FCC TEST REPORT

for

47 CFR Part 15 Subpart C

Equipment: Bluetooth Headset

Model No. : BT5000

FCC ID. : OHH-BT5000

Filing Type : Certification

Applicant : Cal-Comp Electronics (Thailand) Public Co., Ltd.

3F., No.205, Sec.3, Beisin Road, Sindian City, Taipei

County 231, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

TEL: 886-2-2696-2468 FAX: 886-2-2696-2255

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Issued Date : Oct. 05, 2004

History of this test report

Original	Report	Issue	Date:	Oct.	05,	2004
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■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

SPORTON International Inc. FCC ID. : OHH-BT5000

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SPORTON INTERNATIONAL INC.





FCC TEST REPORT

Report No.: FR491513

Certificate No.: FR491513

CERTIFICATE OF COMPLIANCE

for

47 CFR Part 15 Subpart C

Equipment : Bluetooth Headset

Model No. : BT5000

FCC ID. : OHH-BT5000

Filing Type: Certification

Applicant : Cal-Comp Electronics (Thailand) Public Co., Ltd.

3F., No.205, Sec.3, Beisin Road, Sindian City, Taipei

County 231, Taiwan, R.O.C.

I HEREBY CERTIFY THAT :

arel Le 1/7 /2004

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 - 2003 and the equipment under test was *passed* all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Oct. 01, 2004 at SPORTON International Inc. LAB.

Daniel Lee Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

SPORTON International Inc.

TEL: 886-2-2696-2468 FAX: 886-2-2696-2255 FCC ID. : OHH-BT5000

Page No. : 1 of 64

Issued Date : Oct. 05, 2004

1. General Description of Equipment under Test

1.1. Applicant

Cal-Comp Electronics (Thailand) Public Co., Ltd.

3F., No.205, Sec.3, Beisin Road, Sindian City, Taipei County 231, Taiwan, R.O.C.

1.2. Manufacturer

Cal-Comp Electronics (Thailand) Public Co., Ltd.

191/54, 57, 18th Fl., Rachadapisek Rd., Klongtoey Bangkok

1.3. Basic Description of Equipment under Test

Equipment : Bluetooth Headset

Model No. : BT5000
FCC ID : OHH-BT5000
Trade Name : Cal-Comp

Power Supply Type : DC 3.6V (battery)

SPORTON International Inc. FCC ID. : OHH-BT5000

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1.4. Feature of Equipment under Test

	Product Feature & Sp	ecification			
1.	Type of Modulation	GFSK			
2. Frequency Band 2.400GHz ~ 2.4835GHz					
3.	Carrier Frequency of each channel	2402+nMHz, n	n=0~7	78	
4.	Bandwidth of each channel	n channel 1MHz			
5.	Maximum Output Power to Antenna	1 dBm			
6.	IF & L.O. frequency	N/A			
7.	Type of Antenna Connector	N/A			
8.	Antenna Type	Ceramic anten	ına		
9.	Antenna Gain	2 dBi			
10.	Function Type	Transmitter		Transceiver	V
11.	Power Rating (DC/AC , Voltage)	DV 3.6V (Bettery)			
12.	Temperature Range (Operating)	-20°C to + 60°C			

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2. Test Configuration of Equipment under Test

2.1. Test Manner

a. The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.

- b. The complete test system included EUT for EMI test.
- c. The following test modes were pretested for radiation test:

```
Mode 1: CH00 (2402MHz)
```

Mode 2: CH39 (2441MHz)

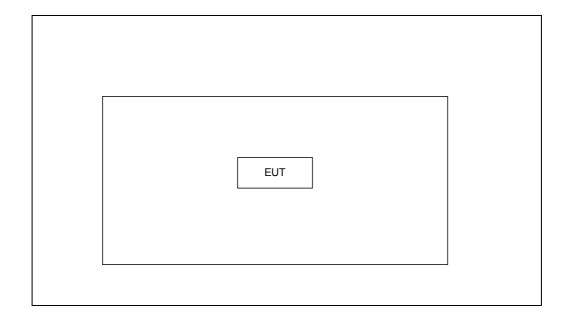
Mode 3: CH78 (2480MHz)

d. Frequency range investigated: conduction 150 kHz to 30 MHz, radiation 30 MHz to 25000MHz.

2.2. Description of Test System

The Test System includes EUT only.

2.3. Connection Diagram of Test System



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3. Operation of Equipment under Test

Executed "True Test. exe" to keep transmitting signals at fixed frequency.

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4. General Information of Test

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,

Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

TEL: 886-3-327-3456 FAX: 886-3-318-0055

Test Site No : 03CH06-HY

4.1. Test Voltage

110V/60Hz or DC 3.6V

4.2. Standard for Methods of Measurement

ANSI C63.4-2003

4.3. Test in Compliance with

47 CFR Part 15 Subpart C

4.4. Frequency Range Investigated

Conduction: from 150 kHz to 30 MHz Radiation: from 30 MHz to 25000MHz

4.5. Test Distance

The test distance of radiated emission from antenna to EUT is 3 m.

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5. Report of Measurements and Examinations

5.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.247(a)(1)	Hopping Channel Bandwidth	Pass
15.247(a)(1)	Hopping Channel Separation	Pass
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass
15.247(a)(1)(iii)	Dwell Time of Each Frequency within a 30 Second Period	Pass
15.247(b)(1)	Output Power	Pass
15.247(c)	100kHz Bandwidth of Frequency Band Edges	Pass
15.207	Conducted Emission	Pass
15.209	Radiated Emission	Pass
15.203	Antenna Requirement	Pass

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5.2. Hopping Channel Separation

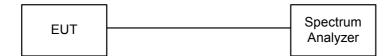
5.2.1. Measuring Instruments:

As described in chapter 7 of this test report.

5.2.2. Test Procedure:

- 1. The transmitter output was connected to the spectrum analyze directly.
- 2. Set RBW of spectrum analyzer to 30kHz and VBW to 100kHz.
- 3. The Hopping Channel Separation is defined as the channel is separated with the next channel.

5.2.3. Test Setup Layout:



5.2.4. Test Result: The spectrum analyzer plots are attached as below

Test Mode: Mode 1~Mode 3

Temperature: 25°C

Relative Humidity: 41 %

Channel	Frequency	Hopping Channel Separation	Limits	Plot
	(MHz)	(MHz)	(MHz)	Ref. No.
00	2402	1.0	0.8640	Mode 1
39	2441	1.0	0.8040	Mode 2
78	2480	1.0	0.8040	Mode 2

Remark: Limit is the greater one of 25kHz or the 20dB bandwidth of the hopping channel.

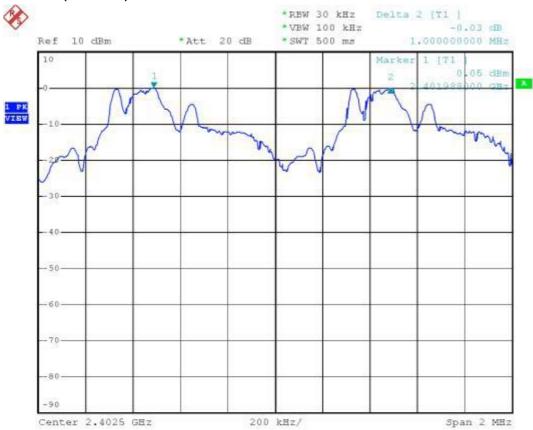
SPORTON International Inc.FCC ID.TEL: 886-2-2696-2468Page No.

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: OHH-BT5000

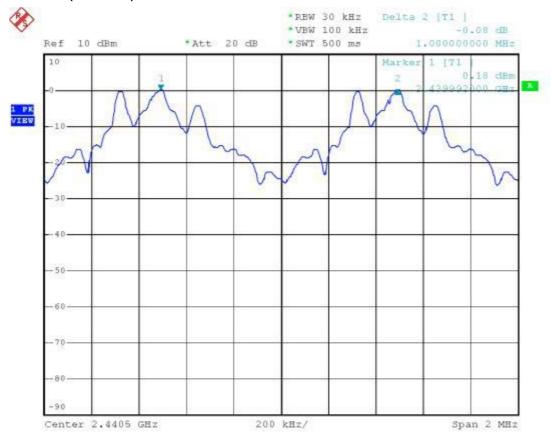
5.2.5 Hopping Channel Separation

Mode 1: CH00 (2402MHz)



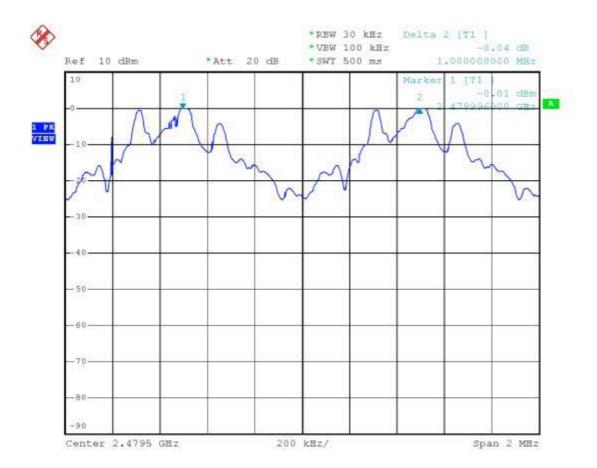
FCC ID. : OHH-BT5000 : 9 of 64 TEL: 886-2-2696-2468 Page No. FAX: 886-2-2696-2255 Issued Date : Oct. 05, 2004

Mode 2: CH39 (2441MHz)



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Mode 3: CH78 (2480MHz)



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5.3. Number of Hopping Frequency

5.3.1. Measuring Instruments:

As described in chapter 7 of this test report.

5.3.2. Test Procedure:

- 1. The transmitter output was connected to the spectrum analyze directly.
- 2. Set RBW of spectrum analyzer to 100kHz and VBW to 100kHz.
- 3. The number of hopping frequency used is defined as the device has the numbers of total channel.

5.3.3. Test Setup Layout:



5.3.4. Test Result: See spectrum analyzer plots below

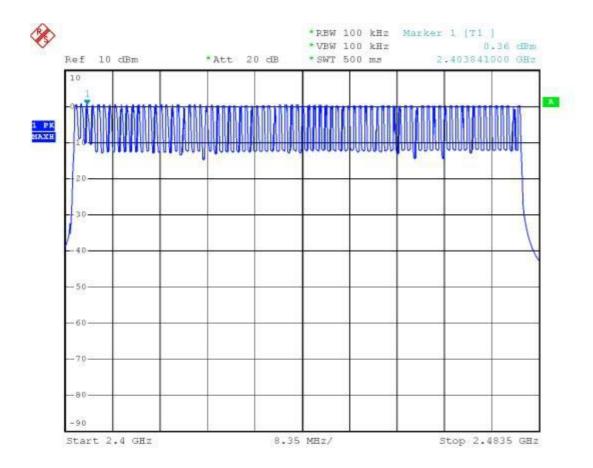
Temperature: 25°C

Relative Humidity: 41 %

Number of Hopping Frequency	Limits
(Channel)	(Channel)
79	75

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5.3.5 Number of Hopping Frequency



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5.4 Hopping Channel Bandwidth

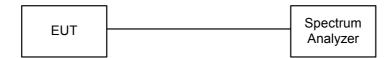
5.4.1 Measuring Instruments:

As described in chapter 7 of this test report.

5.4.2 Test Procedure:

- 1. The transmitter output was connected to the spectrum analyzer directly.
- 2. Set RBW of spectrum analyzer to 30kHz and VBW to 300kHz.
- 3. The Hopping Channel bandwidth is defined as the frequency range where the power is higher than peak power minus 20dB.

5.4.3 Test Setup Layout:



5.4.4 Test Result : See spectrum analyzer plots below

Test Mode: Mode 1~Mode 3

Temperature: 25°C

Relative Humidity: 41 %

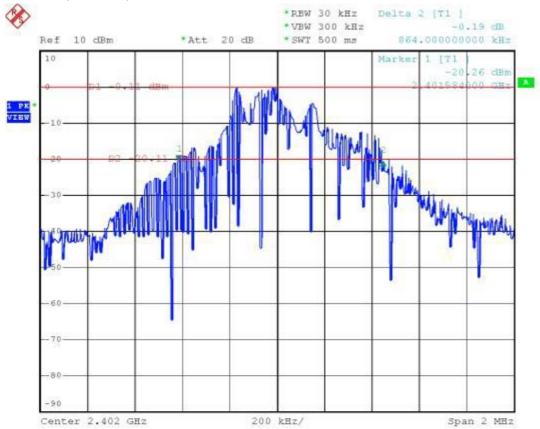
Channel	Frequency	Hopping Channel Bandwidth	Limits	Plot
	(MHz)	(MHz)	(MHz)	Ref. No.
00	2402	0.8640	1.0	Mode 1
39	2441	0.8040	1.0	Mode 2
78	2480	0.8040	1.0	Mode 3

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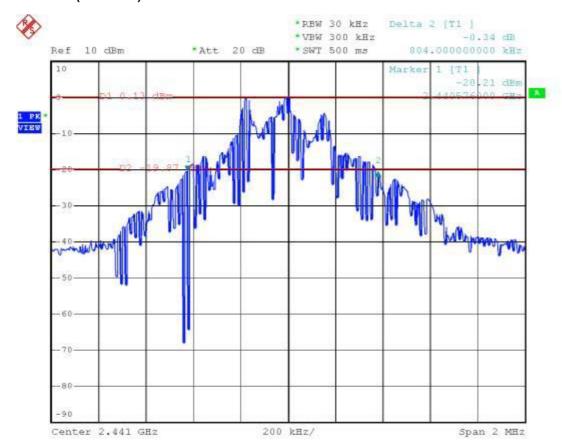
5.4.5 Hopping Channel Bandwidth

Mode 1: CH00 (2402MHz)



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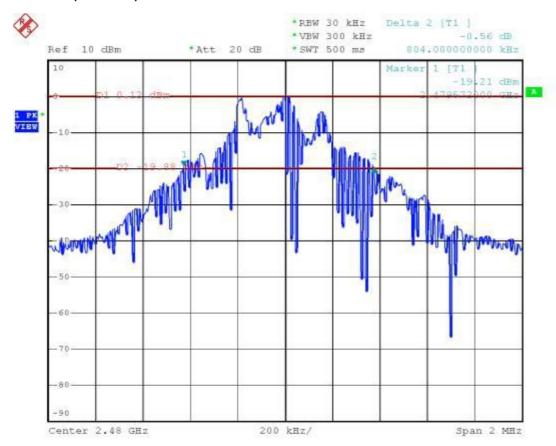
Mode 2: CH39 (2441MHz)



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Mode 3: CH78 (2480MHz)



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5.5 Dwell Time of Each Frequency within a 30 Seconds Period

5.5.1 Measuring Instruments:

As described in chapter 7 of this test report.

5.5.2 Test Procedure:

- 1. The transmitter output was connected to the spectrum analyzer directly.
- 2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- 3. Set the center frequency on any frequency would be measured and set the frequency span to zero span.
- 4. The equation = 30*(1600/79)*t (t = the time duration of one single pulse)

5.5.3 Test Setup Layout:



5.5.4 Test Result : See spectrum analyzer plots below

Test Mode: Mode 1~Mode 3

Temperature: 25°C

Relative Humidity: 41 %

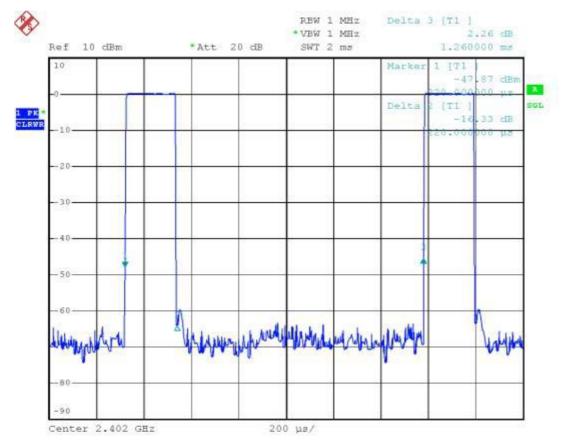
Channel	Frequency	Dwell Time	Limits	Plot
	(MHz)	(s)	(s)	Ref. No.
00	2402	0.13	0.4	Mode 1
39	2441	0.13	0.4	Mode 2
78	2480	0.13	0.4	Mode 3

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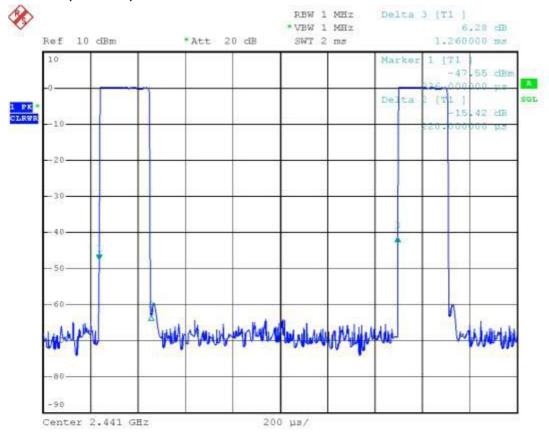
5.5.5 Dwell Time of Each Frequency

Mode 1: CH00 (2402MHz)



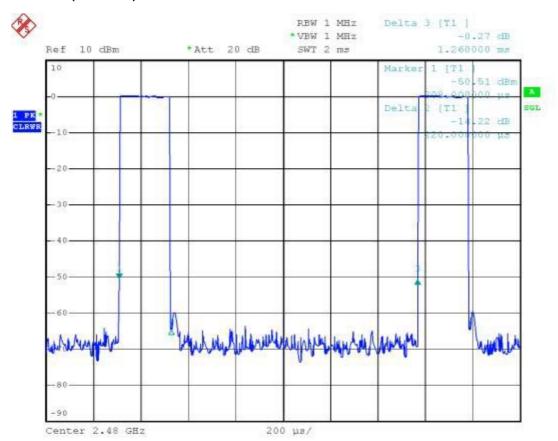
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Mode 2: CH39 (2441MHz)



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Mode 3: CH78 (2480MHz)



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5.6 Output Power

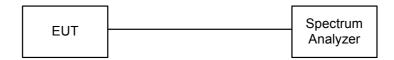
5.6.1 Measuring Instruments:

As described in chapter 7 of this test report.

5.6.2 Test Procedure:

- 1. The transmitter output was connected to the spectrum analyzer directly.
- 2. The center frequency of the spectrum analyzer was set to the fundamental frequency and set RBW to 3MHz and VBW to 3MHz.

5.6.3 Test Setup Layout:



5.6.4 Test Result : See spectrum analyzer plots below

Test Mode: Mode 1~Mode 3

Temperature: 25°C

Relative Humidity: 41 %

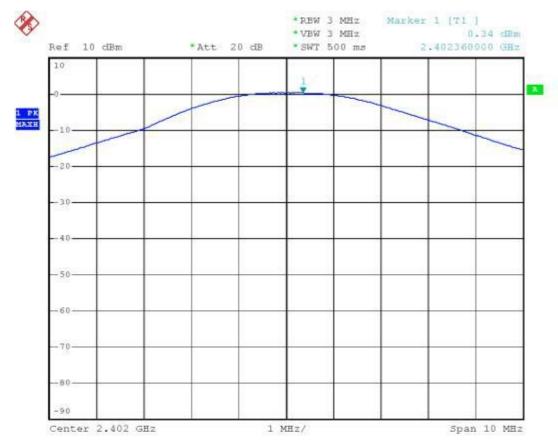
Channel	Frequency Measured Output Power		Limits	Plot
	(MHz)	(dBm)	(Watt/dBm)	Ref. No.
00	2402	0.34	1W/30 dBm	Mode 1
39	2441	0.26	1W/30 dBm	Mode 2
78	2480	0.27	1W/30 dBm	Mode 3

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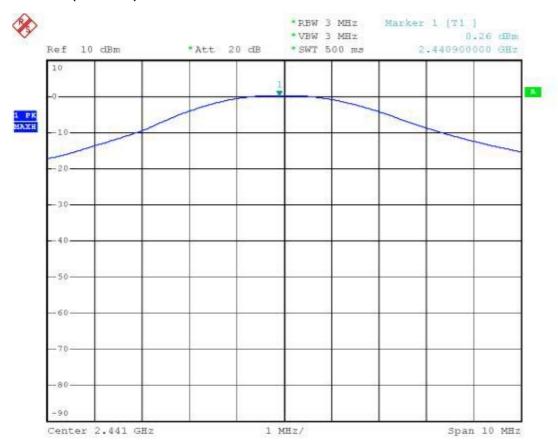
5.6.5 Output Power

Mode 1: CH00 (2402MHz)



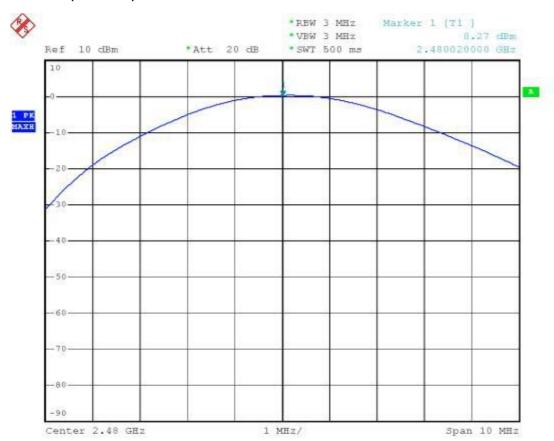
FCC ID. : OHH-BT5000 TEL: 886-2-2696-2468 : 23 of 64 Page No. FAX: 886-2-2696-2255 Issued Date : Oct. 05, 2004

Mode 2: CH39 (2441MHz)



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Mode 3: CH78 (2480MHz)



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5.7 100kHz Bandwidth of Frequency Band Edges

5.7.1 Measuring Instruments:

As described in chapter 7 of this test report.

5.7.2 Test Procedure:

- 1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
- 2. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 kHz bandwidth from band edge.
- 3. The band edges was measured and recorded.

5.7.3 Test Result:

Test Mode: Mode 1 and Mode 3

Temperature: 25°C

Relative Humidity: 41 %

PASS Test Result in lower band (Channel 00): **PASS** Test Result in higher band(Channel 78):

5.7.4 Note on Band edge Emission

CH00 (Horizontal)

Frequency	Level	Over	Limit	Read	Antenna	Preamp	Cable	Detect
		Limit	Line	Level	Factor	Factor	Loss	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	Mode
2390.00	42.22	-26.78	74.00	60.05	28.40	44.55	3.32	Peak
2390.00	37.29	-16.71	51.00	20.12	28.40	44.55	3.32	Average

CH00 (Vertical)

Frequency	Level	Over	Limit	Read	Antenna	Preamp	Cable	Detect
		Limit	Line	Level	Factor	Factor	Loss	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	Mode
2390.00	46.64	-27.36	74.00	59.47	28.40	44.55	3.32	Peak
2390.00	36.29	-17.71	54.00	49.12	28.40	44.55	3.32	Average

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CH78	(Horizontal)
01110	(1 1011 2 011ta1)

Frequency	Level	Over	Limit	Read	Antenna	Preamp	Preamp Cable	
		Limit	Line	Level	Factor	Factor	Loss	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	Mode
2483.50	38.76	-35.24	74.00	51.47	28.48	44.56	3.38	Peak
2483.50	28.30	-25.70	54.00	41.01	28.48	44.56	3.38	Average

CH78 (Vertical)

Frequency Level		Over	Limit	Read	Antenna	Preamp	Cable	Detect
		Limit	Line	Level	Factor	Factor	Loss	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	Mode
2483.50	38.61	-35.39	74.00	51.32	28.48	44.56	3.38	Peak
2483.50	25.70	-25.70	54.00	41.01	28.48	44.56	3.38	Average

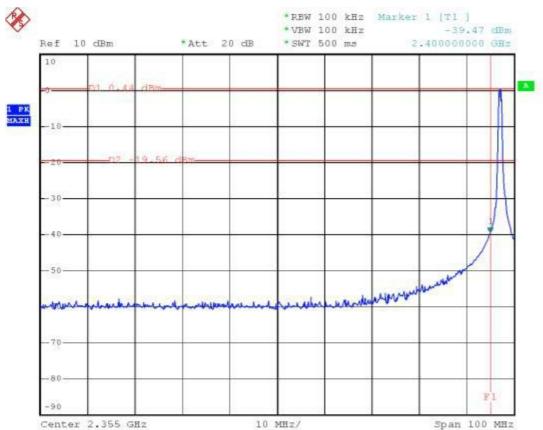
^{*}Remark: The data above can refer to radiated emission in section 5.9.

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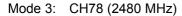
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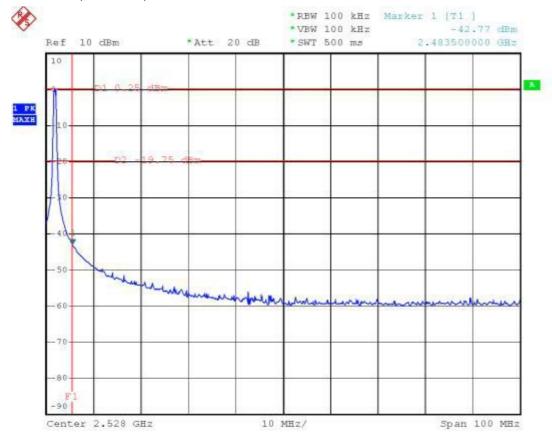
5.7.5 Frequency Band Edge

Mode 1: CH00 (2402 MHz)



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5.8 Test of Conducted Emission

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in ANSI C63.4-2003 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.8.1 Major Measuring Instruments:

 Test Receiver (R&S ESCS 30)

Attenuation 10 dB 0.15 MHz Start Frequency 30 MHz Stop Frequency IF Bandwidth 9 kHz

5.8.2 Test Procedures:

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power port of a line impedance stabilization network (LISN).
- c. All the support units are connected to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

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5.8.3 Test Result of Conducted Emission:

The EUT can not transmit RF signal as in charging mode, so conducted emission test is not necessary.

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Test of Radiated Emission

Radiated emissions from 30 MHz to 26.5 GHz were measured according to the methods defined in ANSI C63.4-2003. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 5.9.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

100 MHz to 1 GHz

5.9.1 Major Measuring Instruments

Signal Input

Amplifier (MITEQ AFS44)

RF Gain 40 dB

Signal Input 100 MHz to 26.5 GHz

 Amplifier (PA-103)

RF Gain 30 dB

 Spectrum analyzer (R&S FSP40)

Attenuation 10 dB Start Frequency 1 GHz Stop Frequency 25 GHz Resolution Bandwidth 1 MHz Video Bandwidth 1 MHz

9 kHz to 40 GHz Signal Input

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5.9.2 Test Procedures

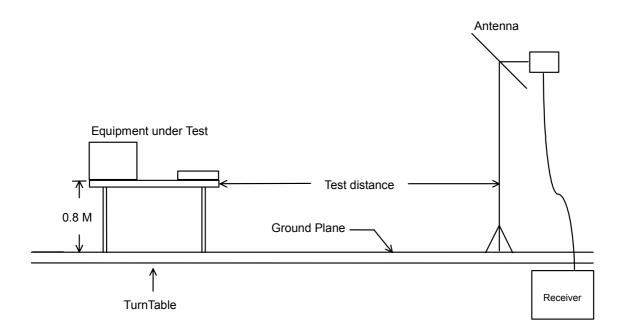
1. The EUT was placed on a rotatable table top 0.8 meter above ground.

- 2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest radiation.
- 4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- 6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- 7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported.

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5.9.3 Typical Test Setup Layout of Radiated Emission



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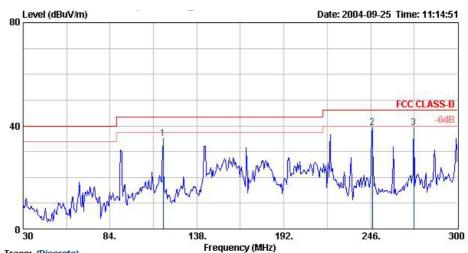
5.9.4 Test Result of Radiated Emission

Test Mode: Mode 1 Test Distance: 3 m Temperature: 25°C Relative Humidity: 41 % Test Date: Sep. 25, 2004

- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Probe Factor + Cable Loss + Read Level Preamp Factor = Level

■ The test that passed at the minimum margin was marked by the frame in the following test record

Spurious Emission



Trace: (Discrete) 03CH06-HY

Site Condition FCC CLASS-B 3m BI LOG 2004 0629 HORIZONTAL

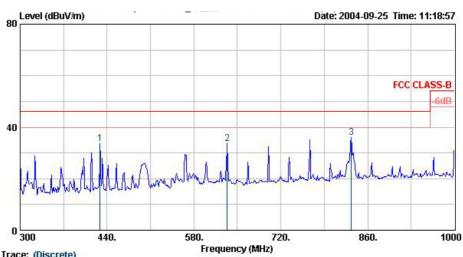
EUT Bluetooth Earpiece Power DC3 6V BT5000 Model

: TX CH00 2402MHz Memo

Over ReadAntenna Preamp Cable Table Limit Ant Freq Level Limit Level Factor Factor Loss Remark Line Pos Pos dB dBuV/m MHz dBuV/m dBu¥ dB/m dB dB CID deg 6.94 43.5011.64 1.38 Peak 400 0 54.13 11.67 0 39.19-6.8146.00 57.35 1.98 Peak 400 -6.6546.0012.50400

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Trace: (Discrete)

Site : 03CH06-HY

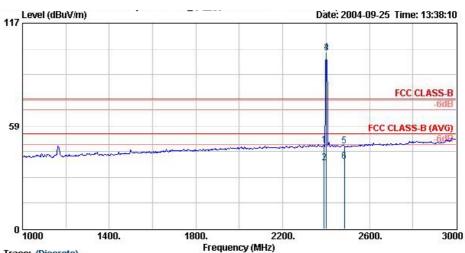
Condition : FCC CLASS-B 3m BI LOG 2004 0629 HORIZONTAL EUT : Bluetooth Earpiece

: Bluetooth Earpiece : DC3.6V Power Model BT5000

Memo	: TX CH00 2402MHz										
	Freq	Level	Over Limit	Limit Line			Preamp Factor		Remark	Ant Pos	Table Pos
	MHz	dBu∜/m	dB	dBu∛/m	dBu∛	dB/m	dB	dB		сп	deg
1 @ 2 @ 3 @	80 633. 90 833. 40	33.74	-12.26	46.00 46.00 46.00		18.80		2. 84 3. 19 3. 81	Peak	99 99 99	0 0 0

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Trace: (Discrete)

: 03CH06-HY

: FCC CLASS-B 3m HF-HORN AH-118 HORIZONTAL

: Bluetooth Earpiece Site Condition

EUT

Power DC3.6V Model BT5000

: TX CH00 2402MHz Memo

	Freq	Level	Over Limit	Limit Line		Antenna Factor		Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBu∀/m	dB	dBu∀/m	dBu∛	dB/m	dB	dB		cn	deg
1 @ 2 @ 4 @ 5 @	2390.00 2390.00 2402.00 2402.00	37. 29 100. 07	-26. 78 -16. 71		60.05 50.12 112.90 113.50		44. 55 44. 55 44. 55 44. 55	$\frac{3.32}{3.32}$	Peak Average Average Peak	100 100 100 100	360 360 360 360
5 @ 6 @	2483.50 2483.50		-26.84 -15.70	74.00 54.00	59.86 51.01	28. 48 28. 48	44.56 44.56		Peak Average	100 100	360 360

Remark: #3 and #4 represent a fundamental frequency.

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