

# FCC TEST REPORT for Chengdu Jaalee Technology Co., Ltd.

Jaalee Beacon Model No.: iB004-N

Prepared for : Chengdu Jaalee Technology Co., Ltd.

Address : Building II, Linli Center (period 1), Section II of Southwest

Airport Road, Chengdu, 610000, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited

Address : 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road,

Nanshan District, Shenzhen, Guangdong, China

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Report Number : R011408359E

Date of Test : Aug. 23~ Oct. 17, 2014

Date of Report : Oct. 20, 2014



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## **TEST REPORT**

Applicant	:	Chengdu Jaalee Technology Co., Ltd.
Manufacturer	•	Chengdu Jaalee Technology Co., Ltd.

EUT : Jaalee Beacon

Model No. : iB004-N

Serial No. : N.A.

Trade Mark : Jaalee

Rating : DC 3V,  $3.6\mu$ A

Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.247

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test :	Aug. 23~ Oct. 17, 2014
Prepared by :	poho shang
	(Tested Engineer / Kebo Zhang)
Reviewer:	Amy Ding
_	(Project Manager / Amy Ding)
Approved & Authorized Signer:	Ton Jen
Tipprova a Tiamonzoa digner	(Manager / Tom Chen)



### 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

EUT : Jaalee Beacon

Model Number : iB004-N

Test Power Supply: DC 3V

Frequency : 2402~2480MHz

Modulation : GFSK

Channel Spacing : 2MHz

Number of

Channels

: 40

Antenna Type : PCB Trace Antenna

Antenna

: PCB Antenna:0 dBi

Specification

Applicant : Chengdu Jaalee Technology Co., Ltd.

Address : Building II, Linli Center (period 1), Section II of Southwest Airport

Road, Chengdu, 610000, China

Manufacturer : Chengdu Jaalee Technology Co., Ltd.

Address : Building II, Linli Center (period 1), Section II of Southwest Airport

Road, Chengdu, 610000, China

Factory : Chengdu Jaalee Technology Co., Ltd.

Address : Building II, Linli Center (period 1), Section II of Southwest Airport

Road, Chengdu, 610000, China

Date of receipt : Aug. 23, 2014

Date of Test : Aug. 23~ Oct. 17, 2014



## 1.2. Auxiliary Equipment Used during Test

Mobile Phone : iPhone 5s

## 1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

#### FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 10, 2013.

#### IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, February 22, 2013.

#### **Test Location**

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

#### 1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB

Conduction Uncertainty : Uc = 3.4dB



## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC Part 15, Paragraph 15.247.

## 2.1. Summary of Test Results

The EUT has been tested according to the following specifications:

	3 -F		
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	-	N/A
FCC Part 15, Paragraph 15.247(b)(1)	Peak Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(2)	6dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(1)	Frequency Separation	1	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Number of Hopping Frequency	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Time of Occupancy	-	N/A
FCC Part 15, Paragraph 15.247(c)	Peak Power Density	PASS	Complies

# 2.2. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode isprogrammed.

Channel Low(2402MHz), Channel Middle(2442MHz) and Channel High(2480MHz) are chosen for the final testing.



## 3. FCC Part 15.247 Requirements for DSSS & OFDM Modulation

#### 3.1 Test Setup

EUT System	Attenuator	Test Receiver
Let bystem	110011001	1000110001101

#### 3.2 6dB Bandwidth

#### a. Limit

For the direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

#### **b.Test Procedure**

- 1. Place the EUT on the table and set it in the transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as:

RBW = 100kHz, VBW $\geqslant 3*RBW = 300kHz$ ,

Detector= Peak

Trace mode= Max hold.

Sweep- auto couple.

- 4. Mark the peak frequency and –6dB (upper and lower) frequency.
- 5. Repeat until all the rest channels are investigated.

#### c. Test Setup See 3.1

d. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 08, 2014	1 Year
2.	Preamplifier	Instruments corporation	EMC01183 0	980100	Aug. 08, 2014	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 22, 2014	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 04, 2014	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 24, 2014	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Aug. 08, 2014	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

#### e. Test Results

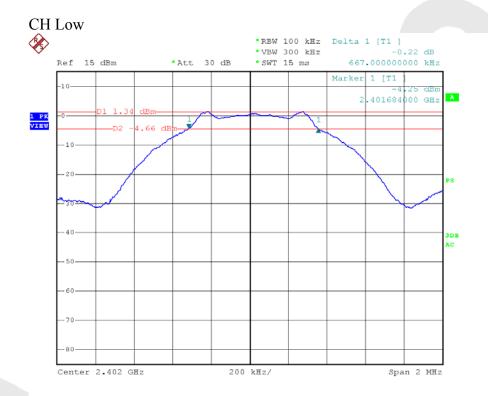
Pass.



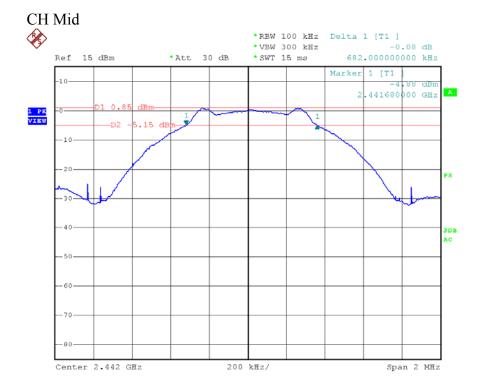
## f. Test Data

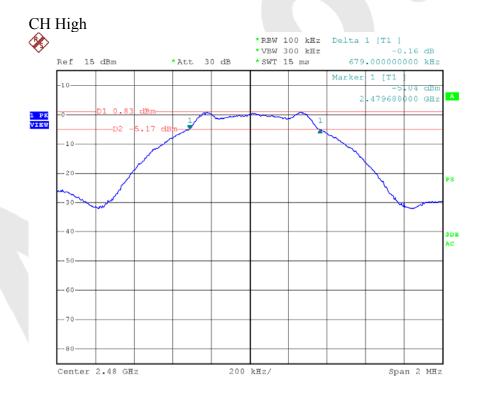
Channel	Frequency	Bandwidth	Limit	Results
Chamie	(MHz)	(kHz)	(kHz)	Results
Low	2402	667.00		Pass
Mid	2442	682.00	>500	Pass
High	2480	679.00		Pass

Test Plots See the following page.











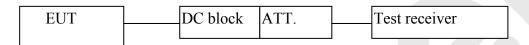
## 3.3. Maximum Peak output power test

#### a. Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

- 1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt (30dBm).
- 2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antenna of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## b. Configuration of Measurement



#### c. Test Procedure

#### This test was according the kDB 558074 9.1.2:

- 1. This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.
- 2. Set the RBW ≥DTS bandwidth.
- 3. Set the VBW≥3\*RBW.
- 4. Set the span  $\geq 3*RBW$ .
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use peak marker function to determine the peak amplitude level.

#### d. Test Equipment

Same as the equipment listed in 3.2.

#### e. Test Results

Pass.

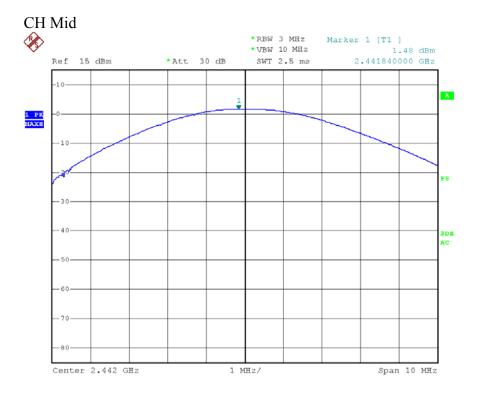


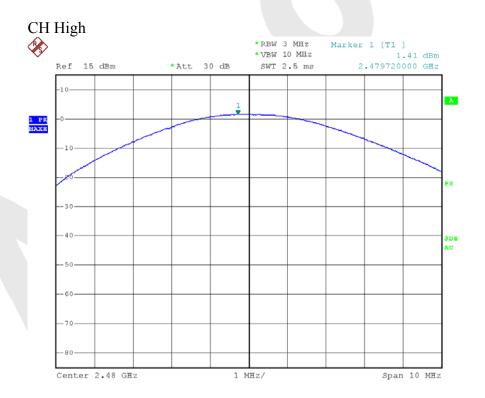
## g. Test Data

Channel Frequency (MHz)		Maximum transmit power	Li	Result	
		(dBm)	(dBm)	(watts)	Result
Low	2402	1.81			Pass
Mid	2442	1.48	30	1	Pass
High	2480	1.41			Pass











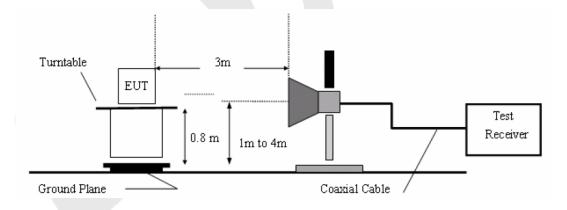
## 3.4. Band Edges Measurement

#### a. Limit

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, 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 in15.209(a).

#### **b.** Test Procedure

- 1. Conducted Method:
- 1) Set RBW=100KHz, VBW=300KHz
- 2) Detector=peak
- 3) Sweep time= auto
- 4) Trace mode=max hold.
- 2. Radiated Method:
- 1) The EUT is placed on a turntable, which is 0.8m above the ground plane.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Peak detector: RBW=1MHz, VBW=3MHz, SWT=AUTO Average detector: RBW=1MHz, VBW=10Hz, SWT=AUTO The EUT is tested in 9\*6\*6 Chamber.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.



#### c. Test Equipment

Same as the equipment listed in 3.2.

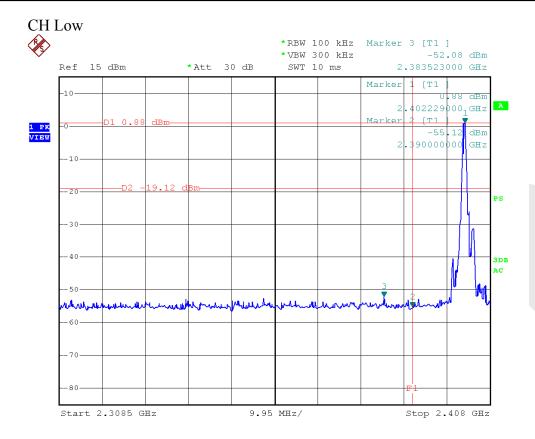
#### d. Test Results

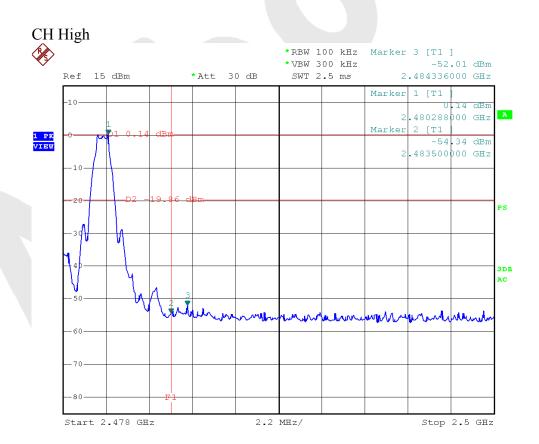
Pass.

#### e. Test Plots

See the following page.



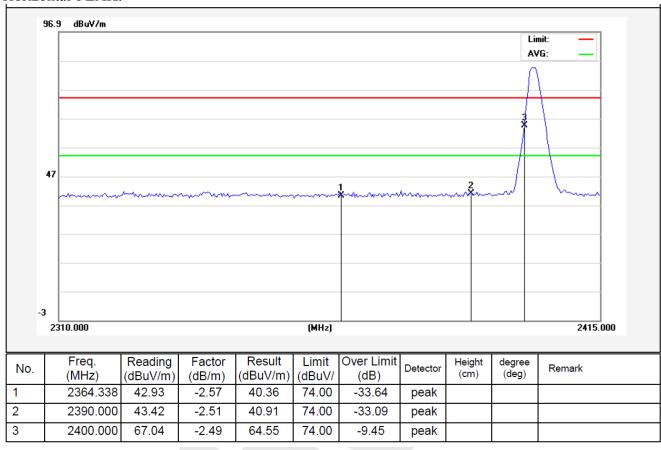






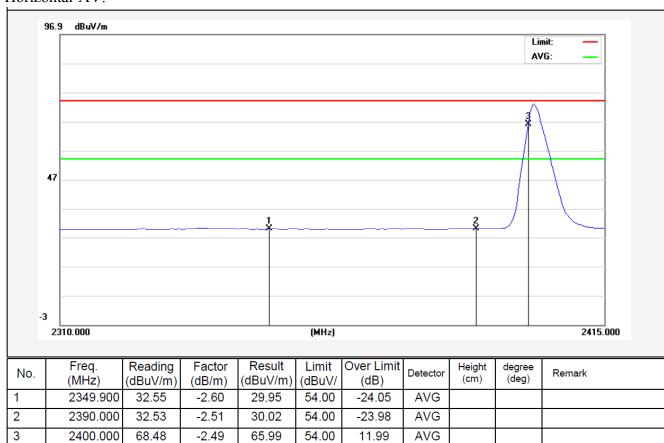
#### 2402MHz

#### Horizontal-PEAK:



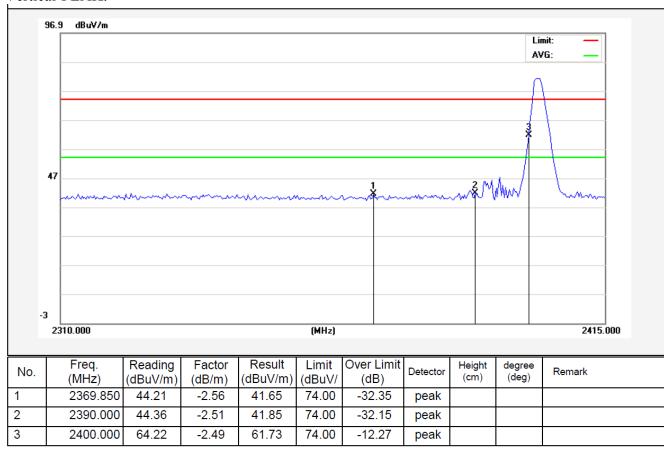


#### Horizontal-AV:



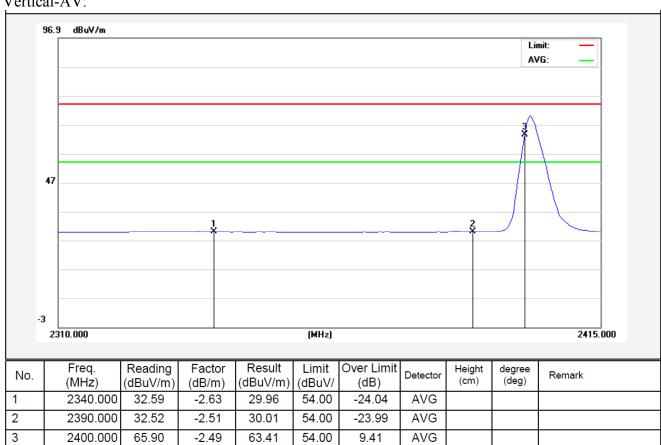


### 2402MHz Vertical-PEAK:



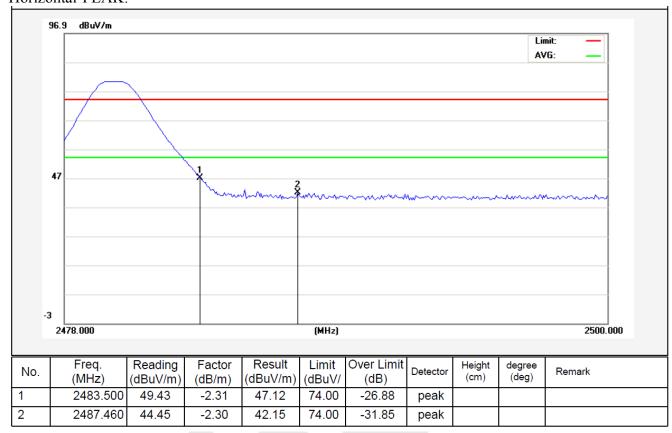


#### Vertical-AV:



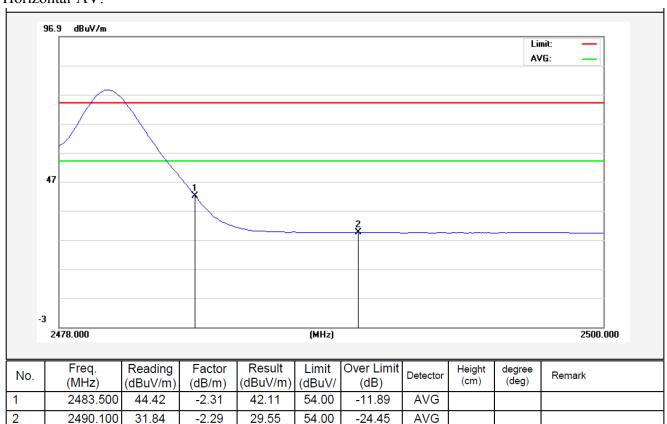


### 2480MHz Horizontal-PEAK:



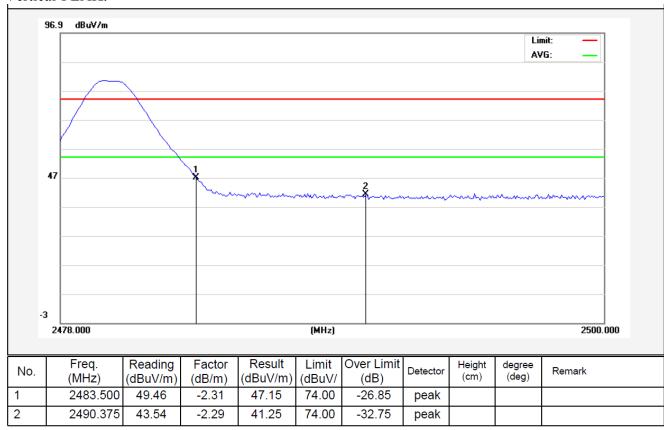


#### Horizontal-AV:



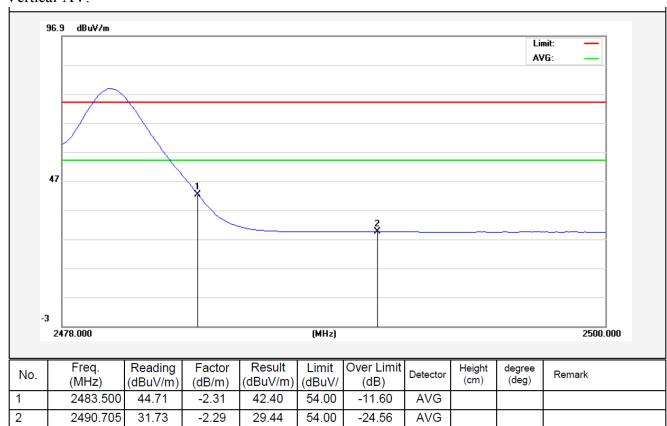


### 2480MHz Vertical-PEAK:





#### Vertical-AV:





## 3.5. Peak Power Spectral Density

#### a. Limit

- 1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
- 2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

#### **b.** Test Procedure

- 1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5xOBW, Sweep=500s
- 3. Record the max. reading.
- 4. Repeat the above procedure until the measurements for all frequencies are completed.

#### c. Test Equipment

Same as the equipment listed in 3.2.

#### d. Test Setup

See 3.1

#### e. Test Results

Pass

#### f. Test Data

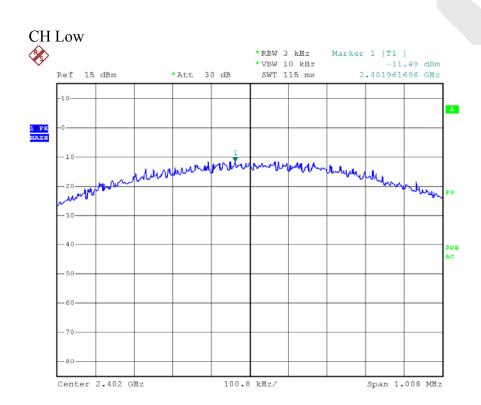
Please refer to the following data.

**g. Test Plot** See the following pages

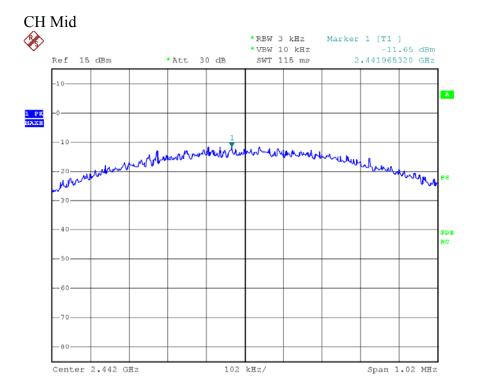


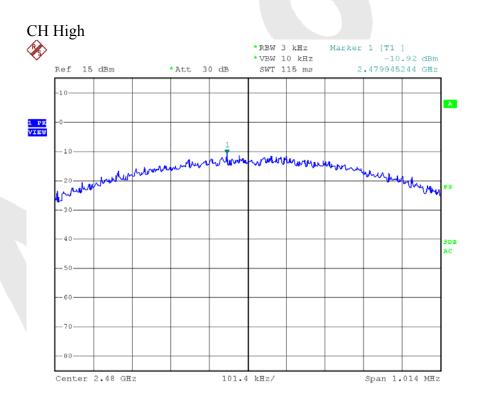
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	$\Sigma$ PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2402	-11.49	-		Pass
Mid	2442	-11.65	-	8.00	Pass
High	2480	-10.92	-		Pass











#### 3.6. Radiated Emissions

#### 3.6.1.1. Test Limits (< 30 MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

#### 3.6.1.2. Test Limits ( $\geq$ 30 MHz)

FIELD STRENGTH	FIELD STRENGTH	S15.209	
of Fundamental:	of Harmonics	30 - 88 MHz	40 dBuV/m
@3M			
902-928 MHZ		88 - 216 MHz	43.5
2.4-2.4835 GHz		216 - 960 MHz	46
94 dBμV/m @3m	54 dBµV/m @3m	ABOVE 960 MHz	54dBuV/m

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. 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) (see Section 15.205(c)).

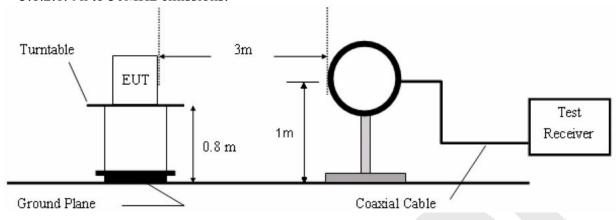
#### Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Aug. 08, 2014	1 Year
2.	Preamplifier	Instruments corporation	EMC01183 0	980100	Aug. 08, 2014	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 22, 2014	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 04, 2014	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 24, 2014	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Aug. 08, 2014	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

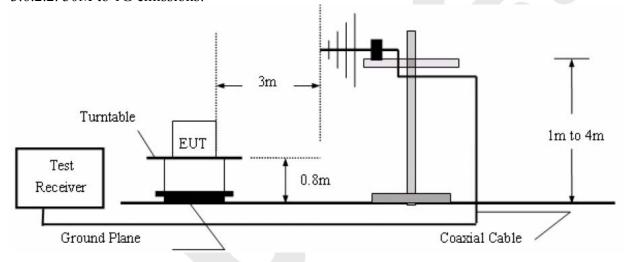


# 3.6.2. Test Configuration:

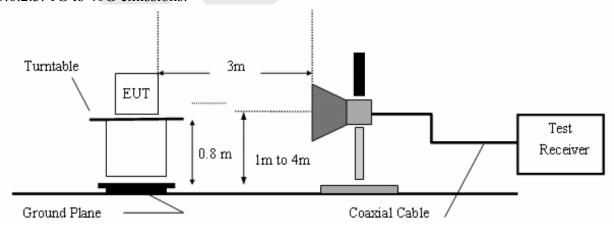
## 3.6.2.1. 9k to 30MHz emissions:



#### 3.6.2.2. 30M to 1G emissions:



#### 3.6.2.3. 1G to 40G emissions:





#### 3.6.3. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Measurements are made on 9KHz to 30MHz and 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz.

The EUT is tested in 9\*6\*6 Chamber.

The test results are listed in Section 3.6.4.

#### 3.6.4. Test Results

Please refer to the following pages.

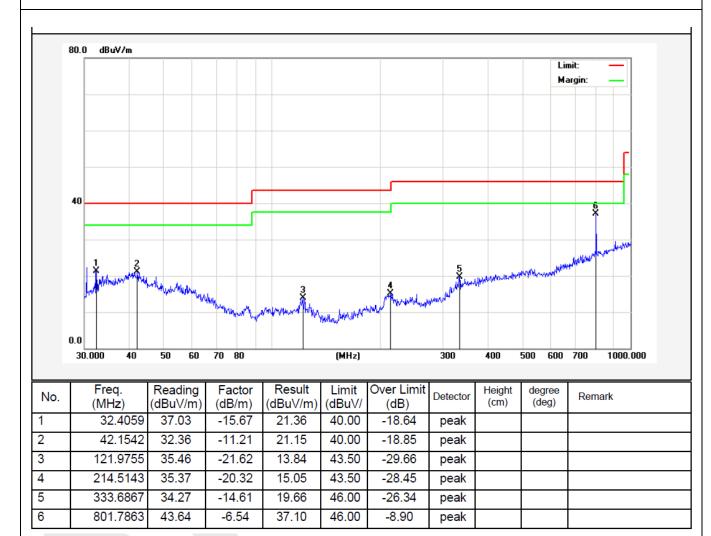


Job No.: 011408359E Polarization: Horizontal

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Test Mode: On Distance: 3m



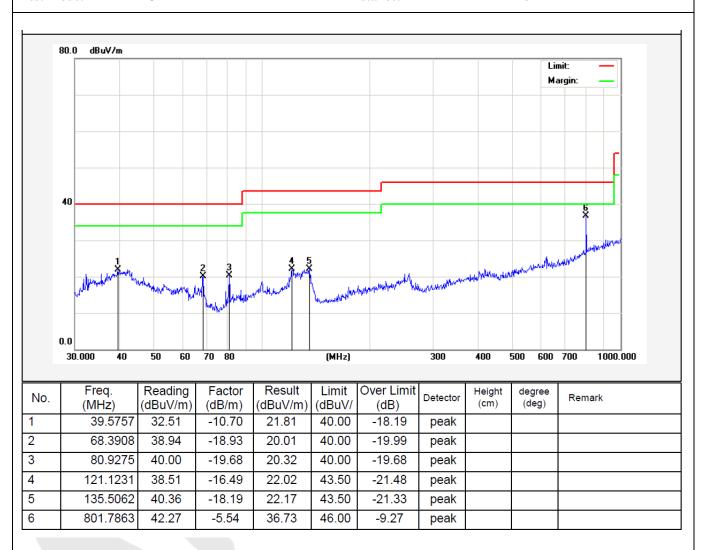


Job No.: 011408359E Polarization: Vertical

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Test Mode: On Distance: 3m



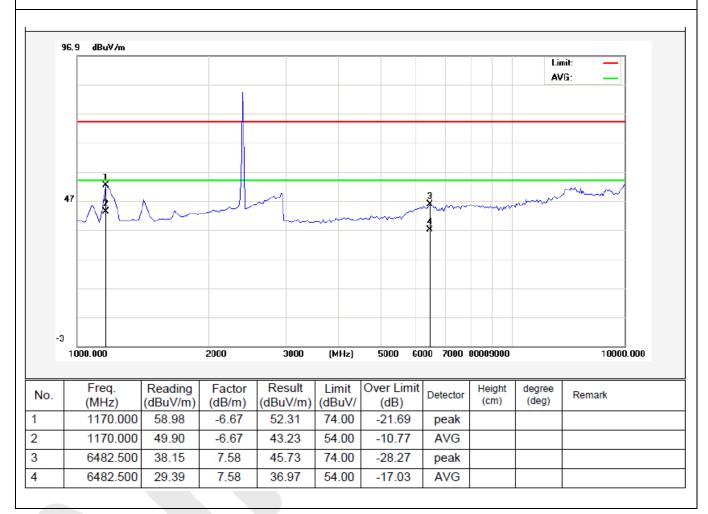


Job No.: 011408359E Polarization: Horizontal

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2402MHz Distance: 3m



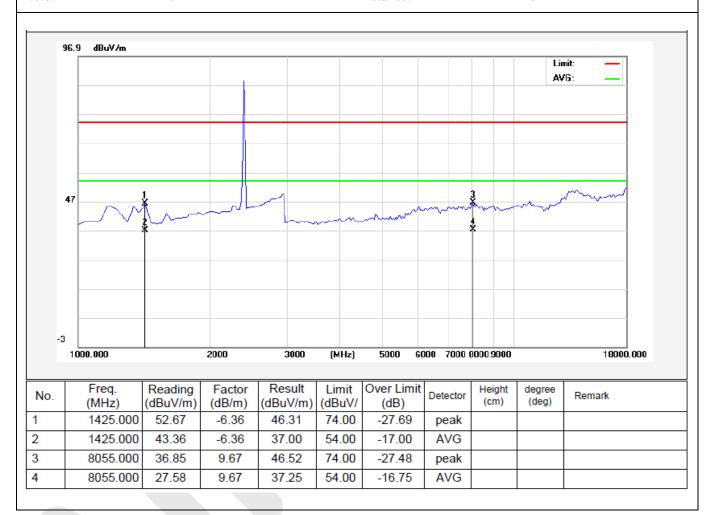


Job No.: 011408359E Polarization: Vertical

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2402MHz Distance: 3m



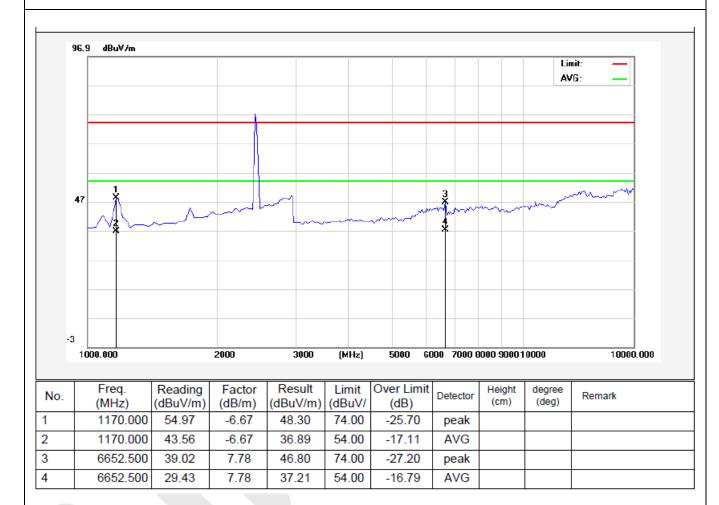


Job No.: 011408359E Polarization: Horizontal

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2442MHz Distance: 3m



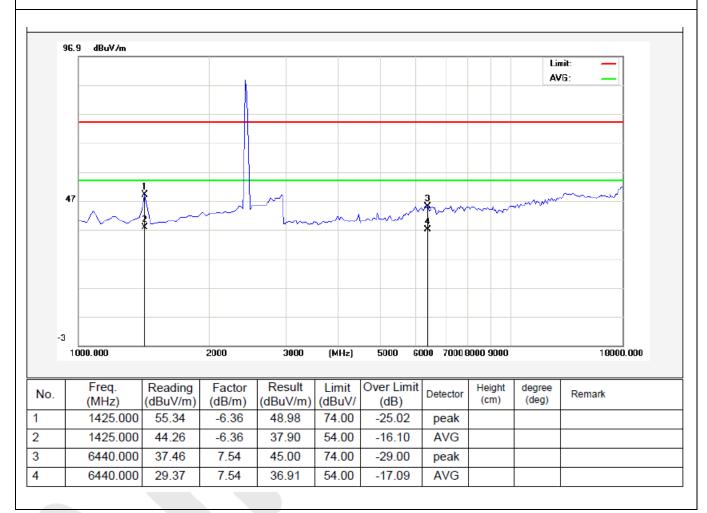


Job No.: 011408359E Polarization: Vertical

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2442MHz Distance: 3m



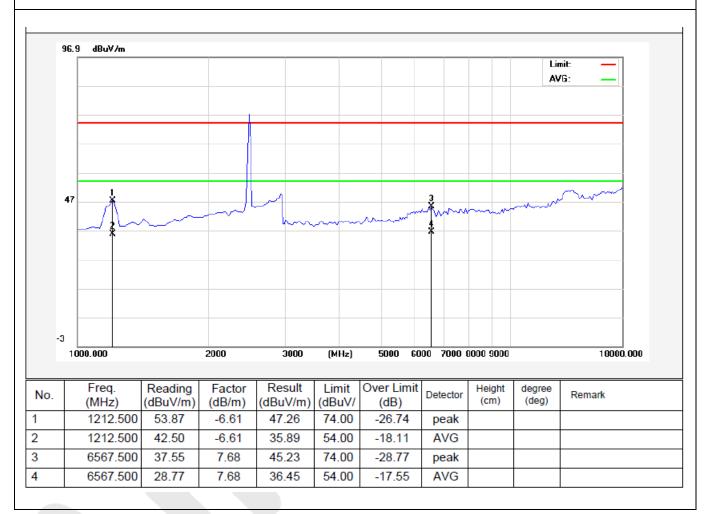


Job No.: 011408359E Polarization: Horizontal

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2480MHz Distance: 3m



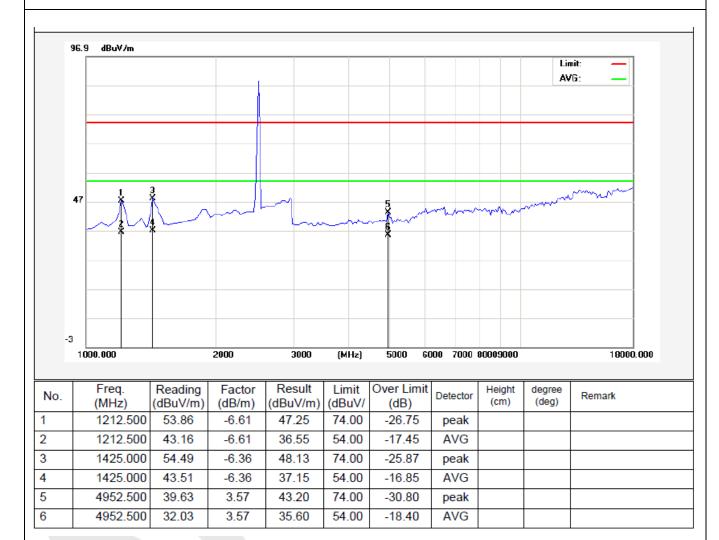


Job No.: 011408359E Polarization: Vertical

Standard: (RE)FCC PART15 C \_3m Power Source: DC 3V

Test item: Radiation Test Temp.(C)/Hum.(%RH): 24.3(C)/55%RH

Note: 2480MHz Distance: 3m

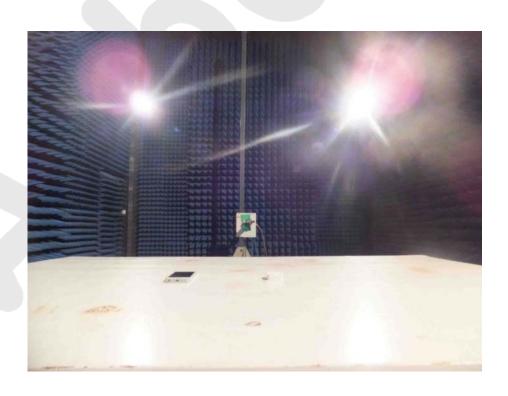




# 4. PHOTOGRAPH

## 4.1. Photo of Radiation Emission Test







# **APPENDIX I (EXTERNAL PHOTOS)**

Figure 1
The EUT-Front View



Figure 2
The EUT-Back View











# APPENDIX III (INTERNAL PHOTOS)

Figure 4
The EUT-Inside View

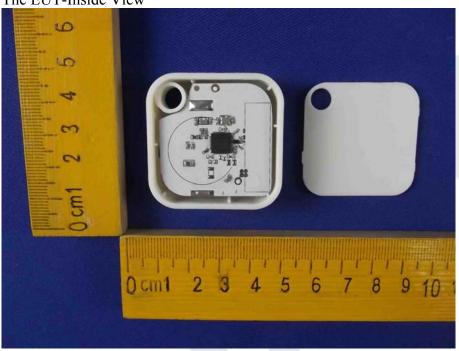
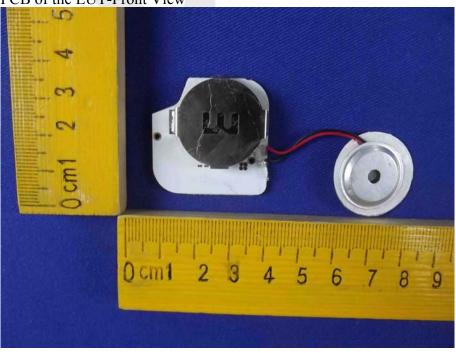


Figure 5
PCB of the EUT-Front View







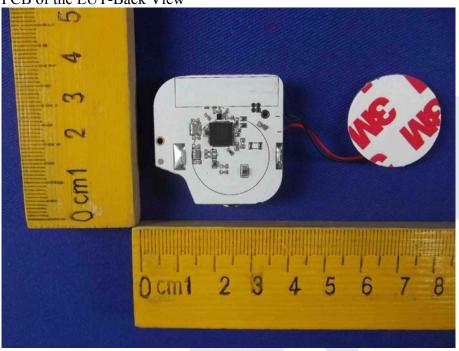


Figure 7
PCB of the BT Module View

