

FCC TEST REPORT

For

Shenzhen Hameigao Electronics CO.,LTD.

Bluetooth Speaker



Trade Name : **Shenzhen Hameigao Electronics CO.,LTD.**

Model No. : H6815, HMG6815
All the model are the same circuit and RF module, except the appearance colour, this report only test mode name: H6815

FCC ID : 2ADDR- H6815

Frequency range : 2402-2480MHz

Number of Channel : 79CH

Type of antenna : Internal monopole Antenna

Applicant : Shenzhen Hameigao Electronics CO.,LTD.
6/F,B7 Building, Yijing Industrial Park, Tianliao, Gongming Town, Guangming District, Shenzhen

Regulation : FCC Rules and Regulations Part 15 Subpart C Section 15.249

Prepared by : WST Certification & Testing (HK) Limited
Address : 12/F., San Toi Building, 137-139 Connaught Road Central, Hong Kong, China

Report No.: WST20141209005

Test Date : Dec. 02-09, 2014

Date of Report : Dec. 09, 2014

TABLE OF CONTENT

Description	Page
Test Report Declaration	
1.1 TEST PROCEDURES AND RESULTS	4
1.2. Test Facility	4
1. GENERAL INFORMATION	5
2.1. General Information.....	5
2. TEST INSTRUMENT USED	6
3. OPERATION OF EUT DURING TESTING	7
4. CONDUCTED EMISSIONS TEST	9
4.1. Conducted Power Line Emission Limit	9
4.2. Test Setup.....	9
4.3. Test Procedure.....	10
4.4. Test Result.....	10
5. RADIATED EMISSION TEST	11
5.1. Radiation Limit	11
5.2. Test Setup.....	11
5.3. Test Procedure.....	12
5.4. Test Result.....	13
6. BAND EDGE	17
6.1. Limits	17
6.2. Test Procedure.....	17
6.3. Test Result.....	17
7. OCCUPIED BANDWIDTH MEASUREMENT	18
7.1. Test Setup.....	18
7.2. Test Procedure.....	18
7.3. Measurement Equipment Used	18
7.4. Test Result.....	18
8. ANTENNA REQUIREMENT	20
9. PHOTOGRAPH OF TEST	21

TEST REPORT DECLARATION

Applicant : Shenzhen Hameigao Electronics CO.,LTD.
 Manufacturer : Shenzhen Hameigao Electronics CO.,LTD.
 EUT Description : Bluetooth Speaker

Model NO. : H6815, HMG6815
 All the model are the same circuit and RF module, except the appearance colour, this report only test mode name: H6815

Serial NO. : N/A
 Power Supply : DC 5V

Measurement Procedure Used:

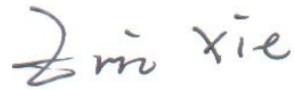
FCC Rules and Regulations Part 15 Subpart C Section 15.249

ANSI C63.4:2009

The device described above is tested by WST Certification & Testing (HK) Limited to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.249 limits. The measurement results are contained in this test report and WST Certification & Testing (HK) Limited. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of WST Certification & Testing (HK) Limited.

Date of Test: _____ Dec. 02-09, 2014

Prepared by: _____ 

Project Engineer(Eric Xie)

Reviewed by: _____ 

Project Supervisor(Nico Lee)

Approved by: _____ 

Technical Director (Kait Chen)

1.1 TEST PROCEDURES AND RESULTS

DESCRIPTION OF TEST	RESULT
CONDUCTED EMISSIONS TEST	COMPLIANT
RADIATED EMISSION TEST	COMPLIANT
BAND EDGE	COMPLIANT
OCCUPIED BANDWIDTH MEASUREMENT	COMPLIANT
ANTENNA REQUIREMENT	COMPLIANT

1.2. Test Facility

Test Firm Shenzhen CTL Testing Technology Co., Ltd.
Address Certificated by FCC, Registration No.: 970318
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road.
Nanshan, Shenzhen, China
Tel 86-755-89486194
Fax 86-755-89486194

Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	3.20dB, k=2
Radiated emission expanded uncertainty(9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty(30MHz-1000MHz)	=	4.10dB, k=2
Radiated emission expanded uncertainty(Above 1GHz)	=	4.32dB, k=2

1. GENERAL INFORMATION

2.1. General Information

EUT : Bluetooth Speaker

Model :
Number : H6815, HMG6815
All the model are the same circuit and RF module, except the appearance colour, this report only test mode name: H6815

Frequency : 2402-2480MHz
Range

Number of : 79CH
Channels

Antenna Gain : 0dBi

Modulation : GFSK
mode

Applicant : Shenzhen Hameigao Electronics CO.,LTD.
6/F,B7 Building, Yijing Industrial Park, Tianliao,
Gongming Town, Guangming District, Shenzhen

Manufacturer : Shenzhen Hameigao Electronics CO.,LTD.
6/F,B7 Building, Yijing Industrial Park, Tianliao,
Gongming Town, Guangming District, Shenzhen

Test Date : Dec. 02-09, 2014

2. TEST INSTRUMENT USED

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2014/07/12	2015/07/11
EMI Test Receiver	R&S	ESCI	103710	2014/07/12	2015/07/11
Spectrum Analyzer	Agilent	E4407B	MY45108355	2014/07/12	2015/07/11
Controller	EM Electronics	Controller EM 1000	N/A	2014/07/12	2015/07/11
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2014/07/12	2015/07/11
Horn Antenna	SCHWARZBECK	BBHA9170	1562	2014/07/12	2015/07/11
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2014/07/12	2015/07/11
LISN	R&S	ENV216	101316	2014/07/12	2015/07/11
LISN	SCHWARZBECK	NSLK8127	8127687	2014/07/12	2015/07/11
Microwave Preamplifier	HP	8349B	3155A00882	2014/07/12	2015/07/11
Amplifier	HP	8447D	3113A07663	2014/07/12	2015/07/11
Transient Limiter	Com-Power	LIT-153	532226	2014/07/12	2015/07/11
Radio Communication Tester	R&S	CMU200	3655A03522	2014/07/12	2015/07/11
Temperature/Humidity Meter	zhicheng	ZC1-2	22522	2014/07/12	2015/07/11
SIGNAL GENERATOR	HP	8647A	3200A00852	2014/07/12	2015/07/11
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2014/07/12	2015/07/11
Climate Chamber	ESPEC	EL-10KA	A20120523	2014/07/12	2015/07/11
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	/	2014/07/12	2015/07/11
High-Pass Filter	K&L	41H10-1375/U12750-O/O	/	2014/07/12	2015/07/11

3. OPERATION OF EUT DURING TESTING

Operating Mode

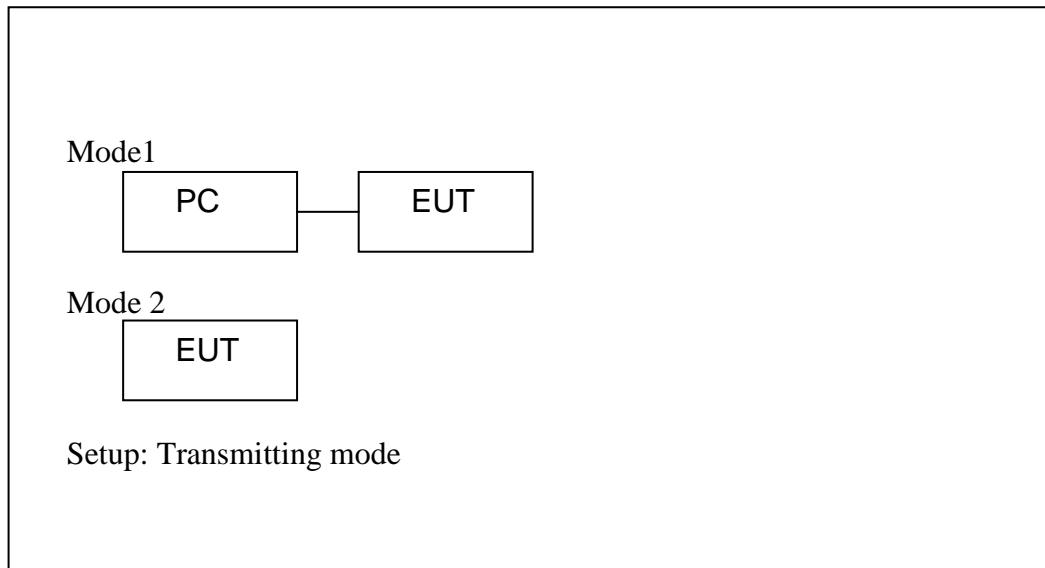
The mode is used: **Transmitting mode**

Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Test Setup



Channel list for Bluetooth

Frequency Band	Channel Number	Frequency
2402~2480MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

4. CONDUCTED EMISSIONS TEST

4.1. Conducted Power Line Emission Limit

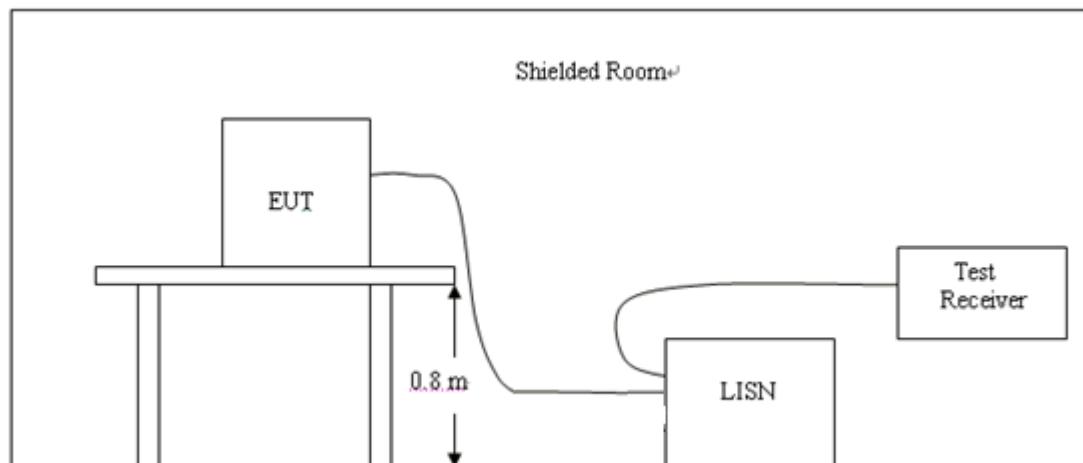
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

4.2. Test Setup

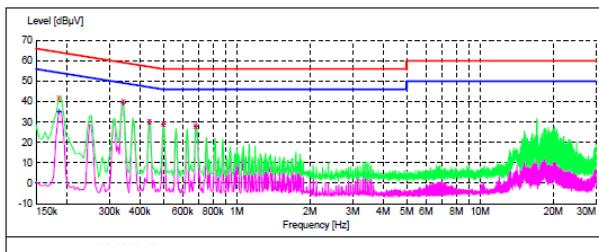


4.3. Test Procedure

- 1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
- 2, Support equipment, if needed, was placed as per ANSI C63.4.
- 3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5, All support equipments received AC power from a second LISN, if any.
- 6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

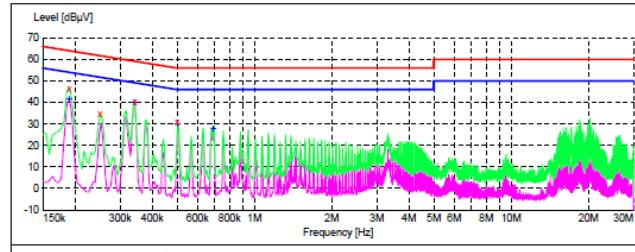
4.4. Test Result

PASS



MEASUREMENT RESULT:

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.186000	41.70	10.2	64	22.5	QP	L1	GND
0.342000	40.00	10.2	59	19.2	QP	L1	GND
0.438000	30.30	10.2	57	26.8	QP	L1	GND
0.500000	29.10	10.2	56	26.9	QP	L1	GND
0.680000	28.10	10.2	56	27.9	QP	L1	GND



MEASUREMENT RESULT:

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.190000	46.10	10.2	64	17.9	QP	N	GND
0.250000	34.80	10.2	62	27.0	QP	N	GND
0.342000	40.50	10.2	59	18.7	QP	N	GND
0.500000	30.80	10.2	56	28.2	QP	N	GND

MEASUREMENT RESULT:

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.186000	35.40	10.2	54	18.8	AV	L1	GND
0.342000	39.90	10.2	49	9.3	AV	L1	GND
0.438000	30.30	10.2	47	16.8	AV	L1	GND
0.500000	29.30	10.2	46	16.7	AV	L1	GND
0.680000	28.20	10.2	46	17.8	AV	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.190000	41.80	10.2	54	12.2	AV	N	GND
0.342000	40.00	10.2	48	8.2	AV	N	GND
0.500000	30.10	10.2	46	18.9	AV	N	GND
0.680000	27.90	10.2	46	18.1	AV	N	GND

5. RADIATED EMISSION TEST

5.1. Radiation Limit

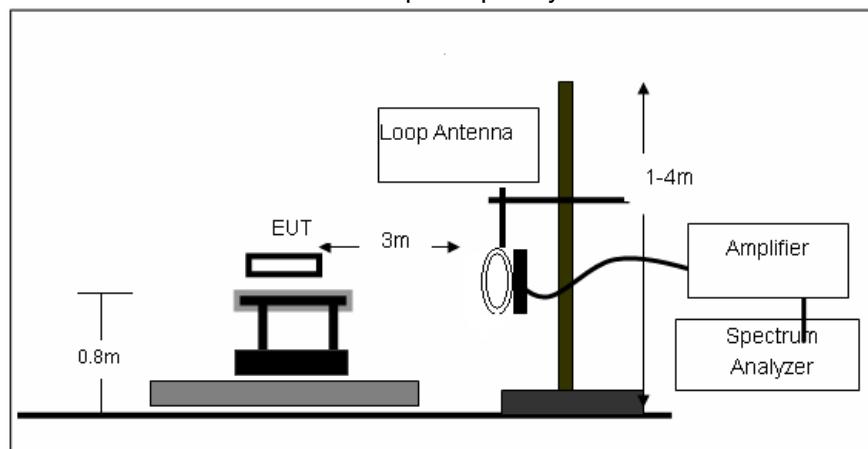
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

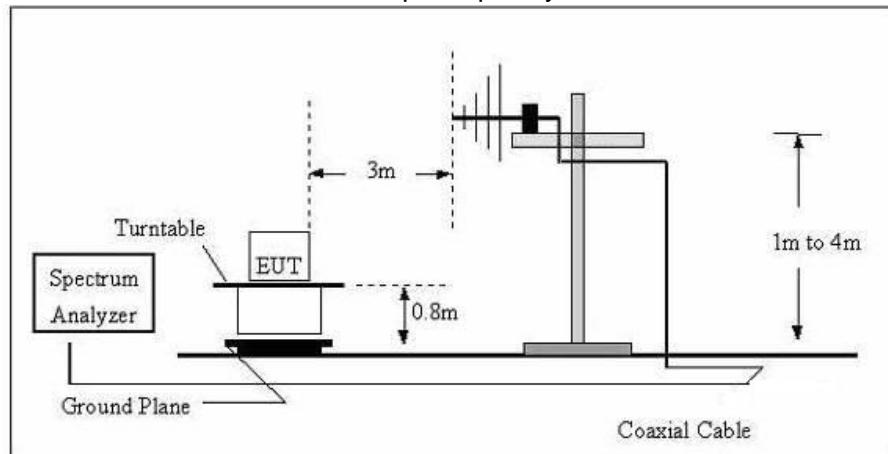
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

5.2. Test Setup

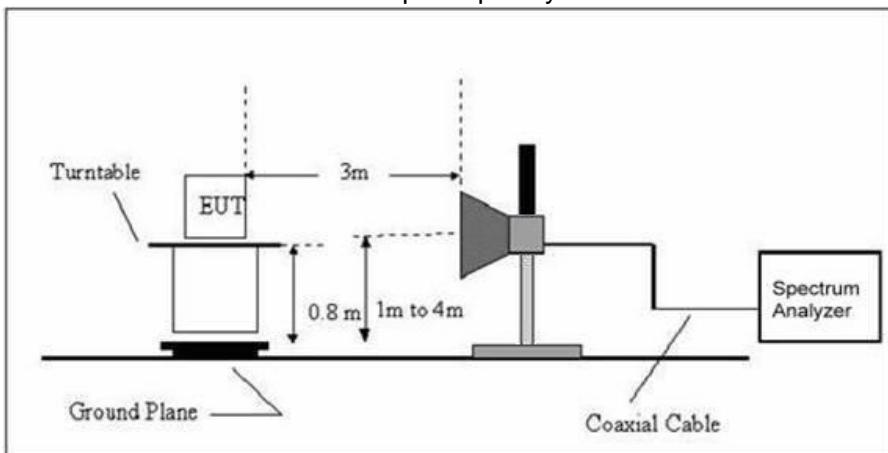
(1) Radiated Emission Test-Up Frequency Below 30MHz



(2) Radiated Emission Test-Up Frequency 30MHz~1GHz



(3) Radiated Emission Test-Up Frequency Above 1GHz



5.3. Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above 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 emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. Based on the Frequency Generator in the device include 26MHz. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

Note:

Three axes are chosen for pretest, the Y axis is the worst mode for final test.

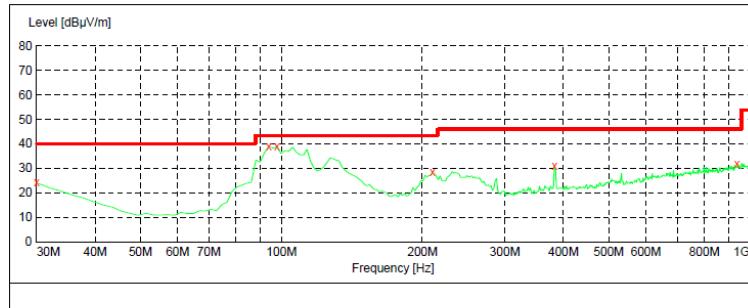
For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Test Result

PASS

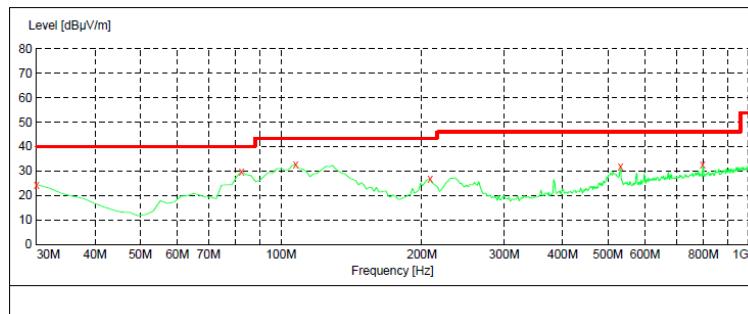
All the test modes completed for test. The worst case of Radiated Emission is playing music; the test data of this mode was reported.

Below 1GHz Test Results:



MEASUREMENT RESULT:

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.10	21.1	40.0	15.9	---	0.0	0.00	HORIZONTAL
94.020000	38.90	10.2	43.5	4.6	---	0.0	0.00	HORIZONTAL
97.900000	38.80	11.1	43.5	4.7	---	0.0	0.00	HORIZONTAL
210.420000	28.30	14.3	43.5	15.2	---	0.0	0.00	HORIZONTAL
383.080000	31.10	17.8	46.0	14.9	---	0.0	0.00	HORIZONTAL
939.860000	31.70	26.5	46.0	14.3	---	0.0	0.00	HORIZONTAL



MEASUREMENT RESULT:

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.50	21.1	40.0	15.5	---	0.0	0.00	VERTICAL
82.380000	29.90	9.0	40.0	10.1	---	0.0	0.00	VERTICAL
107.600000	32.70	13.3	43.5	10.8	---	0.0	0.00	VERTICAL
208.480000	26.60	14.3	43.5	16.9	---	0.0	0.00	VERTICAL
532.460000	32.00	20.6	46.0	14.0	---	0.0	0.00	VERTICAL
798.240000	32.70	24.8	46.0	13.3	---	0.0	0.00	VERTICAL

Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Above 1 GHz Test Results:

Horizontal

CH Low (2402MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor		Limit Level	Line Level	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2402.00	26.32	78.53	7.34	28.72	88.27	94.00	-5.73	Average
2	2402.00	26.32	93.66	7.34	28.72	103.40	114.00	-10.60	Peak
3	4804.00	27.49	31.21	11.96	32.94	48.62	74.00	-25.38	Peak
4	6950.00	27.89	17.97	16.60	37.07	43.75	74.00	-30.25	Peak
5	8820.00	28.34	15.63	16.84	37.18	41.31	74.00	-32.69	Peak
6	14719.00	29.51	14.30	19.83	39.69	44.31	74.00	-29.69	Peak

Vertical

CH Low (2402MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor		Limit Level	Line Level	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	2402.00	26.32	79.13	7.34	28.72	88.87	94.00	-5.13	Average
2	2402.00	26.32	88.94	7.34	28.72	98.68	114.00	-15.32	Peak
3	4804.00	27.49	30.53	11.96	32.94	47.94	74.00	-26.06	Peak
4	6491.00	27.80	17.09	16.60	35.88	41.77	74.00	-32.23	Peak
5	8344.00	28.20	16.88	16.73	36.68	42.09	74.00	-31.91	Peak
6	12951.00	29.19	15.15	18.17	40.58	44.71	74.00	-29.29	Peak

Horizontal
CH Middle (2441MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor		Limit Line	Over Limit	Over Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2441.00	26.33	78.82	7.48	28.76	88.73	94.00	-5.27 Average
2	2441.00	26.33	88.37	7.48	28.76	98.28	114.00	-15.72 Peak
3	4880.00	27.53	30.95	12.14	33.11	48.67	74.00	-25.33 Peak
4	9279.00	28.51	16.96	16.90	37.73	43.08	74.00	-30.92 Peak
5	12169.00	29.03	16.58	17.52	39.43	44.50	74.00	-29.50 Peak
6	14855.00	29.53	16.76	19.91	39.13	46.27	74.00	-27.73 Peak

Vertical
CH Middle (2441MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor		Limit Line	Over Limit	Over Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2441.00	26.33	78.68	7.48	28.76	88.59	94.00	-5.41 Average
2	2441.00	26.33	89.00	7.48	28.76	98.91	114.00	-15.09 Peak
3	4880.00	27.53	30.34	12.14	33.11	48.06	74.00	-25.94 Peak
4	7341.00	27.97	16.69	16.62	37.34	42.68	74.00	-31.32 Peak
5	10146.00	28.82	18.45	16.99	38.64	45.26	74.00	-28.74 Peak
6	12237.00	29.05	19.77	17.56	39.45	47.73	74.00	-26.27 Peak

Horizontal
CH High (2480MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2480.00	26.34	79.19	7.57	28.79	89.21	94.00	-4.79 Average
2	2480.00	26.34	88.64	7.57	28.79	98.66	114.00	-15.34 Peak
3	4960.00	27.58	30.85	12.36	33.32	48.95	74.00	-25.05 Peak
4	7358.00	27.97	15.76	16.62	37.34	41.75	74.00	-32.25 Peak
5	10911.00	28.89	14.63	17.15	39.45	42.34	74.00	-31.66 Peak
6	14226.00	29.43	11.84	19.51	42.20	44.12	74.00	-29.88 Peak

Vertical
CH High (2480MHz)

	Preamp Freq	Read Factor	Cable Loss	Antenna Factor	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2480.00	26.34	79.52	7.57	28.79	89.54	94.00	-4.46 Average
2	2480.00	26.34	88.64	7.57	28.79	98.66	114.00	-15.34 Peak
3	4960.00	27.58	30.46	12.36	33.32	48.56	74.00	-25.44 Peak
4	7460.00	27.99	17.72	16.62	37.39	43.74	74.00	-30.26 Peak
5	11132.00	28.91	15.55	17.19	39.61	43.44	74.00	-30.56 Peak
6	13818.00	29.36	10.96	19.14	43.32	44.06	74.00	-29.94 Peak

Remark:

- (1) Measuring frequencies from 1 GHz to the 25 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) 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.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

6. BAND EDGE

6.1.Limits

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

6.2.Test Procedure

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW to 100KHz and VBM to 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength. The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW to 100 KHz and VBM to 300 KHz, to measure the conducted peak band edge.

6.3.Test Result

PASS

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)	
		PK	AV	PK	AV
<2400	H	49.29	40.03	74.00	54.00
<2400	V	51.01	41.37	74.00	54.00
>2483.5	H	49.76	40.42	74.00	54.00
>2483.5	V	50.11	40.24	74.00	54.00

7. OCCUPIED BANDWIDTH MEASUREMENT

7.1. Test Setup

Same as Radiated Emission Measurement

7.2. Test Procedure

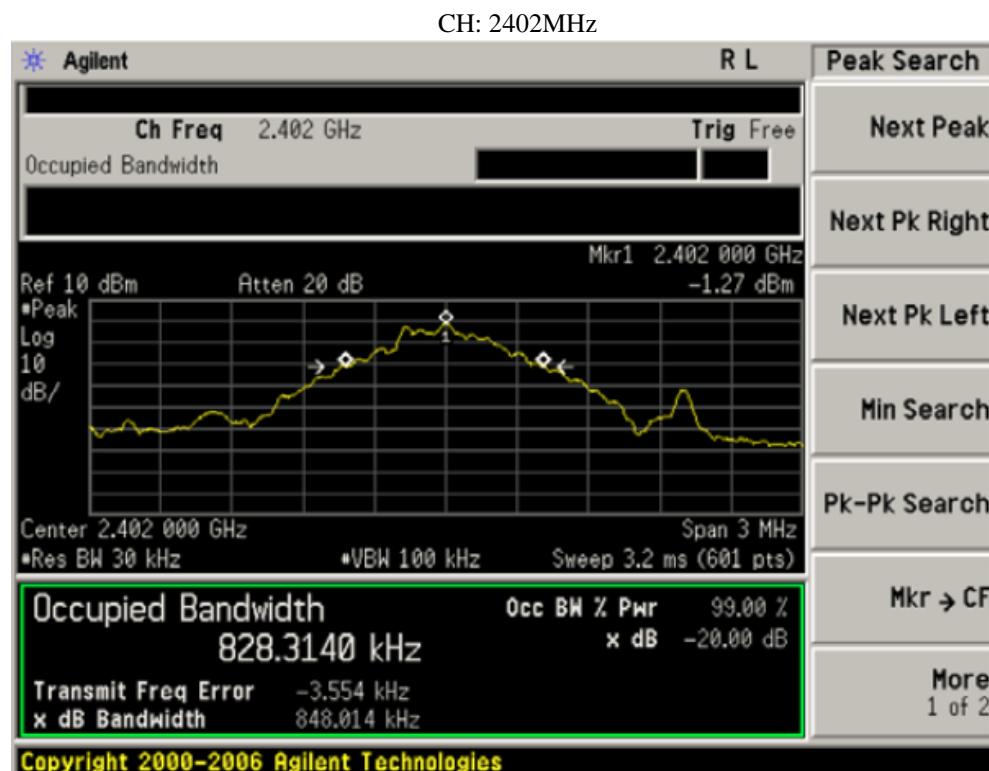
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Based on FCC Part15 C Section 15.239(a): RBW= 10KHz. VBW= 30 KHz, Span=1MHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

7.3. Measurement Equipment Used

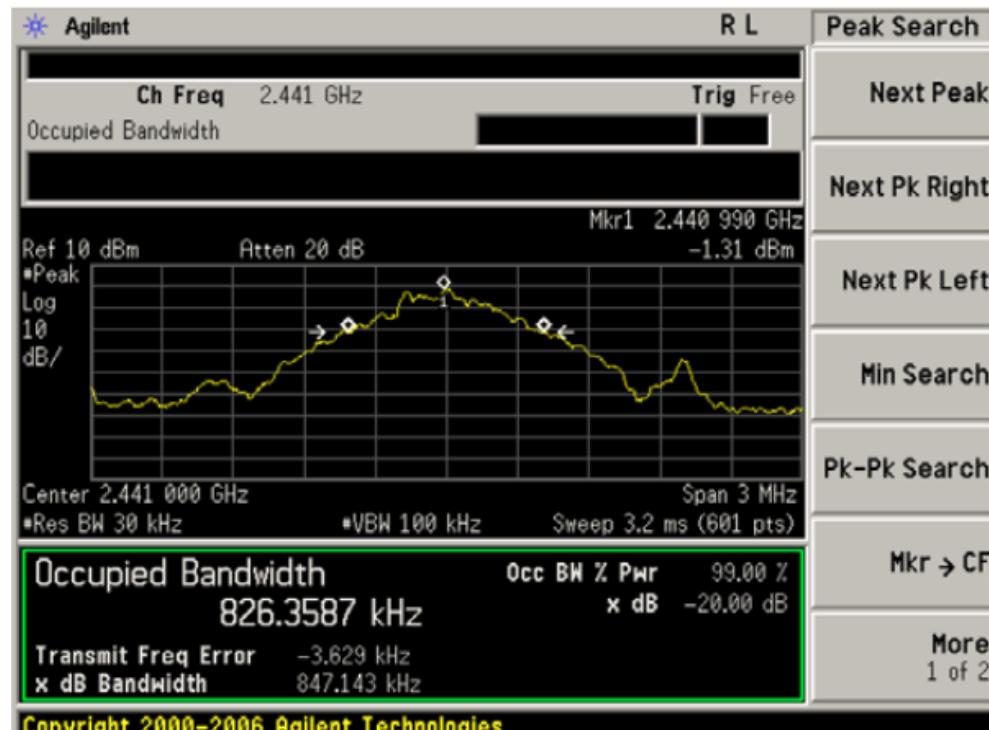
Same as Radiated Emission Measurement

7.4. Test Result

PASS



CH: 2441MHz



CH: 2480MHz



8. ANTENNA REQUIREMENT

Standard Applicable

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 15.249, 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.

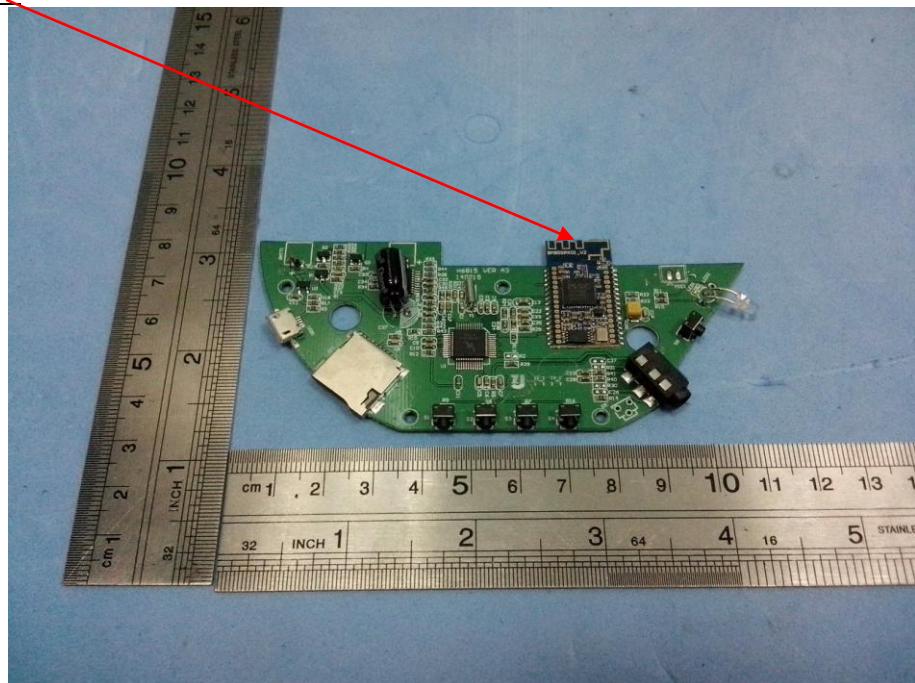
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

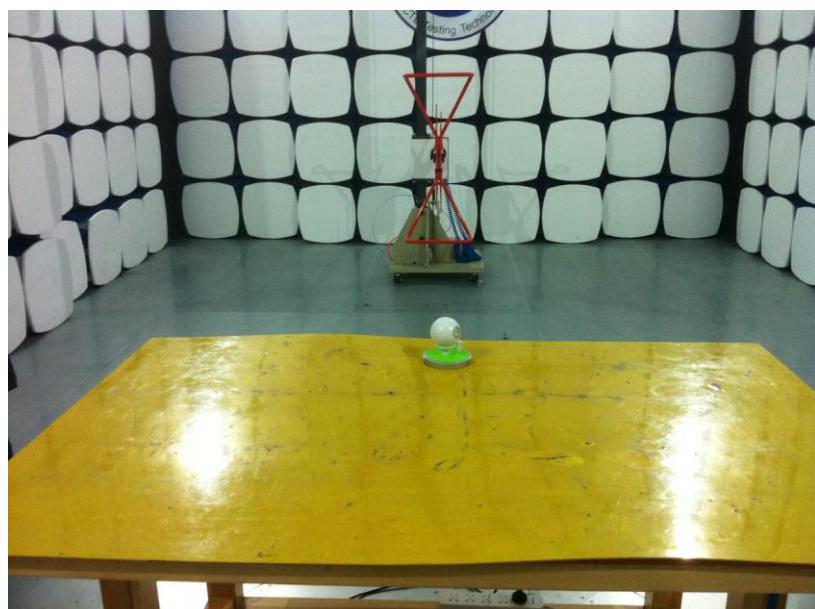
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is 0dBi.

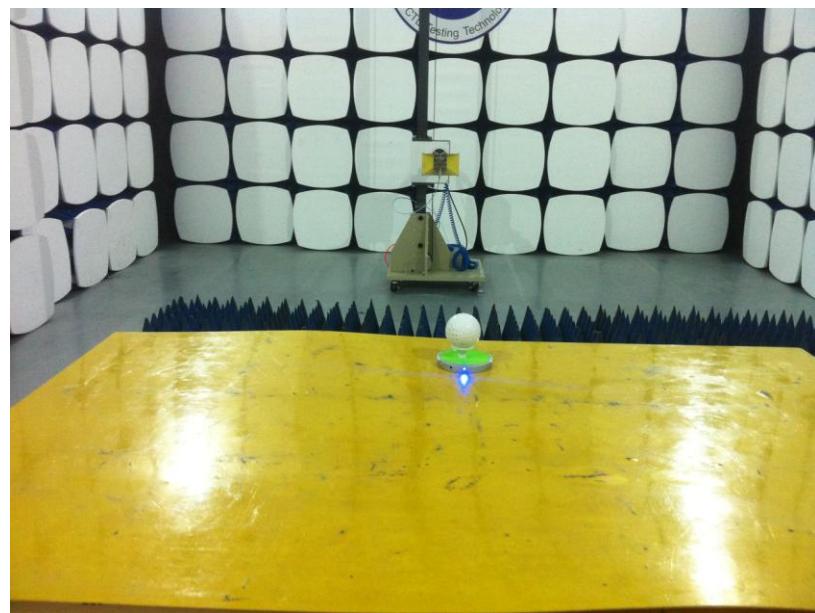
ANTENNA



9. PHOTOGRAPH OF TEST

Radiated Emission





Conducted Power Line Emission

