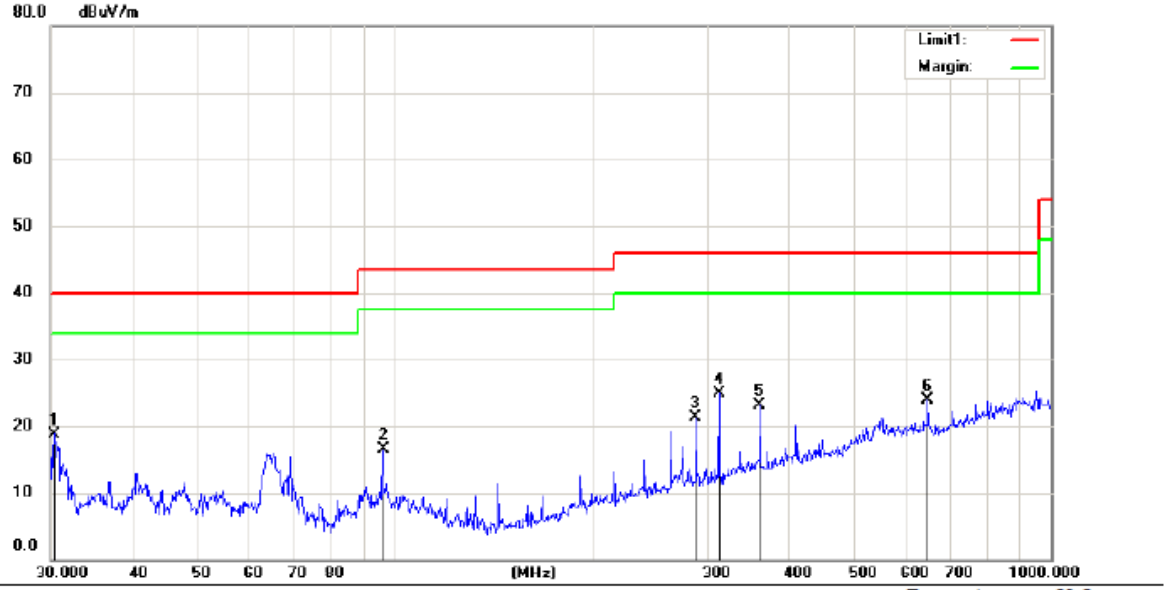
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		211.5265	54.24	-21.14	33.10	43.50	-10.40	QP			
2		222.1698	54.53	-20.63	33.90	46.00	-12.10	QP			
3		228.4904	53.36	-20.26	33.10	46.00	-12.90	QP			
4		333.6867	54.51	-16.91	37.60	46.00	-8.40	QP			
5		499.4247	47.65	-12.65	35.00	46.00	-11.00	QP			
6	*	798.9797	47.57	-7.27	40.30	46.00	-5.70	QP			



Site site #1 Polarization: *Vertical* Temperature: 23 C
Limit: FCC Part15_3M Radiation Power: DC 5V Humidity: 52 %
Mode:Charging
Note:

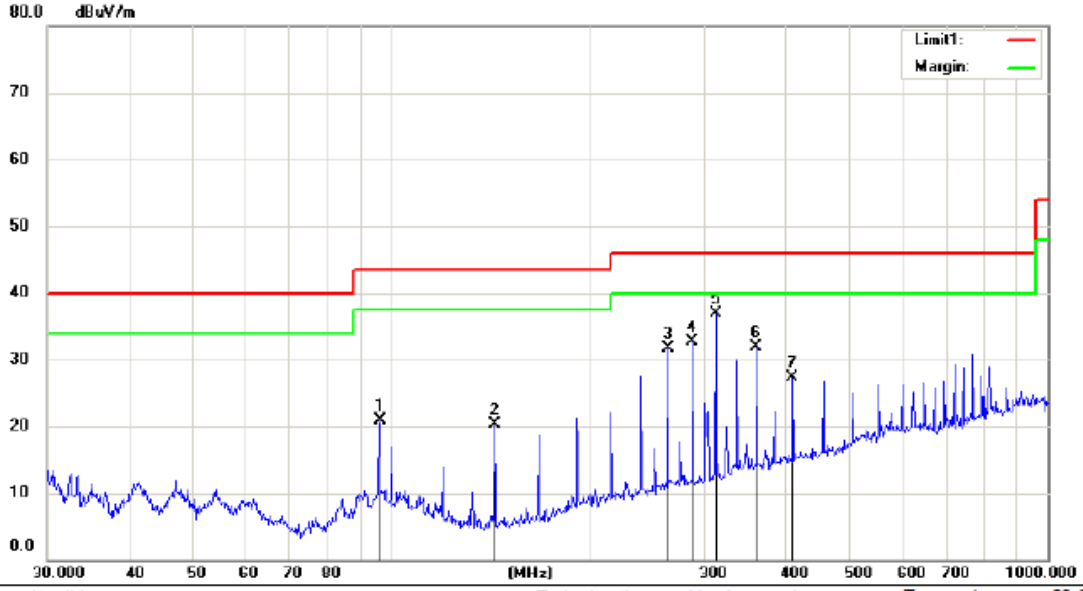
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		218.3085	46.83	-20.83	26.00	46.00	-20.00	QP			
2		332.5187	43.26	-16.96	26.30	46.00	-19.70	QP			
3		400.4320	42.81	-15.31	27.50	46.00	-18.50	QP			
4		499.4247	41.55	-12.65	28.90	46.00	-17.10	QP			
5	*	798.9797	41.47	-7.27	34.20	46.00	-11.80	QP			
6		1000.000	42.65	-5.05	37.60	54.00	-16.40	QP			

GFSK Mode: Low channel



Site site #1 Polarization: *Vertical* Temperature: 23 C
Limit: FCC Part15_3M Radiation Power: DC 3.7V Humidity: 56 %
Mode:GFSK, (2402MHz)
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.3172	40.39	-21.59	18.80	40.00	-21.20	QP			
2		96.0985	37.38	-20.88	16.50	43.50	-27.00	QP			
3		287.9904	39.62	-18.32	21.30	46.00	-24.70	QP			
4	*	312.1794	42.60	-17.70	24.90	46.00	-21.10	QP			
5		360.4476	39.38	-16.18	23.20	46.00	-22.80	QP			
6		649.6596	33.72	-9.82	23.90	46.00	-22.10	QP			



Site site #1 Polarization: *Horizontal* Temperature: 23 C

Limit: FCC Part15_3M Radiation Power: DC 3.7V Humidity: 56 %

Mode:GFSK, (2402MHz)

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		96.0986	41.78	-20.88	20.90	43.50	-22.60	QP			
2		143.8295	45.37	-24.97	20.40	43.50	-23.10	QP			
3		263.8190	51.04	-19.24	31.80	46.00	-14.20	QP			
4		287.9904	51.12	-18.32	32.80	46.00	-13.20	QP			
5	*	312.1794	54.60	-17.70	36.90	46.00	-9.10	QP			
6		360.4476	48.08	-16.18	31.90	46.00	-14.10	QP			
7		408.9460	42.34	-15.04	27.30	46.00	-18.70	QP			

Above 1000MHz:

Frequency Range:	1GHz~25GHz	Test Date :	09/24/2014
Measured Distance:	3m	Temperature :	24 ℃
Test Result:	PASS	Humidity :	53%
Test By:	KK		

Charging Mode							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
1112.179	V	49.26	30.53	74.00	54.00	-24.74	-23.47
1272.436	V	51.62	26.16	74.00	54.00	-22.38	-27.84
1913.462	V	52.21	27.62	74.00	54.00	-21.79	-26.38
2073.718	V	52.07	29.93	74.00	54.00	-21.93	-24.07
2241.987	V	49.57	32.26	74.00	54.00	-24.43	-21.74
3475.962	V	52.53	31.60	74.00	54.00	-21.47	-22.40
1272.436	H	58.41	28.56	74.00	54.00	-15.59	-25.44
1488.782	H	50.25	27.95	74.00	54.00	-23.75	-26.05
2153.846	H	48.95	30.39	74.00	54.00	-25.05	-23.61
2362.179	H	54.03	31.11	74.00	54.00	-19.97	-22.89
2474.359	H	54.44	30.61	74.00	54.00	-19.56	-23.39
2987.179	H	55.00	29.05	74.00	54.00	-19.00	-24.95

GFSK Mode: Low channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3206.731	V	50.63	38.82	74.00	54.00	-23.37	-15.18
4868.59	V	55.35	44.02	74.00	54.00	-18.65	-9.98
7102.564	V	57.80	43.34	74.00	54.00	-16.20	-10.66
9581.731	V	63.60	47.04	74.00	54.00	-10.40	-6.96
11052.885	V	64.51	49.69	74.00	54.00	-9.49	-4.31
12769.231	V	65.37	48.67	74.00	54.00	-8.63	-5.33
4514.423	H	53.01	42.82	74.00	54.00	-20.99	-11.18
6639.423	H	57.35	48.15	74.00	54.00	-16.65	-5.85
8491.987	H	60.65	48.56	74.00	54.00	-13.35	-5.44
9472.756	H	64.49	50.71	74.00	54.00	-9.51	-3.29
11107.372	H	64.36	48.76	74.00	54.00	-9.64	-5.24
13150.641	H	66.05	50.62	74.00	54.00	-7.95	-3.38

GFSK Mode: Middle channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
3833.333	V	49.03	38.47	74.00	54.00	-24.97	-15.53
4868.590	V	54.85	44.19	74.00	54.00	-19.15	-9.81
7865.385	V	58.74	49.65	74.00	54.00	-15.26	-4.35
9581.731	V	63.10	49.64	74.00	54.00	-10.90	-4.36
11052.885	V	64.51	50.57	74.00	54.00	-9.49	-3.43
12769.231	V	65.37	47.34	74.00	54.00	-8.63	-6.66
4868.590	H	53.35	42.08	74.00	54.00	-20.65	-11.92
7102.564	H	57.30	44.75	74.00	54.00	-16.70	-9.25
8519.231	H	59.67	47.28	74.00	54.00	-14.33	-6.72
9445.513	H	61.16	49.29	74.00	54.00	-12.84	-4.71
11052.885	H	63.51	48.71	74.00	54.00	-10.49	-5.29
13858.974	H	67.44	49.79	74.00	54.00	-6.56	-4.21

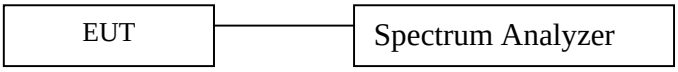
GFSK Mode: High channel							
Freq. (MHz)	Ant.Pol. (H/V)	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
4868.590	V	54.85	44.38	74.00	54.00	-19.15	-9.62
7102.564	V	56.80	46.37	74.00	54.00	-17.20	-7.63
7865.385	V	59.24	49.39	74.00	54.00	-14.76	-4.61
8519.231	V	60.67	47.23	74.00	54.00	-13.33	-6.77
9581.731	V	63.10	48.62	74.00	54.00	-10.90	-5.38
11052.885	V	64.51	49.66	74.00	54.00	-9.49	-4.34
6693.910	H	56.64	46.30	74.00	54.00	-17.36	-7.70
7102.564	H	57.30	43.65	74.00	54.00	-16.70	-10.35
8519.231	H	58.67	45.54	74.00	54.00	-15.33	-8.46
9581.731	H	60.60	47.84	74.00	54.00	-13.40	-6.16
11052.885	H	63.51	49.66	74.00	54.00	-10.49	-4.34
12769.231	H	64.37	47.74	74.00	54.00	-9.63	-6.26

6. Channel Separation Test

6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print 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

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

6.4 Measurement Results

The following table is the setting of spectrum analyzer.

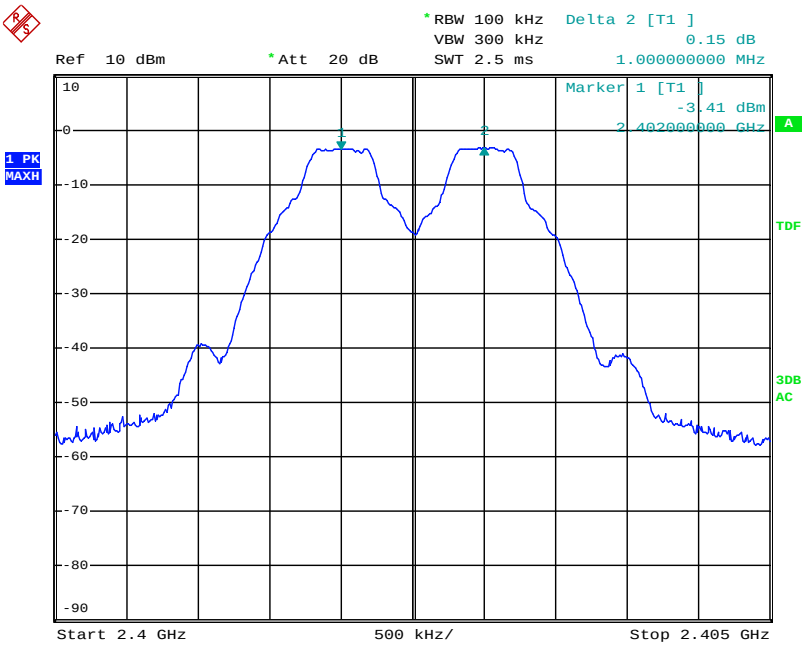
Attenuation	Auto
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max hold

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	09/22/2014
Test By:	Jary	Temperature :	20 ℃
Test Result:	PASS	Humidity :	55 %

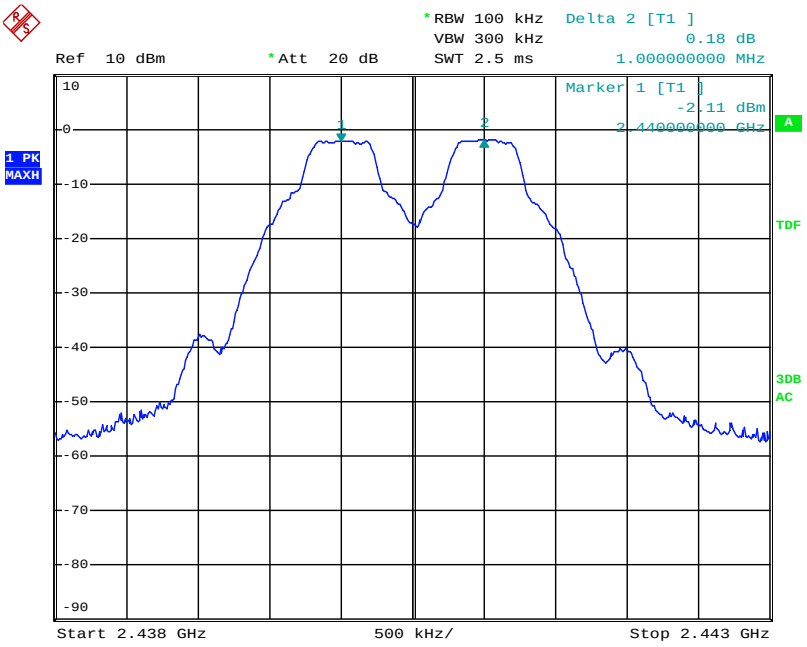
Test Channel	Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit 2/3*20dB Down BW(kHz)
Low Channel	2402	1000.00	693
Adjacency Channel	2403		
Middle channel	2441	1000.00	693
Adjacency Channel	2440		
High Channel	2480	1000.00	700
Adjacency Channel	2479		

Low channel



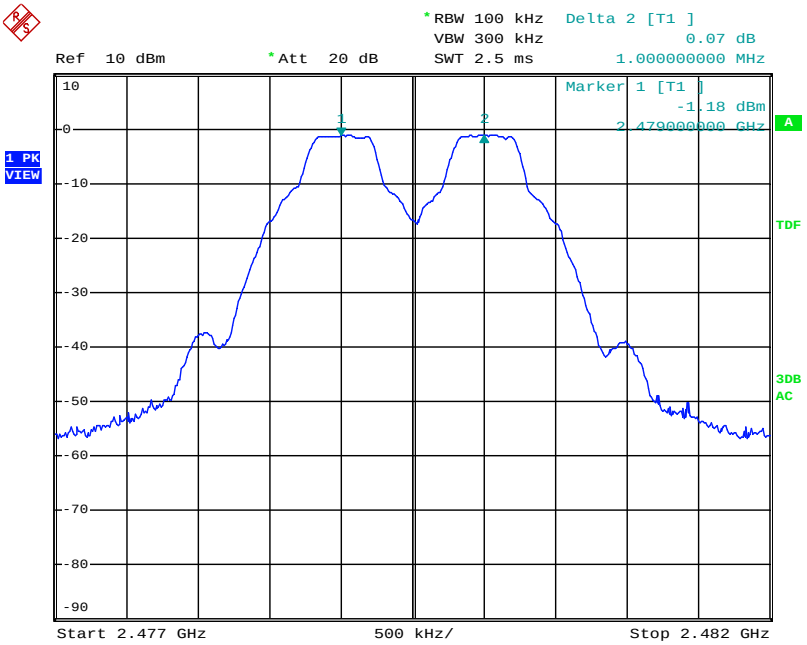
Date: 22.SEP.2014 11:13:25

Middle channel



Date: 22.SEP.2014 11:14:57

High channel



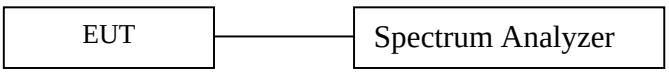
Date: 22.SEP.2014 11:11:12

7. Bandwidth Test

7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Print 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

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

7.4 Measurement Results

The following table is the setting of spectrum analyzer.

Attenuation	Auto
SPAN	3MHz
RB	30KHz
VB	100KHz
Detector	Peak
Trace	Max hold

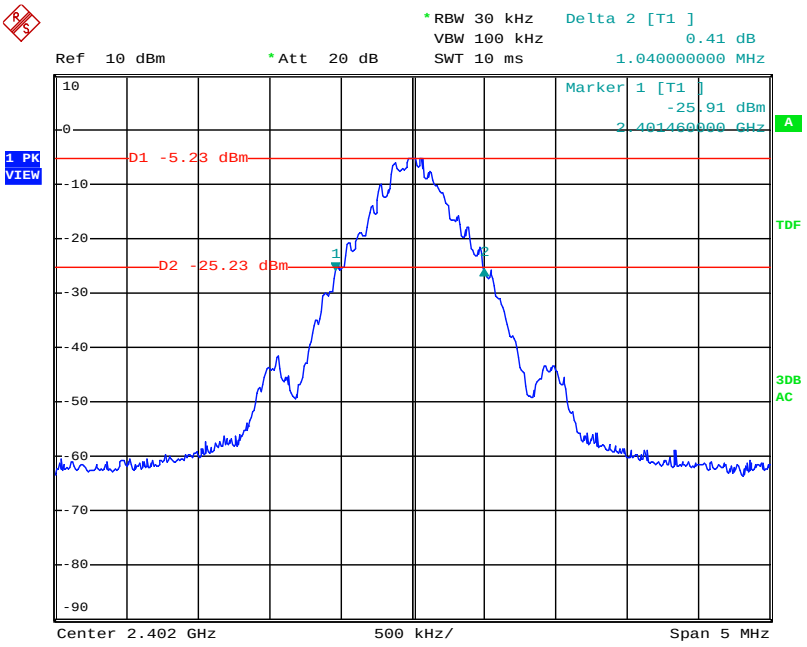
20dB Bandwidth test data Chart:

Refer to attached data chart.

Spectrum Detector:	PK	Test Date:	09/22/2014
Test By:	Jary	Temperature:	20 ℃
Test Result:	N/A	Humidity:	55 %

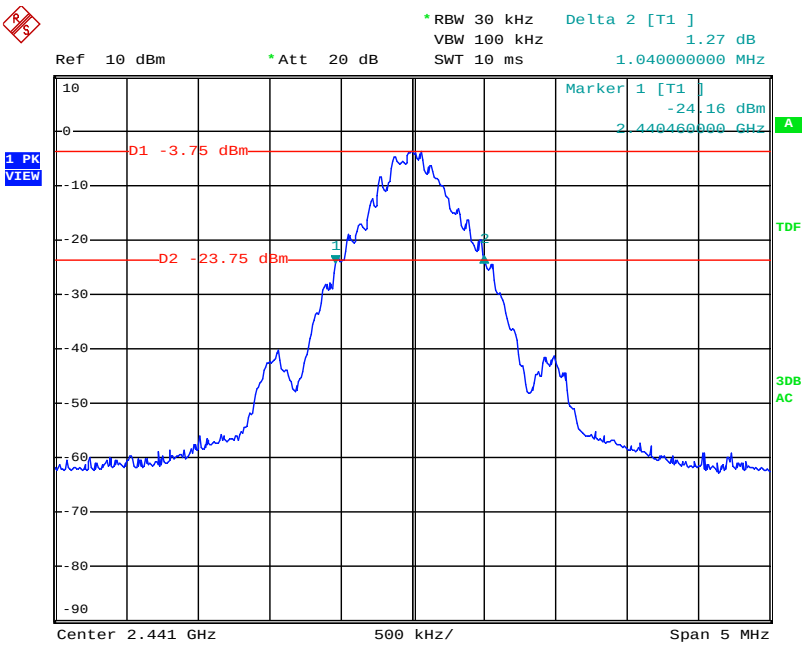
Channel number	Channel frequency (MHz)	20dB Down BW(kHz)
Low channel	2402	1040
Middle channel	2441	1040
High channel	2480	1050

Low channel



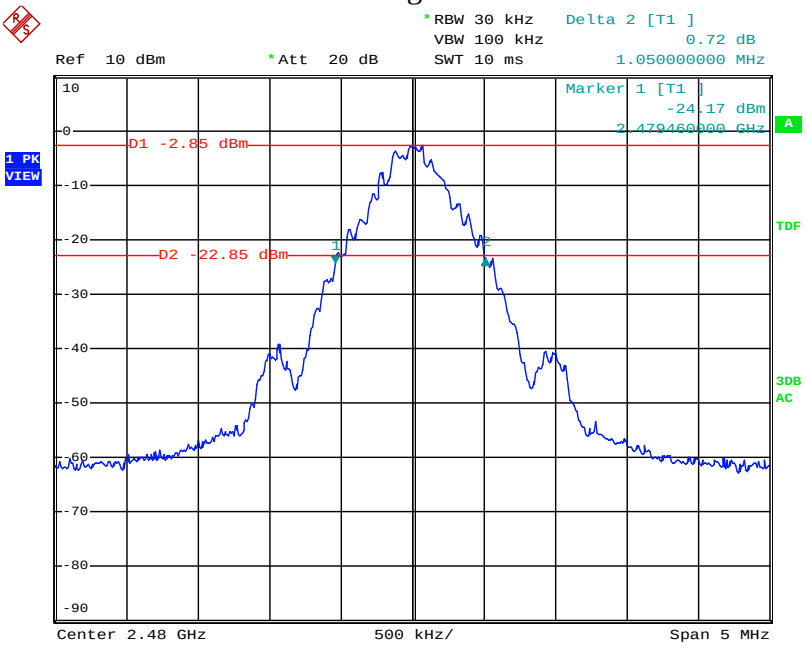
Date: 22.SEP.2014 10:34:17

Middle channel



Date: 22.SEP.2014 10:31:42

High channel



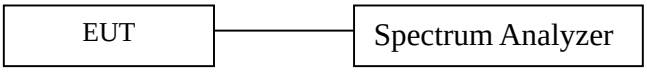
Date: 22.SEP.2014 10:27:37

8. Quantity of Hopping Channel Test

8.1 Measurement Procedure

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

8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used

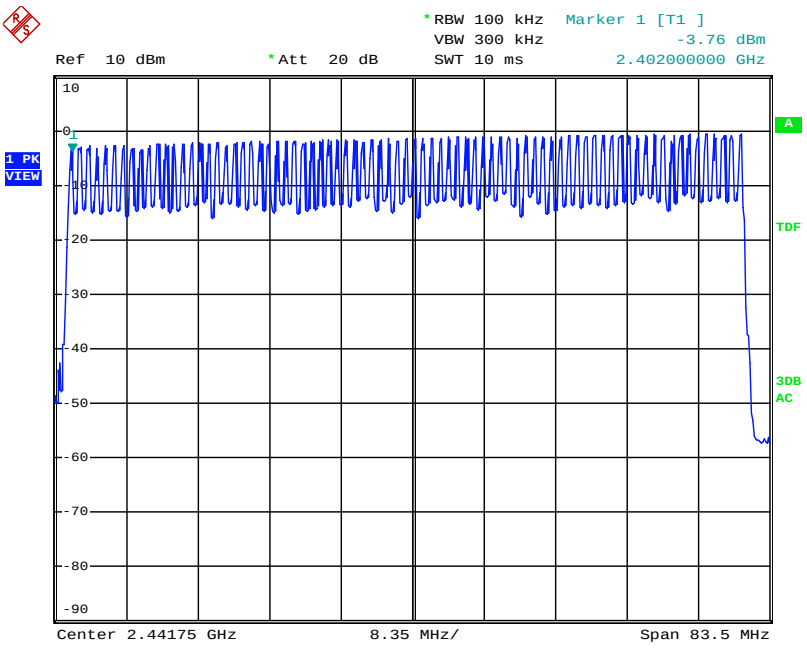
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

8.4 Measurement Results

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	09/22/2014
Test By:	Jary	Temperature :	22 ℃
Test Result:	PASS	Humidity :	56 %

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel limit
2402-2480	79	>15



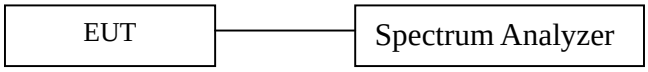
Date: 22.SEP.2014 11:28:22

9. Time of Occupancy (Dwell Time) Test

9.1 Measurement Procedure

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

9.2 Test SET-UP (Block Diagram of Configuration)



9.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

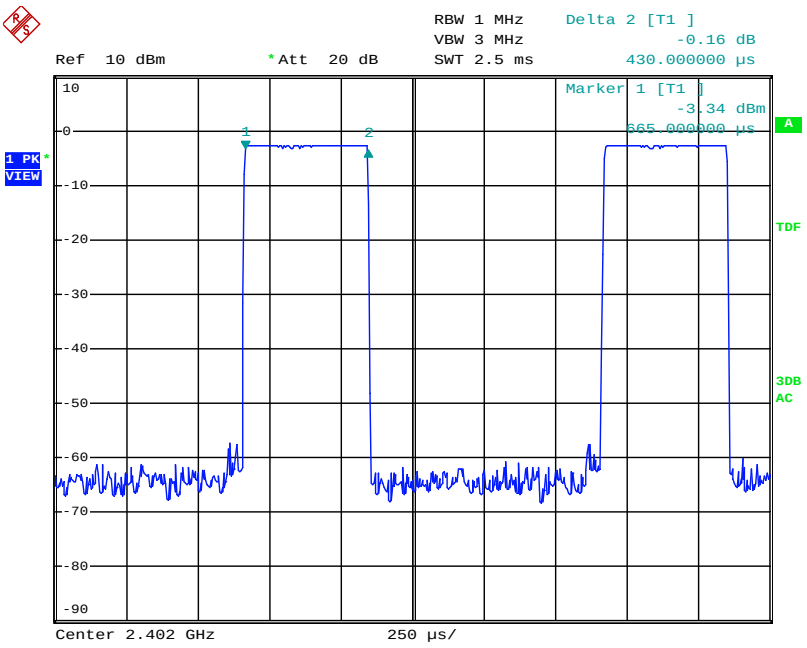
9.4 Measurement Results

Refer to attached data chart.

Spectrum Detector:	PK	Test Date :	09/22/2013
Test By:	Jary	Temperature :	20 ℃
Test Result:	PASS	Humidity :	55 %

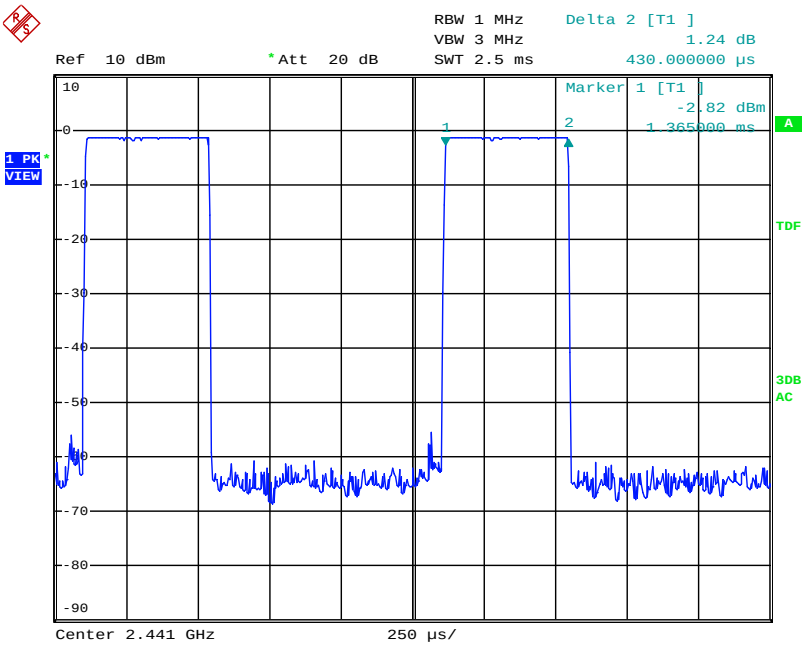
Mode	Channel	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
GFSK Mode					
DH1	Low channel	0.430	137.6	400	Pass
	Middle channel	0.430	137.6	400	Pass
	High channel	0.430	137.6	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second				
DH3	Low channel	1.690	270.4	400	Pass
	Middle channel	1.690	270.4	400	Pass
	High channel	1.690	270.4	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second				
DH5	Low channel	2.930	312.5	400	Pass
	Middle channel	2.930	312.5	400	Pass
	High channel	2.930	312.5	400	Pass
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				

DH1: Low channel



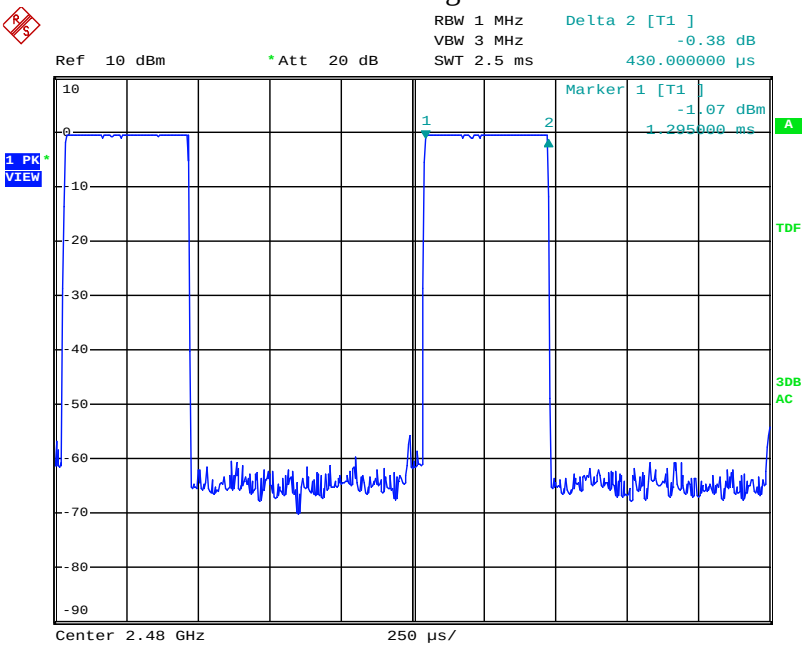
Date: 22.SEP.2014 11:31:13

DH1: Middle channel



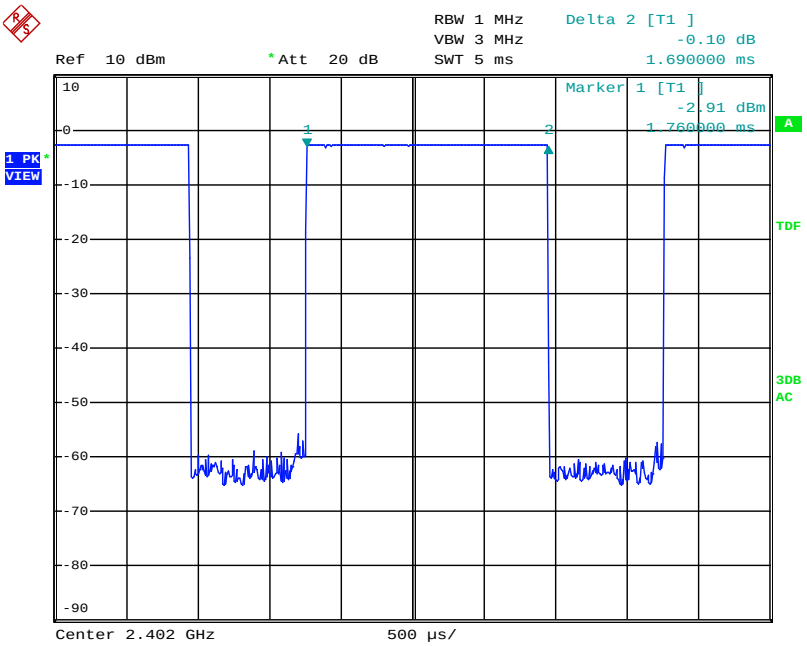
Date: 22.SEP.2014 11:34:41

DH1: High channel



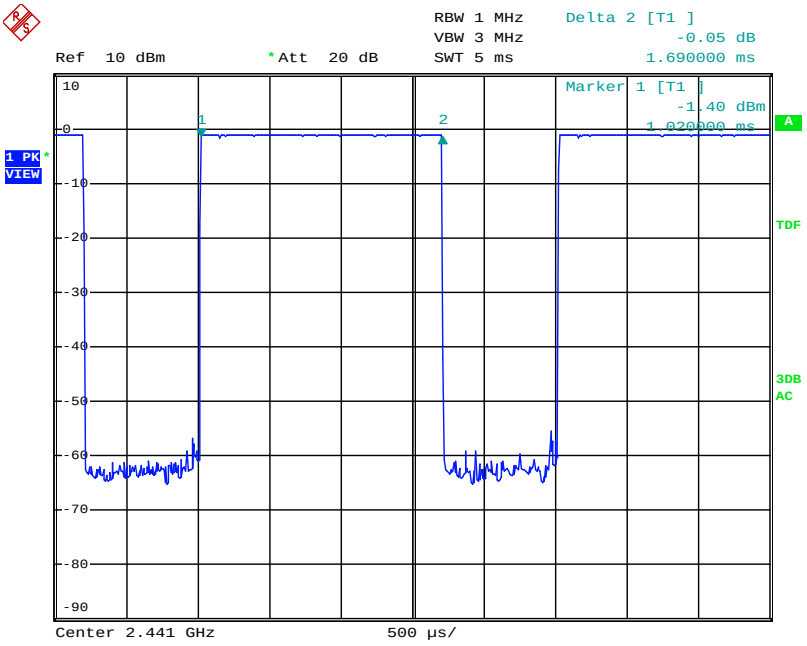
Date: 22.SEP.2014 11:33:15

DH3: Low channel



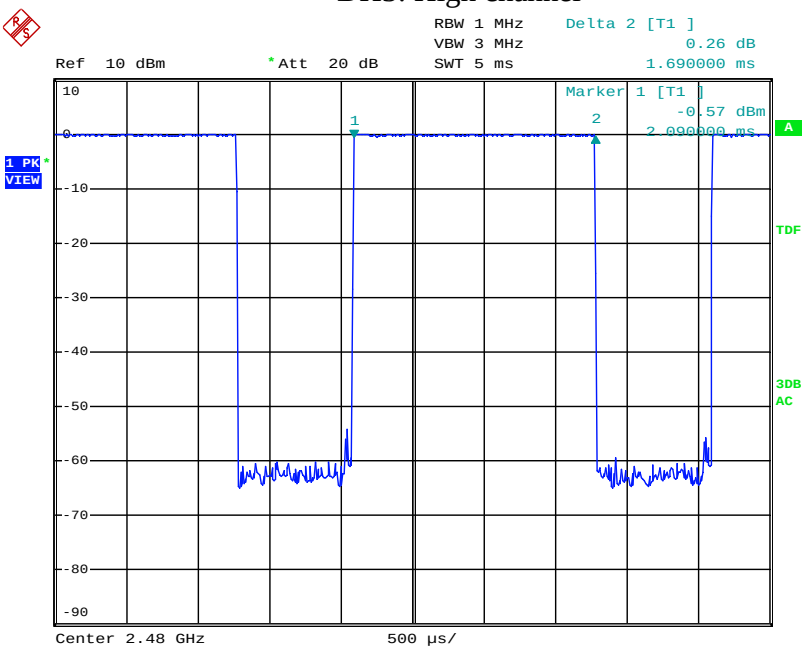
Date: 22.SEP.2014 12:06:31

DH3: Middle channel



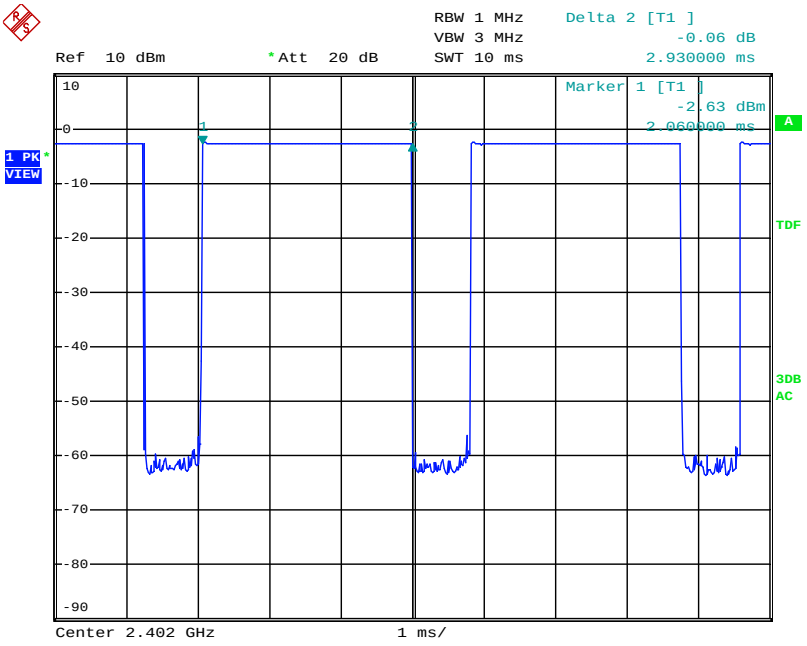
Date: 22.SEP.2014 12:05:40

DH3: High channel



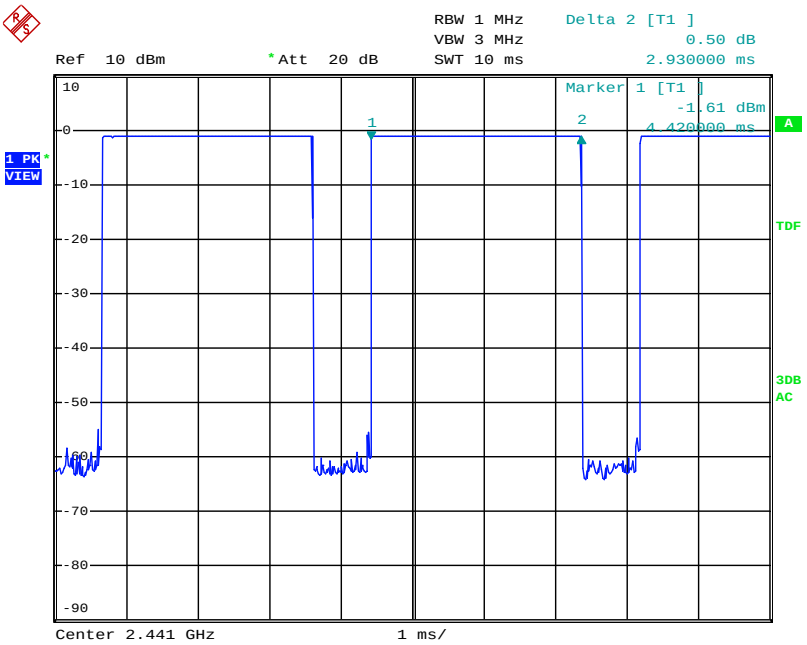
Date: 22.SEP.2014 12:04:16

DH5: Low channel



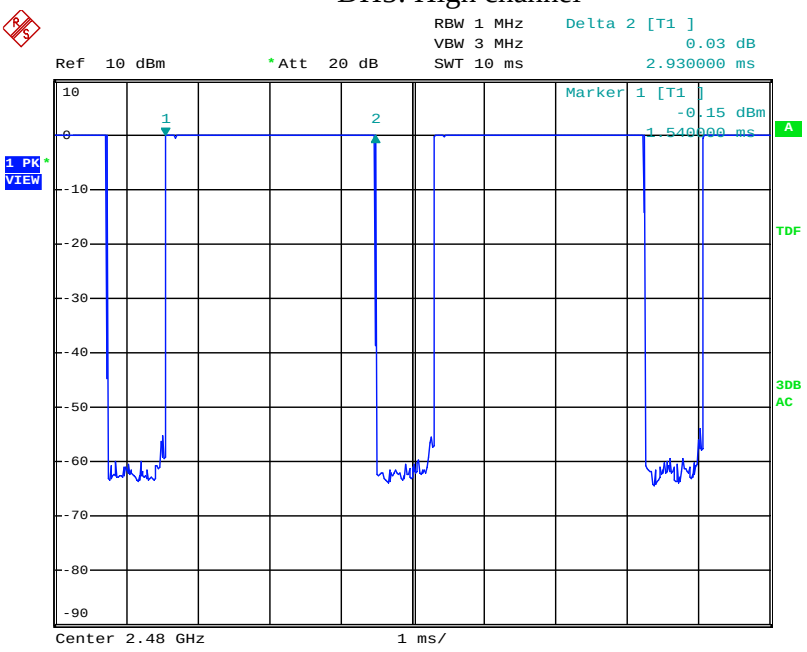
Date: 22.SEP.2014 12:15:39

DH5: Middle channel



Date: 22.SEP.2014 12:16:38

DH5: High channel



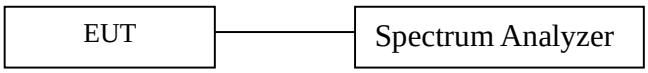
Date: 22.SEP.2014 12:17:46

10. Maximum Peak Output Power Test

10.1 Measurement Procedure

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

10.2 Test SET-UP (Block Diagram of Configuration)



10.3 Measurement Equipment Used

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	ESCI	10017	08/01/2014	08/01/2015

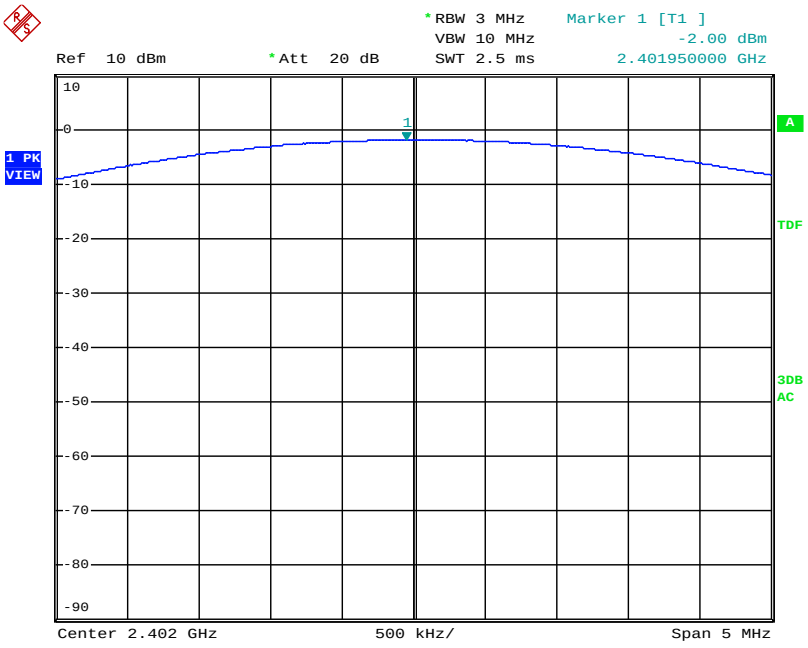
10.4 Measurement Results

Refer to attached data chart.

Spectrum Detector:	PK	Temperature :	23 ℃
Test By:	Jary	Humidity :	53 %
Test Result:	PASS		

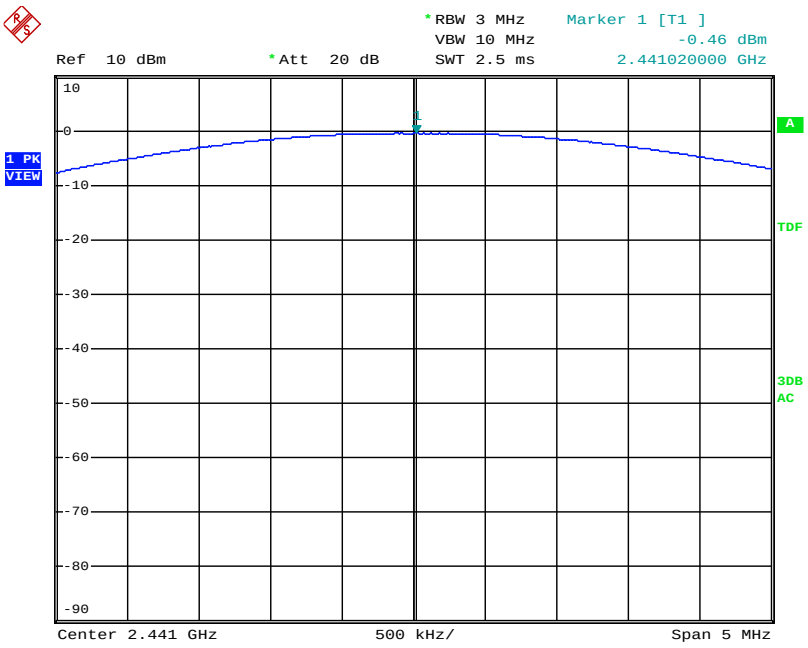
Channel	Channel Frequency (MHz)	Peak Power output(dBm)	Peak Power output(mW)	Peak Power Limit(mW)	Pass/Fail
Low channel	2402.00	-2.00	0.63	125	PASS
Middle channel	2441.00	-0.46	0.90	125	PASS
High channel	2480.00	0.28	1.07	125	PASS

Low channel



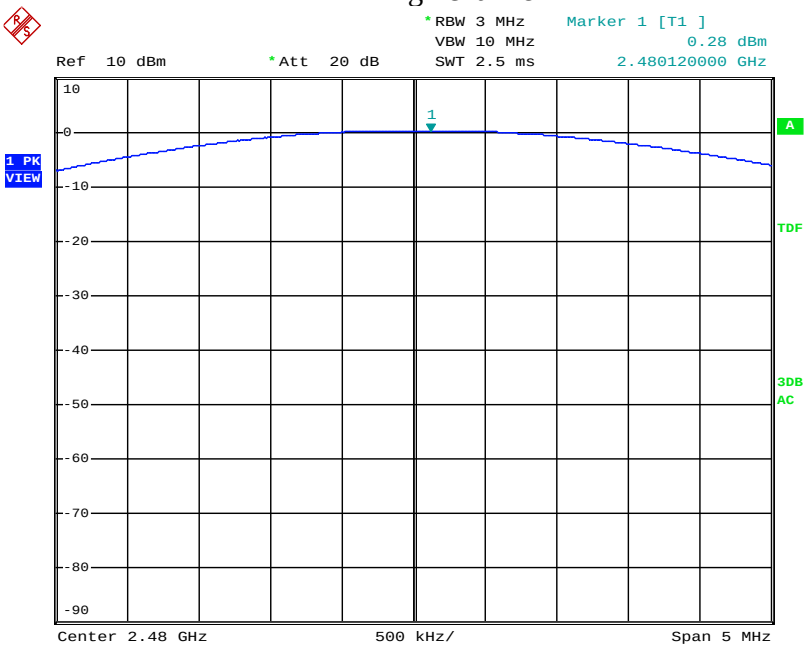
Date: 15.OCT.2014 17:27:36

Middle channel



Date: 15.OCT.2014 17:31:18

High channel



Date: 15.OCT.2014 17:23:53

11. Band Edge Test

11.1 Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Measurement Procedure

(A) Conducted method:

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: RBW = 100kHz, VBW = 300kHz.

(B) Radiated method:

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.

(Peak measurement: Peak detector, RBW=1MHz, VBW=3MHz, Sweep=Auto
Average measurement: Peak detector, RBW=1MHz, VBW=10Hz, Sweep=Auto)

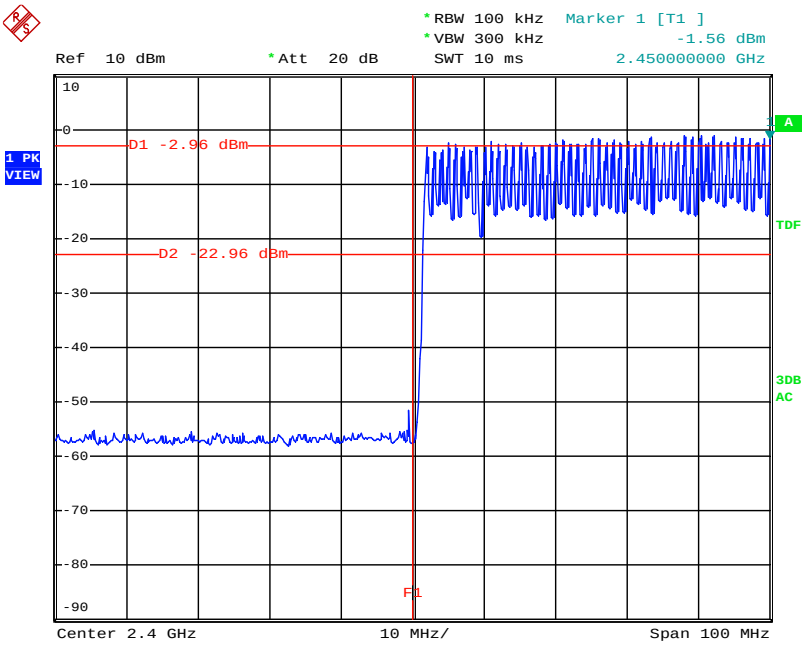
11.3 Measurement Equipment Used

Conducted method: Same as 6.3 Channel Separation Measurement.
Radiated method: Same as 5.3 Radiated Emission Measurement.

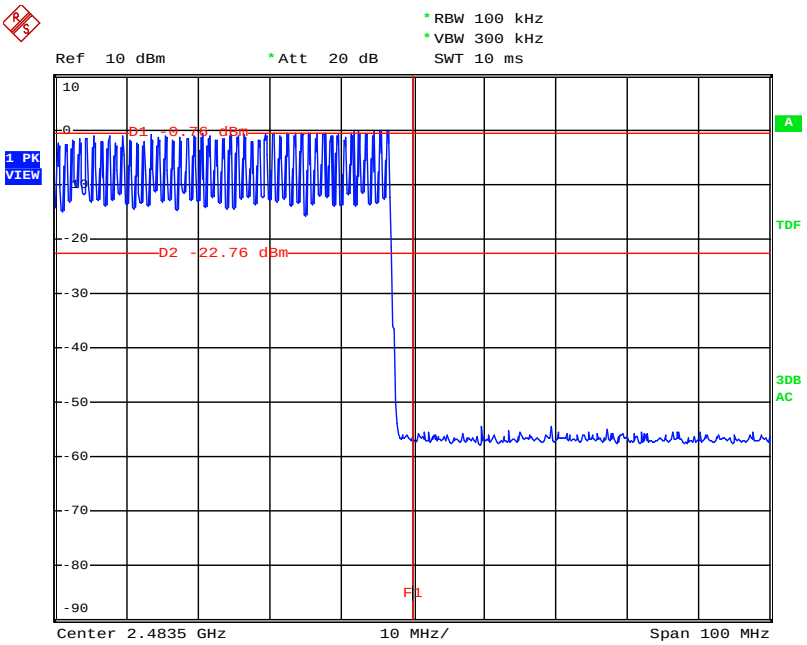
11.4 Measurement Results

Pass
Refer to attached data chart.

(A) Conducted Measurement
For Hopping Mode:

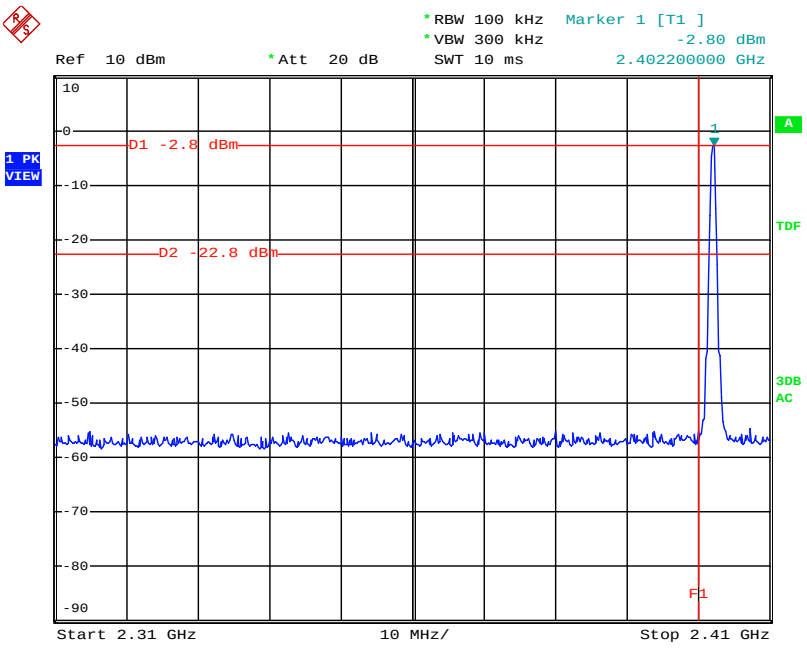


Date: 22.SEP.2014 12:39:38

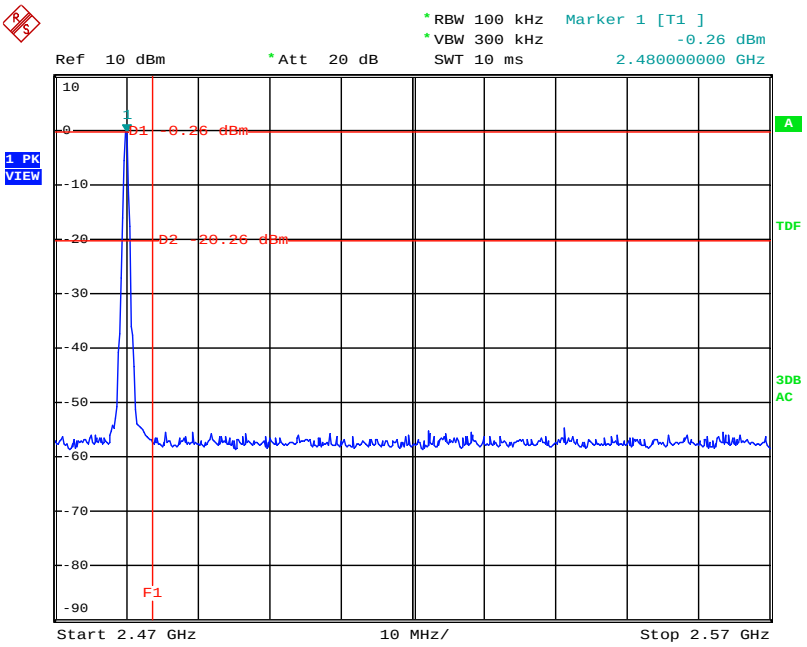


Date: 22.SEP.2014 12:41:34

For Non-Hopping Mode



Date: 22.SEP.2014 12:32:22

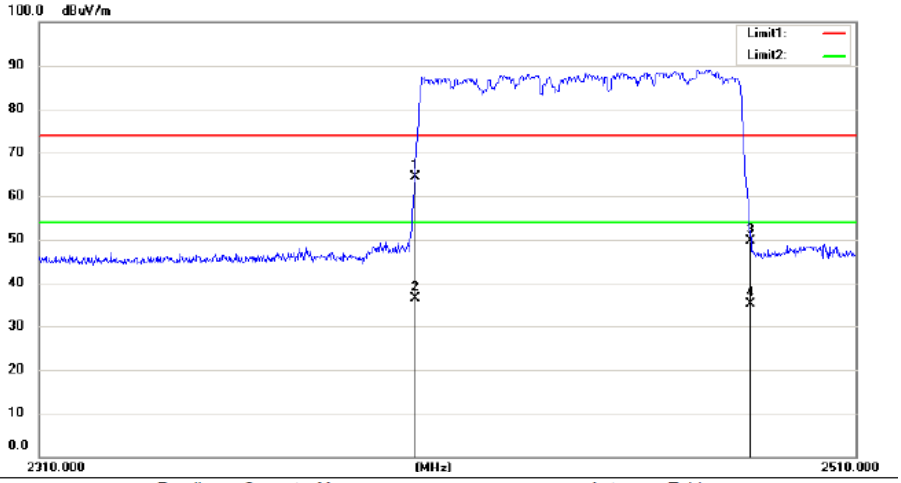


Date: 22.SEP.2014 12:36:57

(B) Radiated Measurement

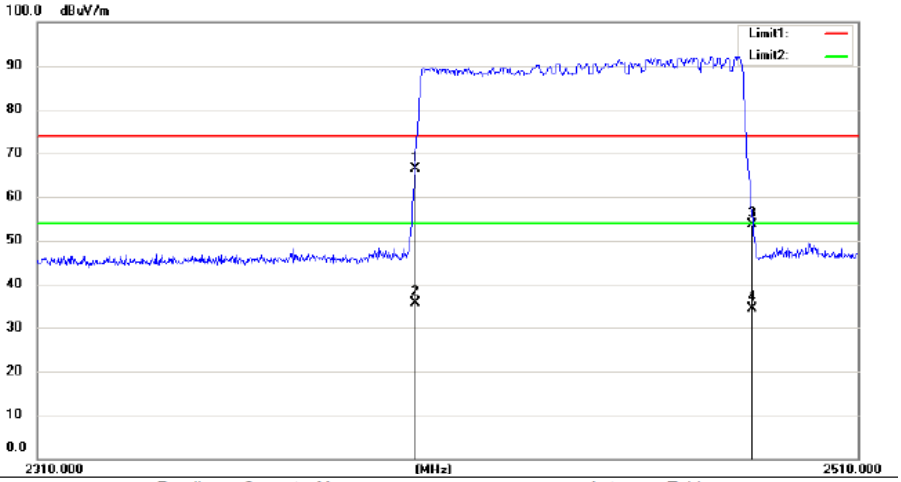
For Hopping Mode:

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comme
1	*	2400.000	53.12	11.33	64.45	73.90	-9.45	peak			
2		2400.000	25.07	11.33	36.40	53.90	-17.50	AVG			
3		2483.500	37.53	12.13	49.66	73.90	-24.24	peak			
4		2483.500	22.90	12.13	35.03	53.90	-18.87	AVG			

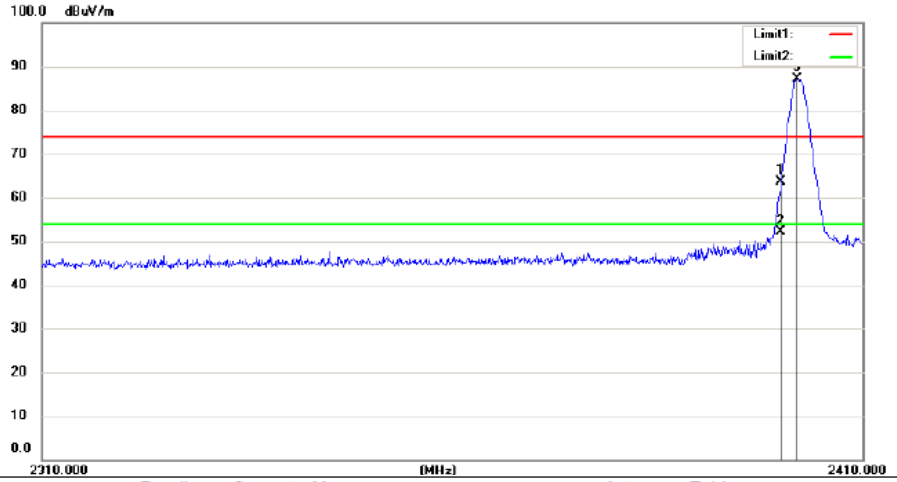
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comme
1	*	2400.000	55.00	11.33	66.33	73.90	-7.57	peak			
2		2400.000	24.18	11.33	35.51	53.90	-18.39	AVG			
3		2483.500	41.52	12.13	53.65	73.90	-20.25	peak			
4		2483.500	22.29	12.13	34.42	53.90	-19.48	AVG			

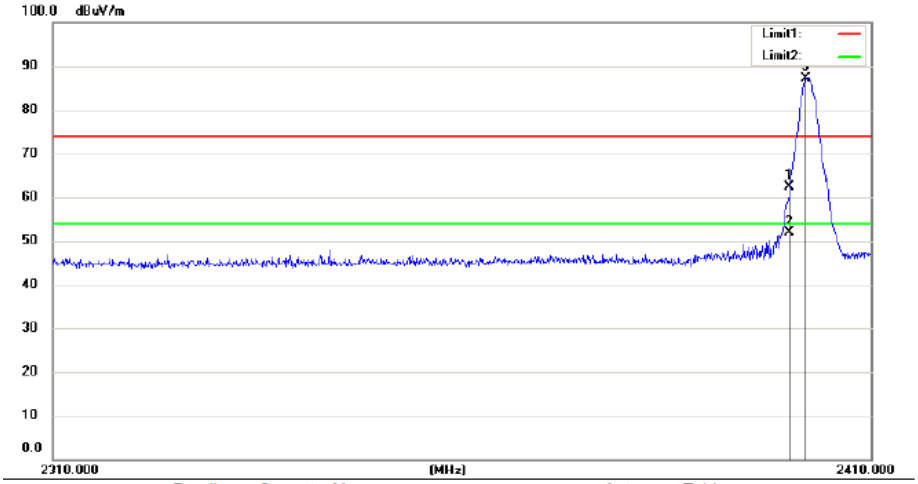
For Non-Hopping Mode:

Low Channel (V):



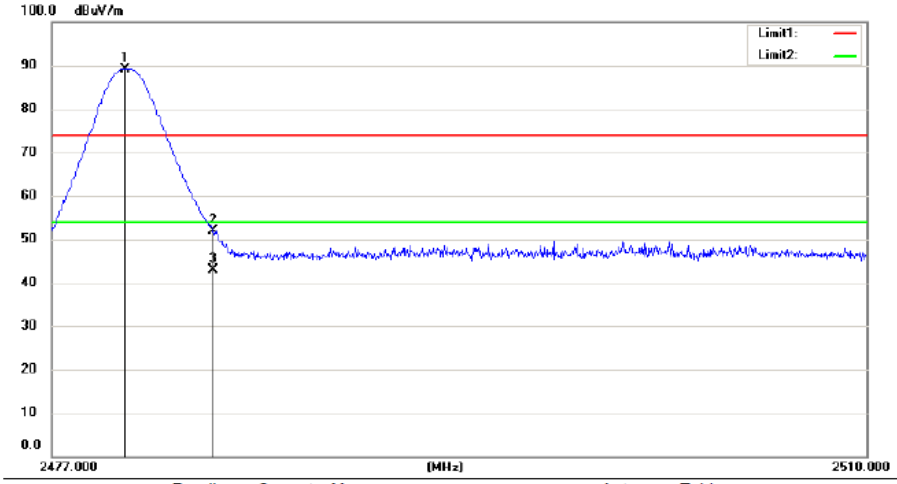
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comment
1		2400.000	52.18	11.33	63.51	73.90	-10.39	peak			
2		2400.000	40.71	11.33	52.04	53.90	-1.86	AVG			
3	*	2402.000	75.72	11.35	87.07	73.90	13.17	peak			

Low Channel (H):



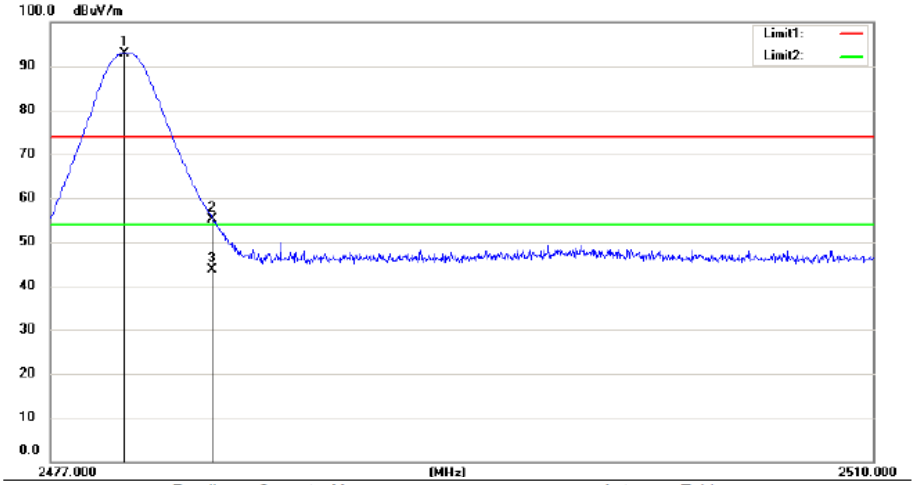
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comment
1		2400.000	51.04	11.33	62.37	73.90	-11.53	peak			
2		2400.000	40.52	11.33	51.85	53.90	-2.05	AVG			
3	*	2402.000	75.89	11.35	87.24	73.90	13.34	peak			

High Channel (V):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comment
1	*	2480.000	76.92	12.10	89.02	73.90	15.12	peak			
2		2483.500	39.73	12.13	51.86	73.90	-22.04	peak			
3		2483.500	30.67	12.13	42.80	53.90	-11.10	AVG			

High Channel (H):



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Peak/AVG	cm	degree	Comment
1	*	2480.000	80.66	12.10	92.76	73.90	18.86	peak			
2		2483.500	43.06	12.13	55.19	73.90	-18.71	peak			
3		2483.500	31.41	12.13	43.54	53.90	-10.36	AVG			

12. Antenna Port Emission

12.1 Test Equipment

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.	CAL DUE.
Spectrum Analyzer	Agilent	E4407B	MY45107013	05/29/2014	05/28/2015

12.2 Measuring Instruments and setting

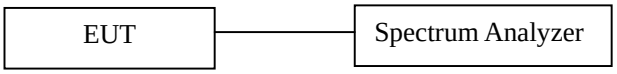
The following table is the setting of spectrum analyzer.

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

12.3 Test Procedures

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

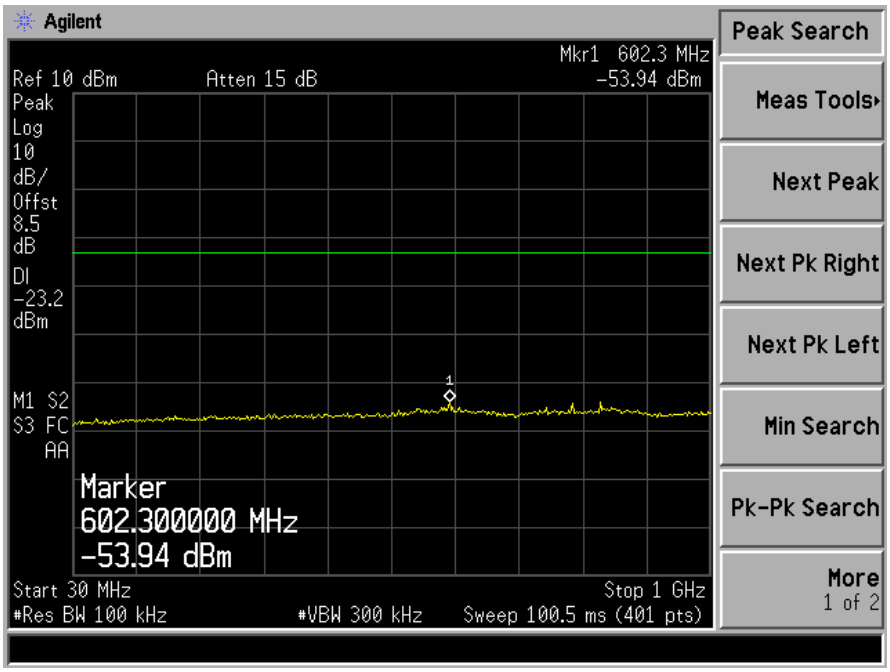
12.4 Block Diagram of Test setup

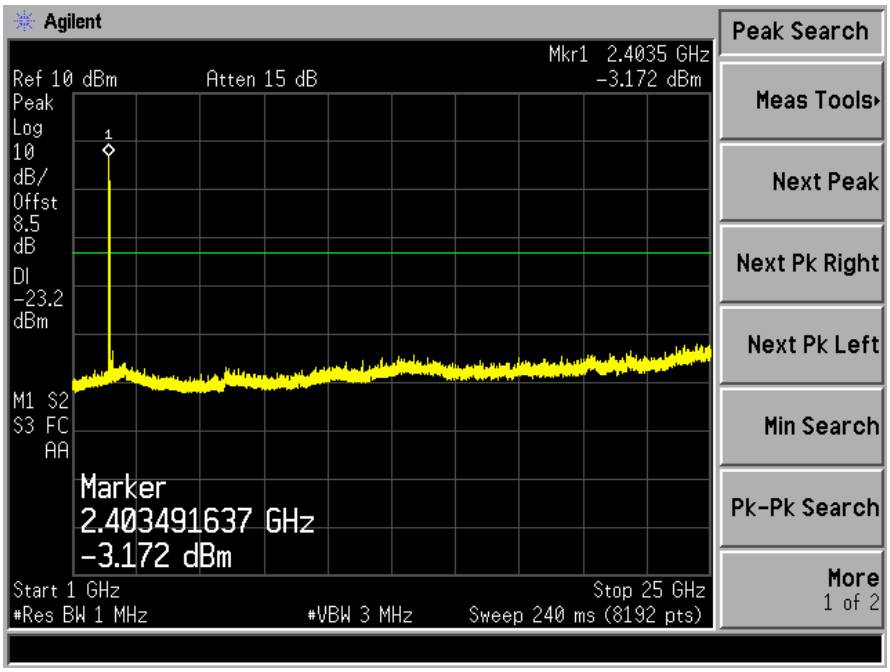


12.5 Test Result

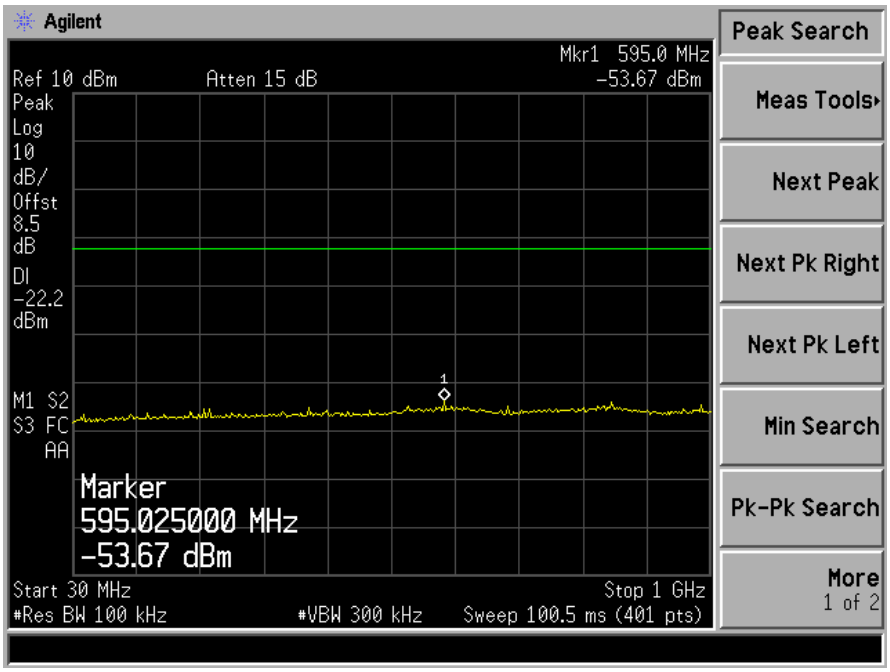
PASS.

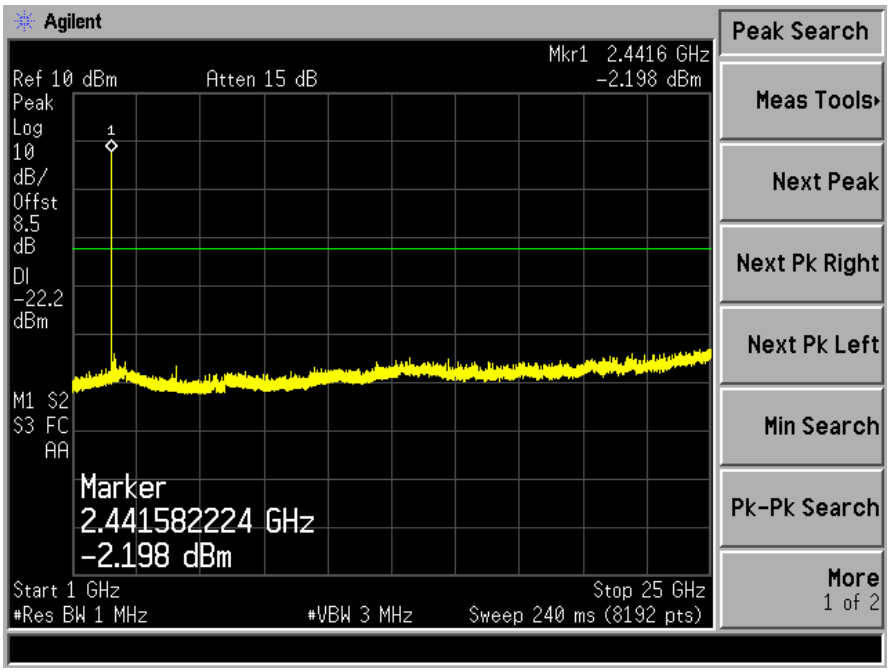
Low channel


Agilent
Mkr1 602.3 MHz
Ref 10 dBm
Atten 15 dB
-53.94 dBm
Peak
Log
10
dB/
Offst
8.5
dB
Dl
-23.2
dBm
M1 S2
S3 FC
AA
Marker
602.300000 MHz
-53.94 dBm
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

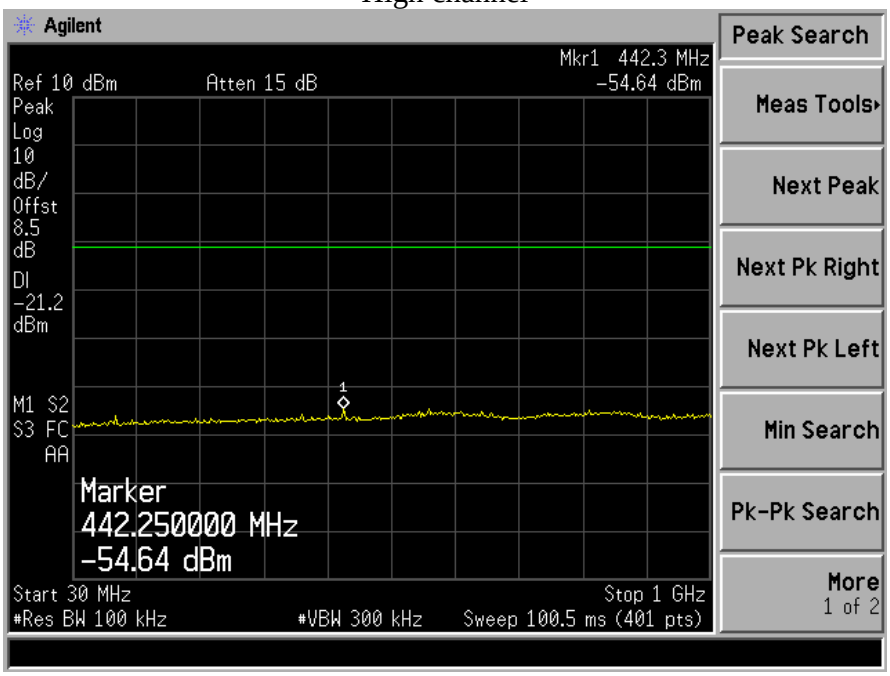

Agilent
Mkr1 2.4035 GHz
Ref 10 dBm
Atten 15 dB
-3.172 dBm
Peak
Log
10
dB/
Offst
8.5
dB
Dl
-23.2
dBm
M1 S2
S3 FC
AA
Marker
2.403491637 GHz
-3.172 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 25 GHz
Sweep 240 ms (8192 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

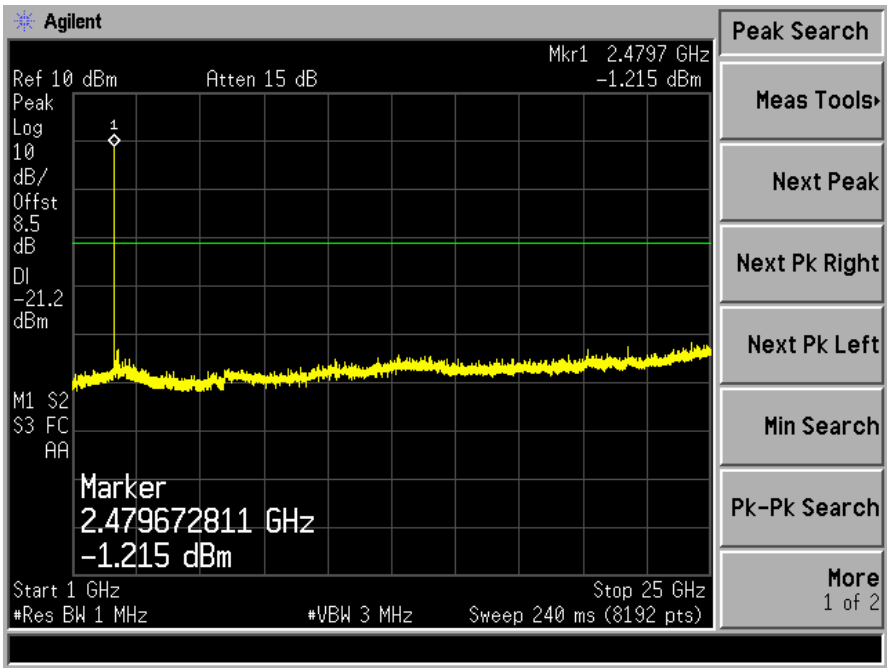
Middle channel





High channel





13. Antenna Application

13.1 Antenna requirement

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

FCC part 15C section 15.247 requirements:
Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

13.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 0 dBi and meets the requirement

Annex A

B&W ELECTRONICS DEVELOPMENT LIMITED

China Factory: 4/F,No. 2 Building, Guangxi Industrial Park, West of Jianshe Rd., Longhua Town, ShenZhen City, China
Tel：+86-755-8418 3383 Fax：+86-755-8418 3383 Email: eddie.zhang@bluetooth-wifi.com

HK Office: Room 1701, Henan Building, No.90, Jaffe Road, Wanchai, Hong Kong
Tel: +852-5804 2046 Fax: +852-3115 8812 Website：www.bluetooth-wifi.com

October 09, 2014

To: SIEMIC, INC.
775 Montague Expressway,
Milpitas, CA 95035
USA

We, SHENZHEN B&W ELECTRONICS DEVELOPMENT LIMITED hereby declare EUT (Bluetooth Keyboard Case): Models BW05002-3, 44041, ABKCi-014, BW05002-5, BW05002-7, BW05002-8 and ABKC-014 are identical in circuitry and electrical, mechanical and physical construction, and all models have the same RF module and antenna; the only differences are the appearance and model no. for trading purpose.

Models	SIZE(L*W*H)	Number of keys
BW05002-3, 44041, ABKCi-014	26cm*19.5cm*2cm	78
BW05002-8, ABKC-014	26.5cm*18cm*2cm	78
BW05002-5	26cm*18.5*cm*2cm	78
BW05002-7	20.5cm*14.5cm*2cm	59

Eddie Zhang/Manager
Shenzhen B&W Electronics Development Limited
Address: 4/F, No.2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen City, China
Telephone: 0086-755-8418 3383
Fax : 0086-755-8179 6937
E-mail: eddie.zhang@bw-electronics.com

---The End---