

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.
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SPORTON International Inc.

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

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History of this test report

Original Report Issue Date: Oct. 05, 2004

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

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 :

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.

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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)

1.4. Feature of Equipment under Test

Product Feature & Specification				
1. Type of Modulation	GFSK			
2. Frequency Band	2.400GHz ~ 2.4835GHz			
3. Carrier Frequency of each channel	2402+nMHz, n=0~78			
4. Bandwidth of each 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 antenna			
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			

2. Test Configuration of Equipment under Test

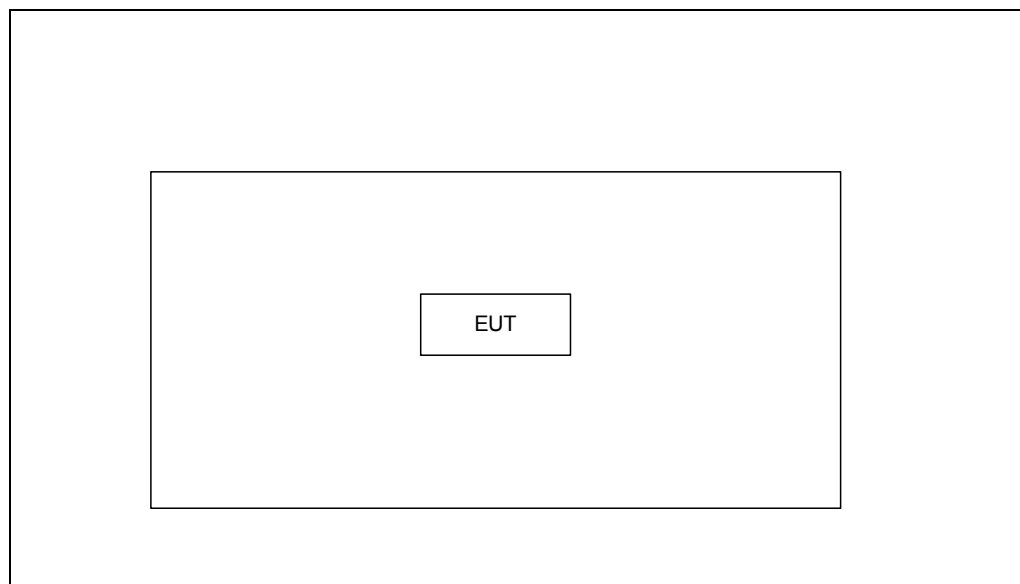
2.1. Test Manner

- 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



3. Operation of Equipment under Test

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

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.

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

5.2. Hopping Channel Separation

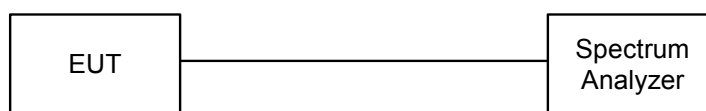
5.2.1. Measuring Instruments :

As described in chapter 7 of this test report.

5.2.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer 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

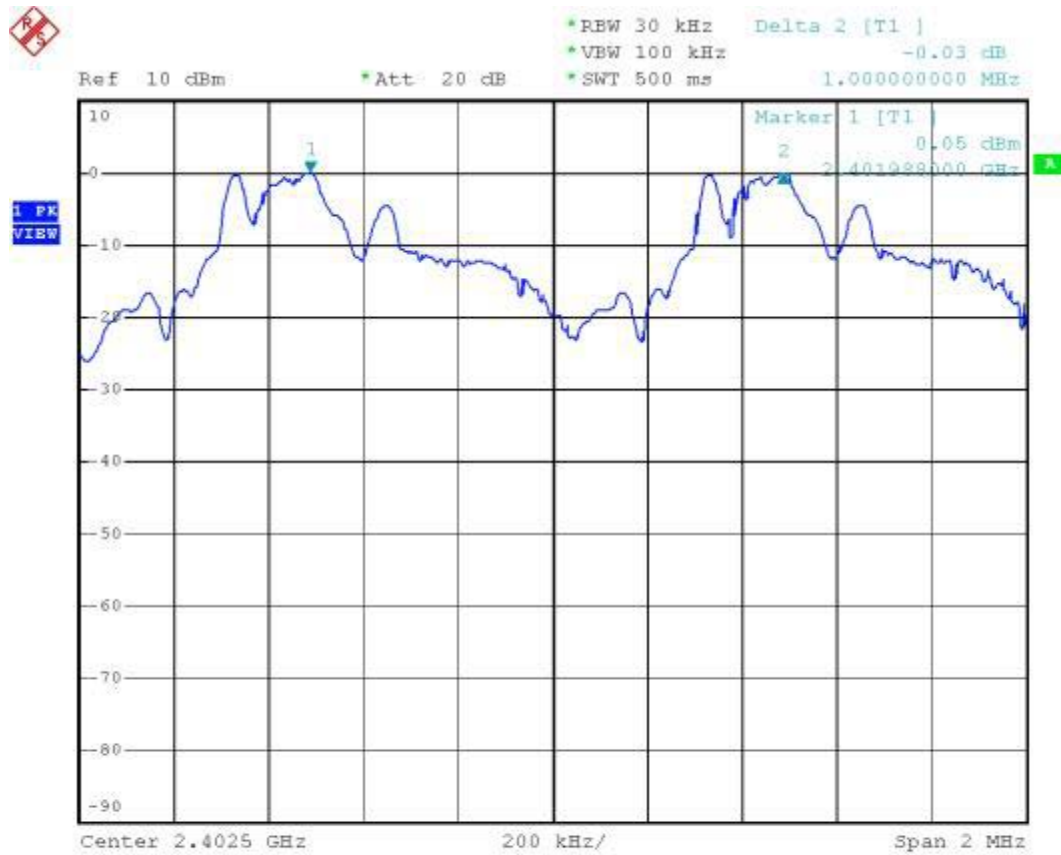
- Test Mode: Mode 1~Mode 3
- Temperature: 25°C
- Relative Humidity: 41 %

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

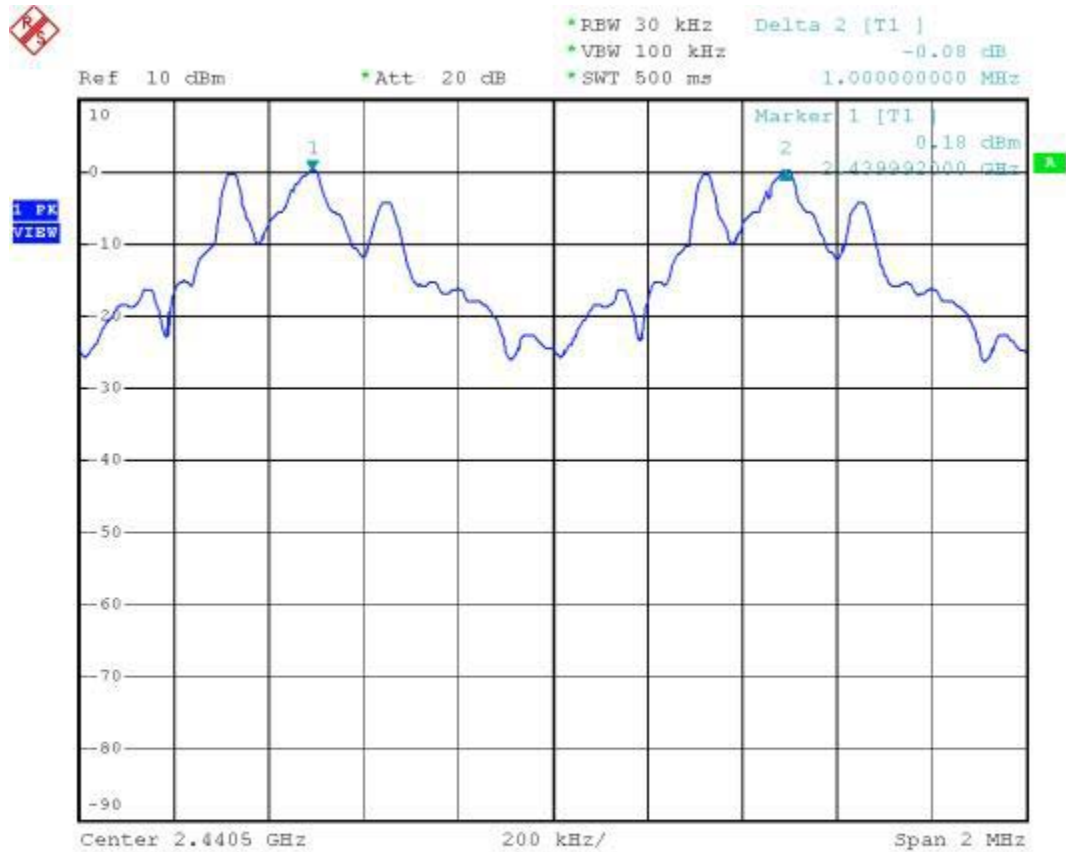
Remark: Limit is the greater one of 25kHz or the 20dB bandwidth of the hopping channel.

5.2.5 Hopping Channel Separation

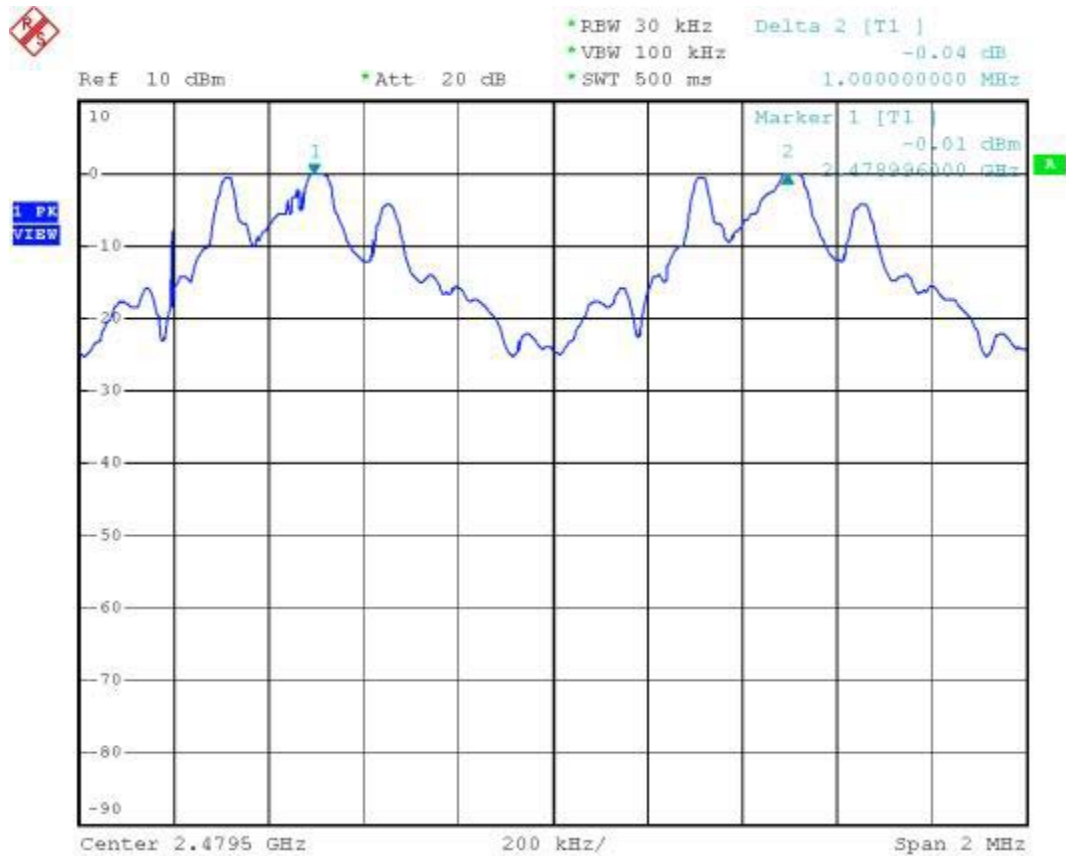
Mode 1: CH00 (2402MHz)



Mode 2: CH39 (2441MHz)



Mode 3: CH78 (2480MHz)



5.3. Number of Hopping Frequency

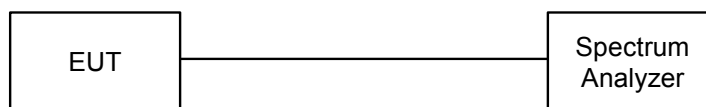
5.3.1. Measuring Instruments :

As described in chapter 7 of this test report.

5.3.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer 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 :

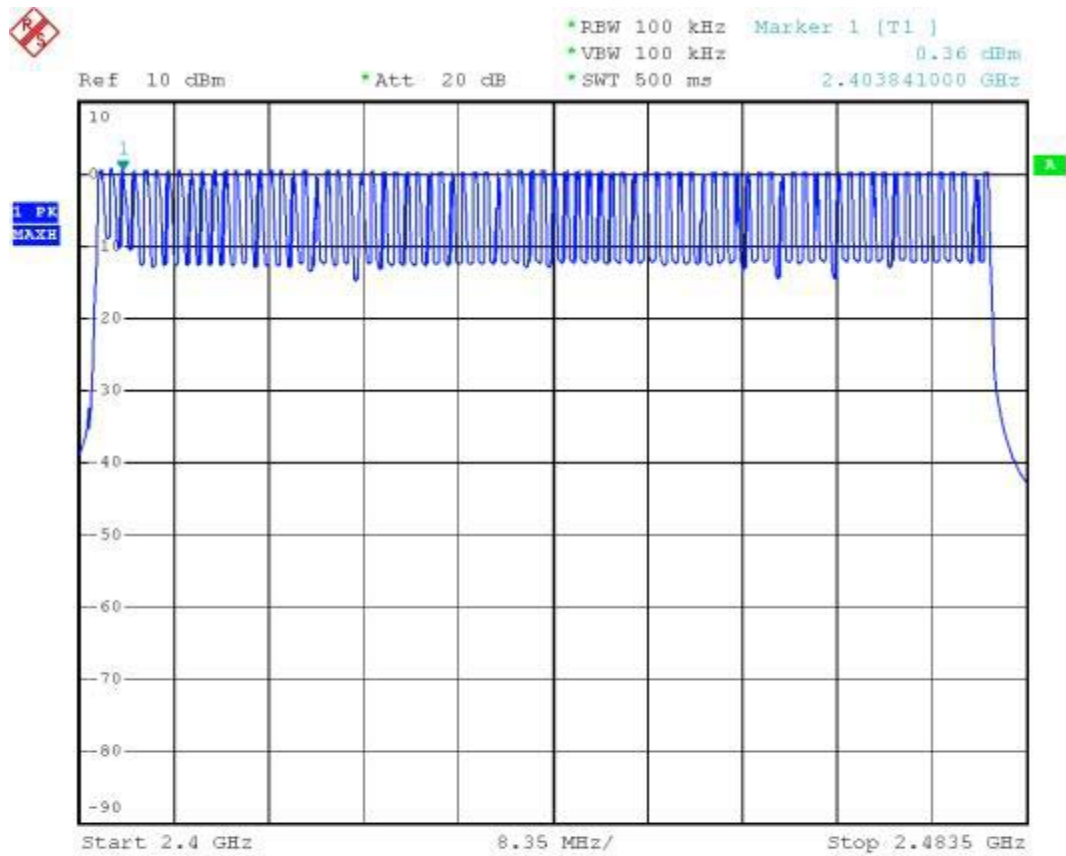


5.3.4. Test Result : See spectrum analyzer plots below

- Temperature: 25°C
- Relative Humidity: 41 %

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

5.3.5 Number of Hopping Frequency



5.4 Hopping Channel Bandwidth

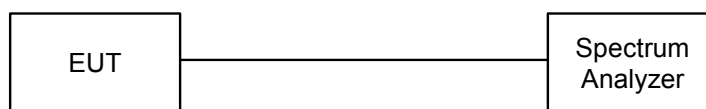
5.4.1 Measuring Instruments :

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 :



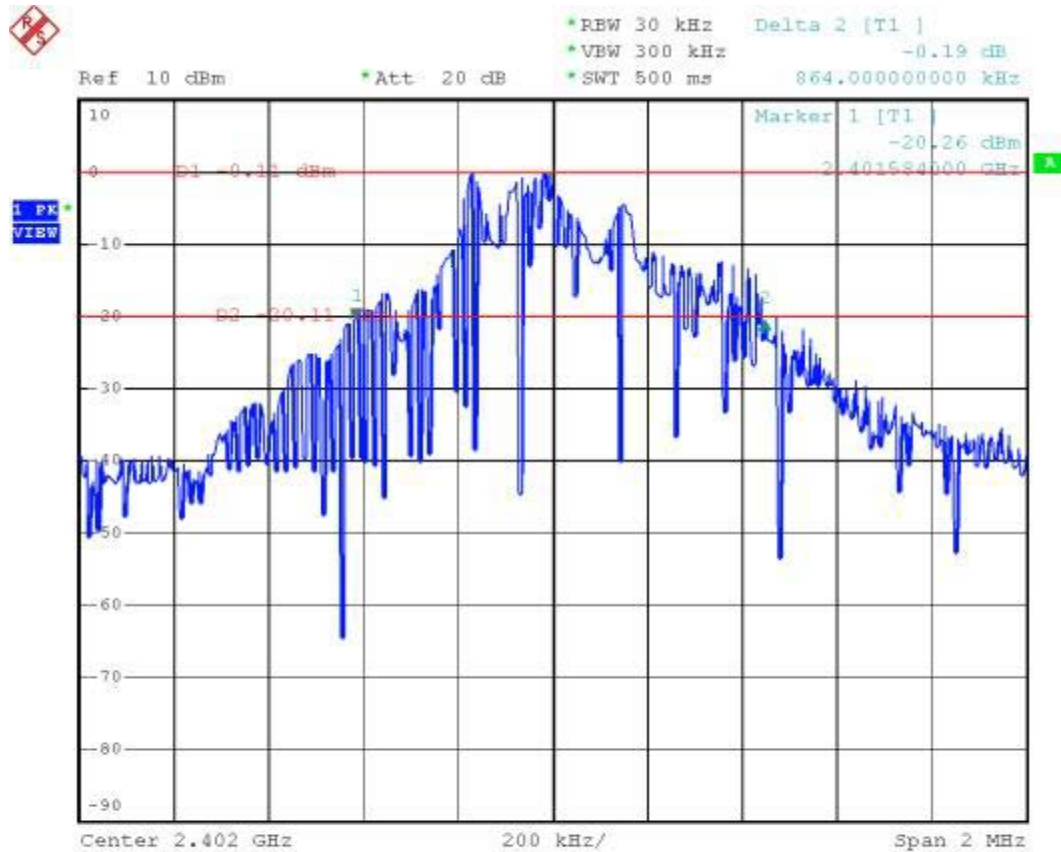
5.4.4 Test Result : See spectrum analyzer plots below

- Test Mode: Mode 1~Mode 3
- Temperature: 25°C
- Relative Humidity: 41 %

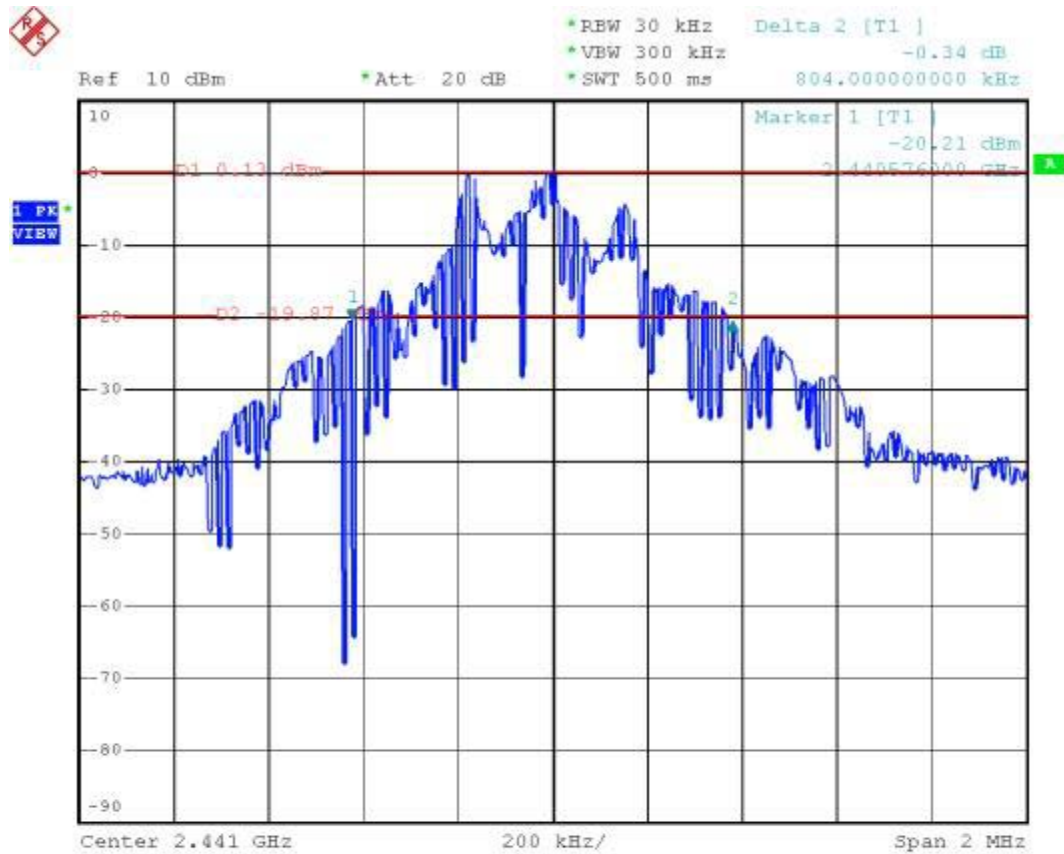
Channel	Frequency	Hopping Channel Bandwidth	Limits	Plot
	(MHz)	(MHz)	(MHz)	Ref. No.
00	2402	0.8640	1.0	Mode 1
39	2441	0.8040	1.0	Mode 2
78	2480	0.8040	1.0	Mode 3

5.4.5 Hopping Channel Bandwidth

Mode 1: CH00 (2402MHz)



Mode 2: CH39 (2441MHz)



Mode 3: CH78 (2480MHz)



5.5 Dwell Time of Each Frequency within a 30 Seconds Period

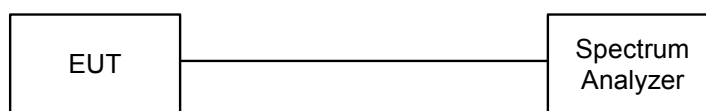
5.5.1 Measuring Instruments :

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 = $30 \times (1600/79) \times t$ (t = the time duration of one single pulse)

5.5.3 Test Setup Layout :



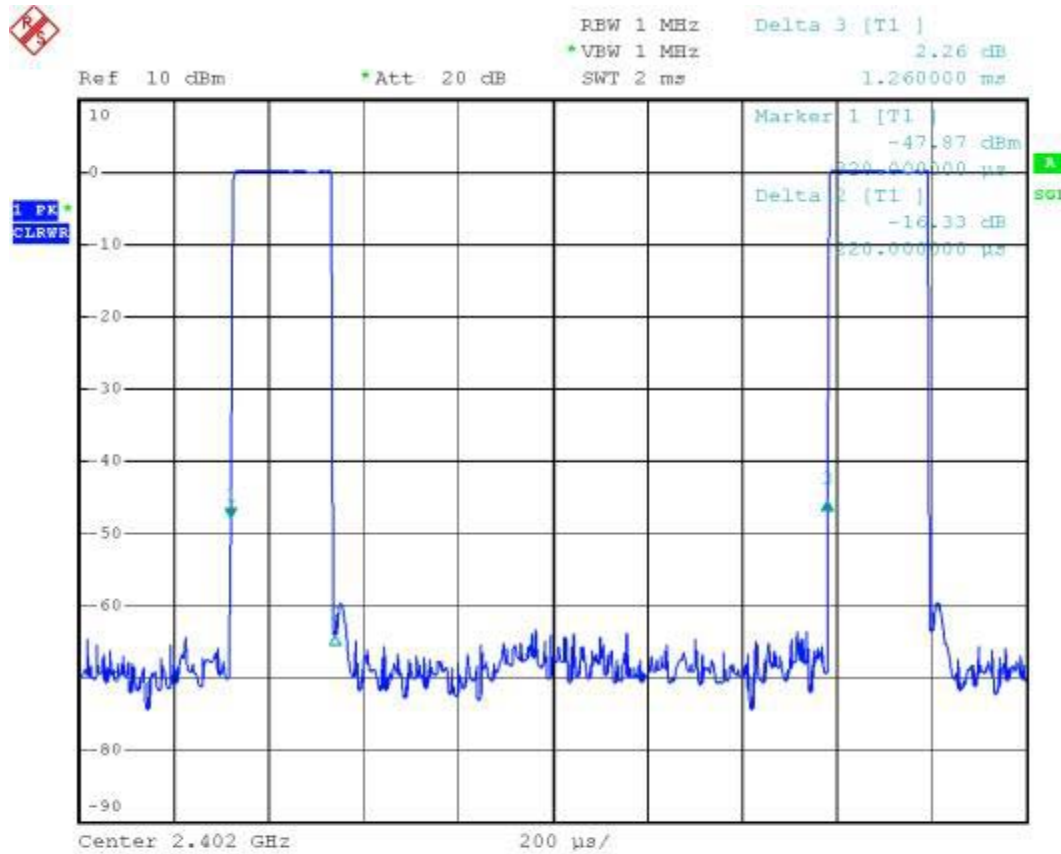
5.5.4 Test Result : See spectrum analyzer plots below

- Test Mode: Mode 1~Mode 3
- Temperature: 25°C
- Relative Humidity: 41 %

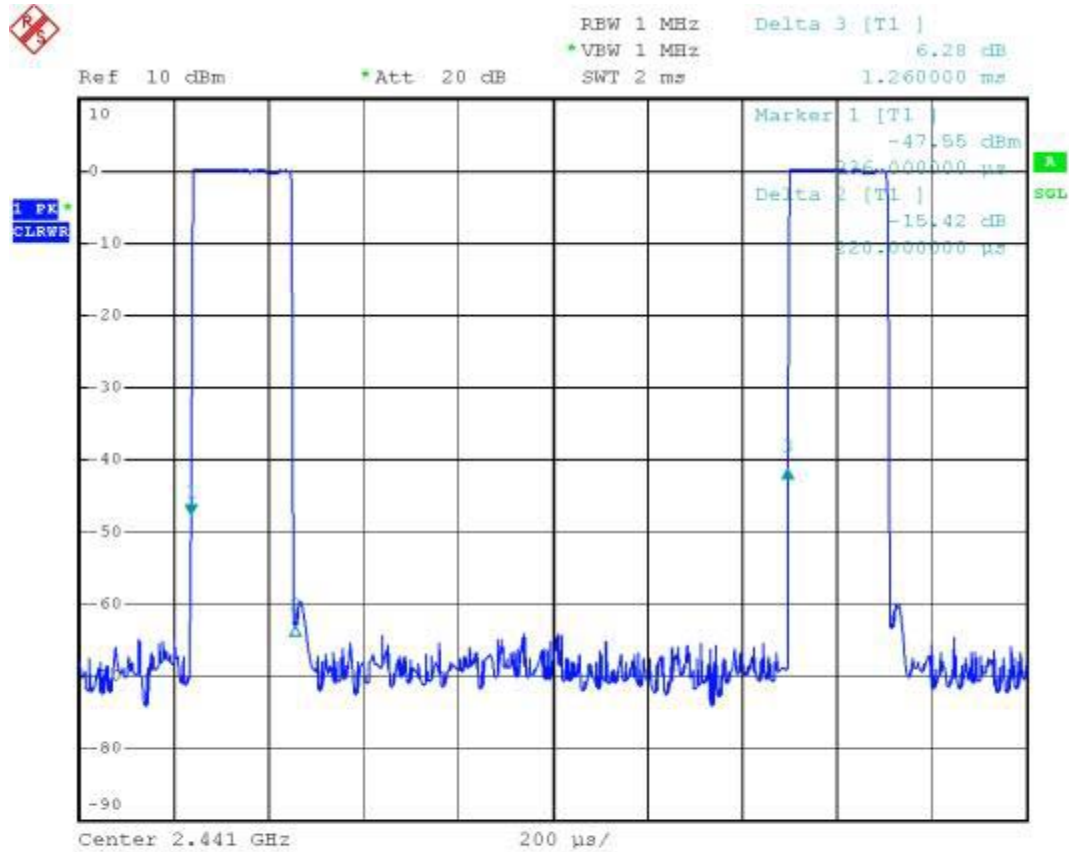
Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)	Plot Ref. No.
00	2402	0.13	0.4	Mode 1
39	2441	0.13	0.4	Mode 2
78	2480	0.13	0.4	Mode 3

5.5.5 Dwell Time of Each Frequency

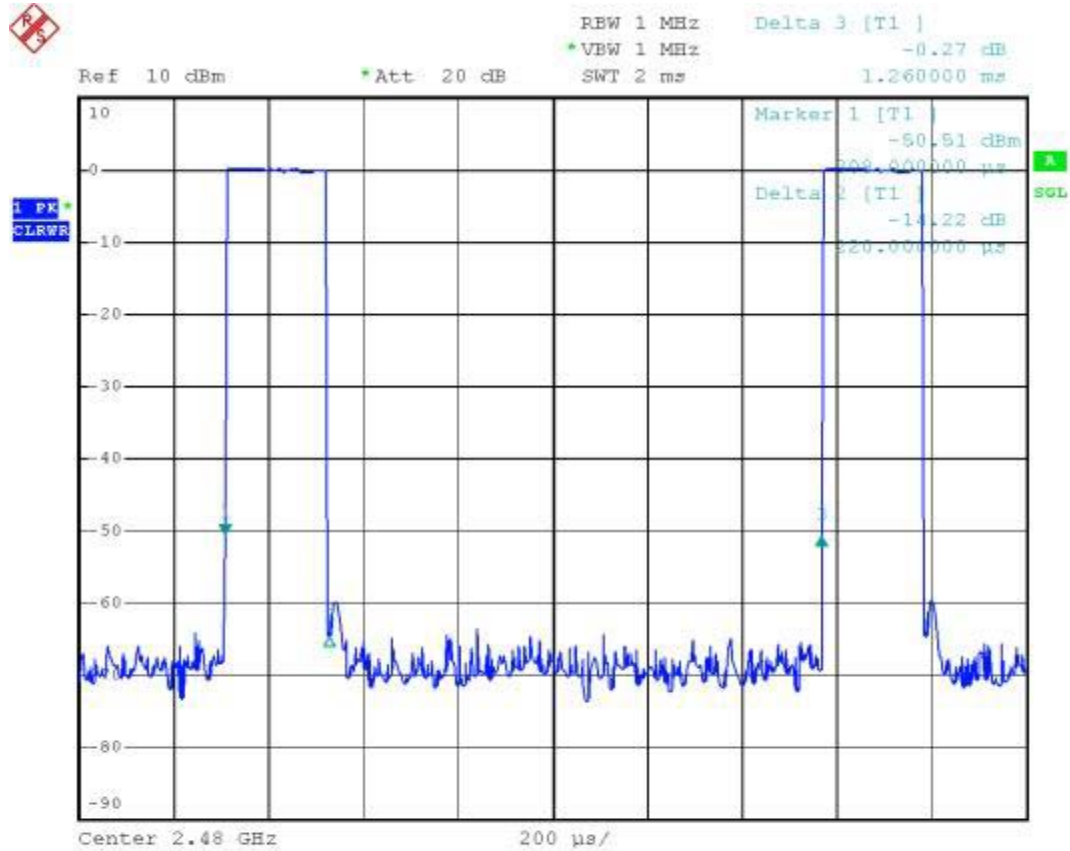
Mode 1: CH00 (2402MHz)



Mode 2: CH39 (2441MHz)



Mode 3: CH78 (2480MHz)



5.6 Output Power

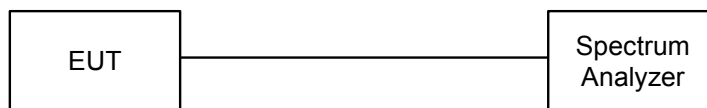
5.6.1 Measuring Instruments :

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 :



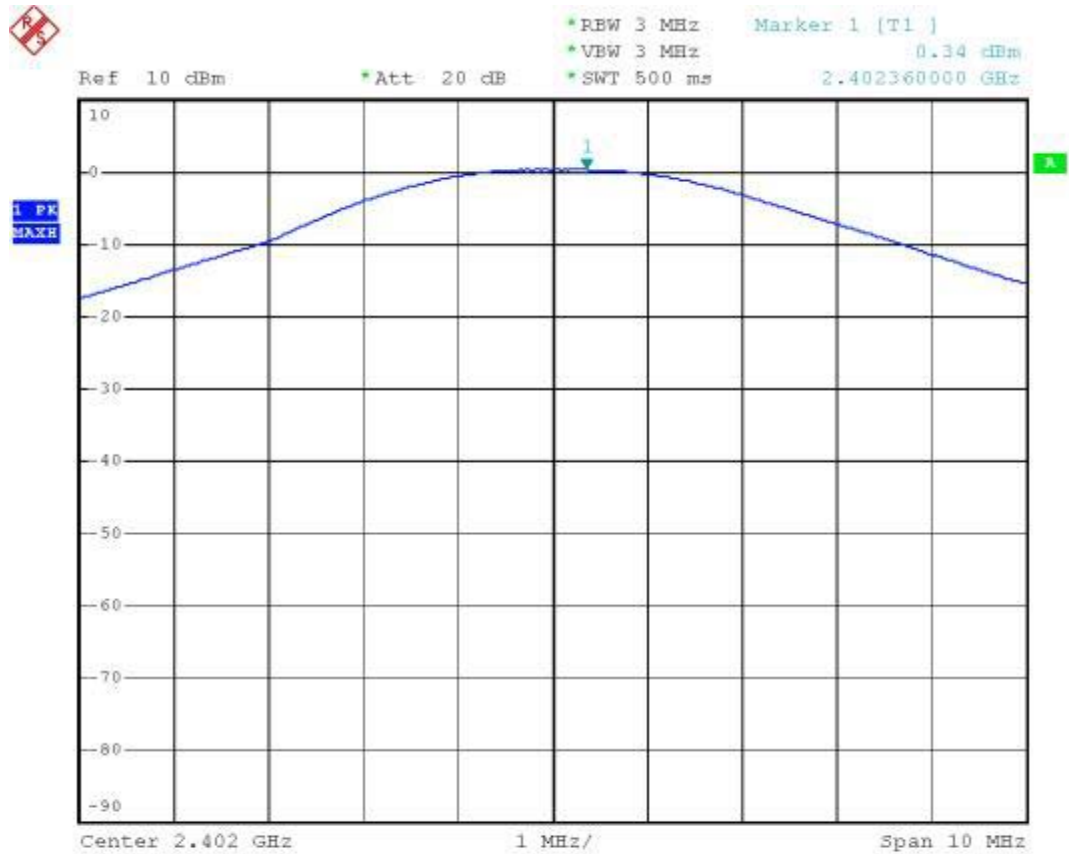
5.6.4 Test Result : See spectrum analyzer plots below

- Test Mode: Mode 1~Mode 3
- Temperature: 25°C
- Relative Humidity: 41 %

Channel	Frequency (MHz)	Measured Output Power (dBm)	Limits (Watt/dBm)	Plot 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

5.6.5 Output Power

Mode 1: CH00 (2402MHz)



Mode 2: CH39 (2441MHz)



Mode 3: CH78 (2480MHz)



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 %

Test Result in lower band (Channel 00) : PASS

Test Result in higher band(Channel 78) : PASS

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

CH78 (Horizontal)

Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Detect Mode
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	
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

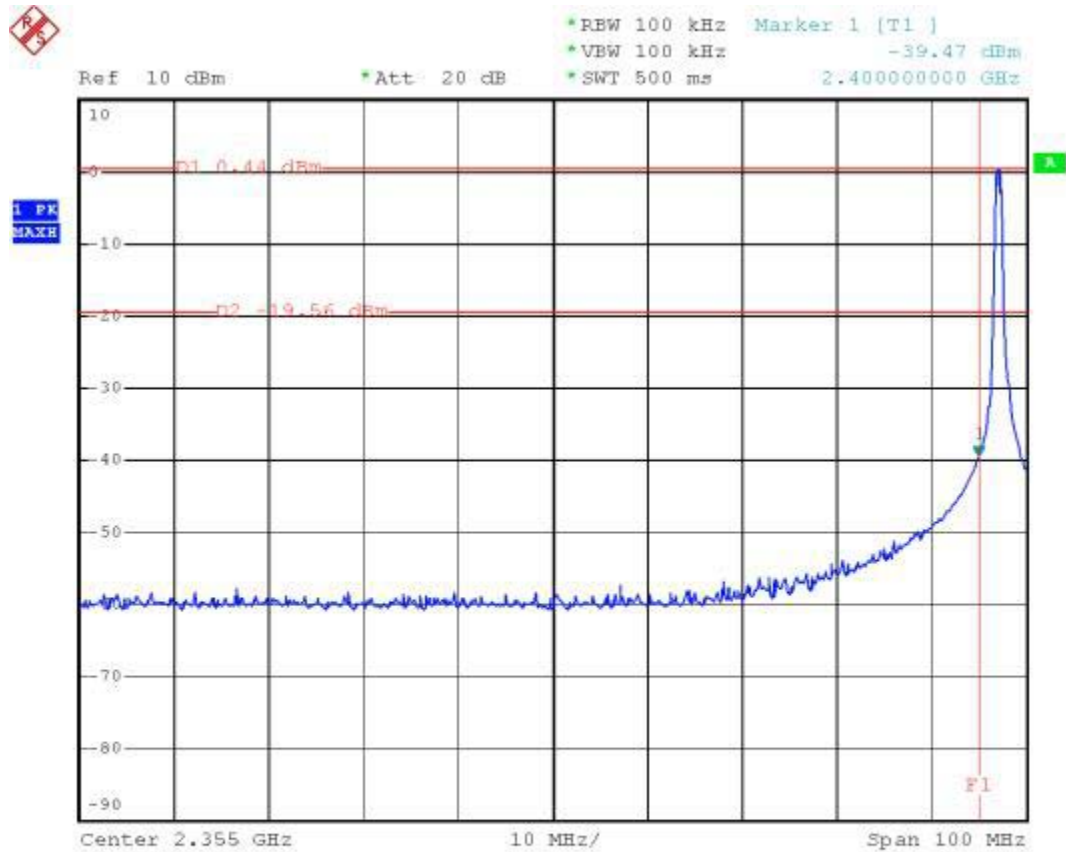
CH78 (Vertical)

Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Detect Mode
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	
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

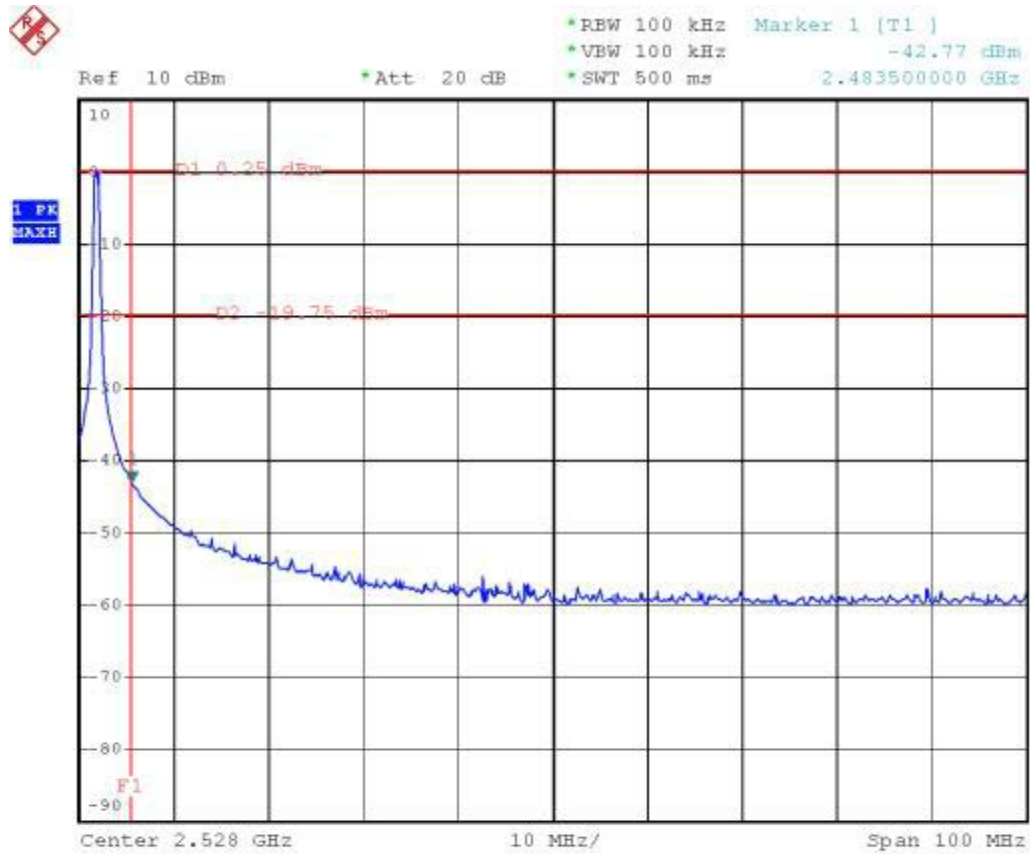
* Remark: The data above can refer to radiated emission in section 5.9.

5.7.5 Frequency Band Edge

Mode 1: CH00 (2402 MHz)



Mode 3: CH78 (2480 MHz)



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
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
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.
- f. 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.

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.

5.9 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

5.9.1 Major Measuring Instruments

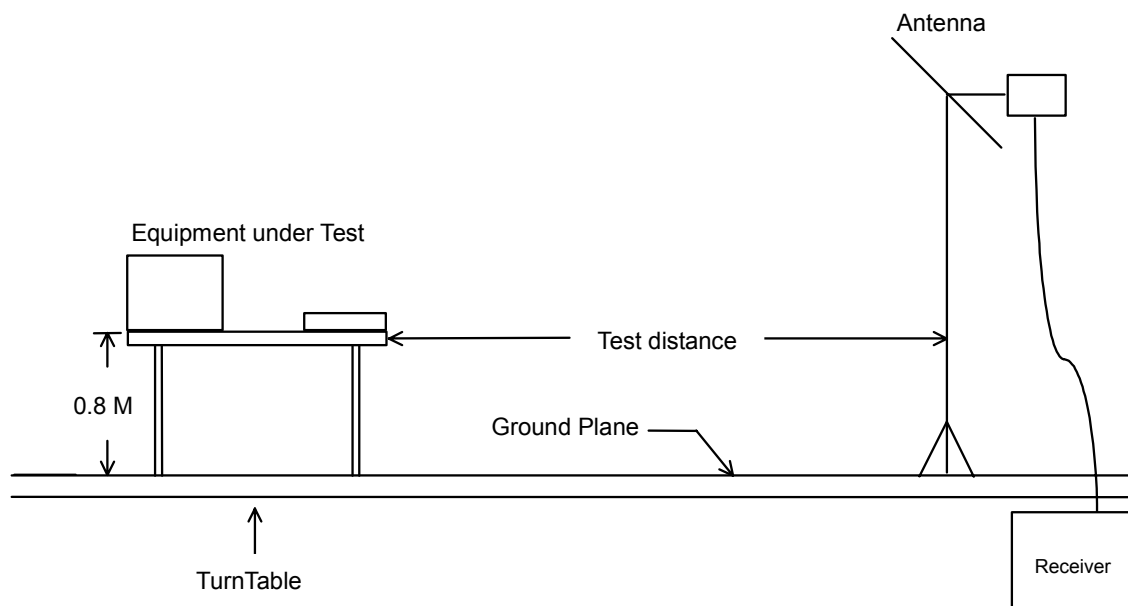
- Amplifier (MITEQ AFS44)
 - RF Gain 40 dB
 - Signal Input 100 MHz to 26.5 GHz

- Amplifier (PA-103)
 - RF Gain 30 dB
 - Signal Input 100 MHz to 1 GHz

- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 25 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 kHz to 40 GHz

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.

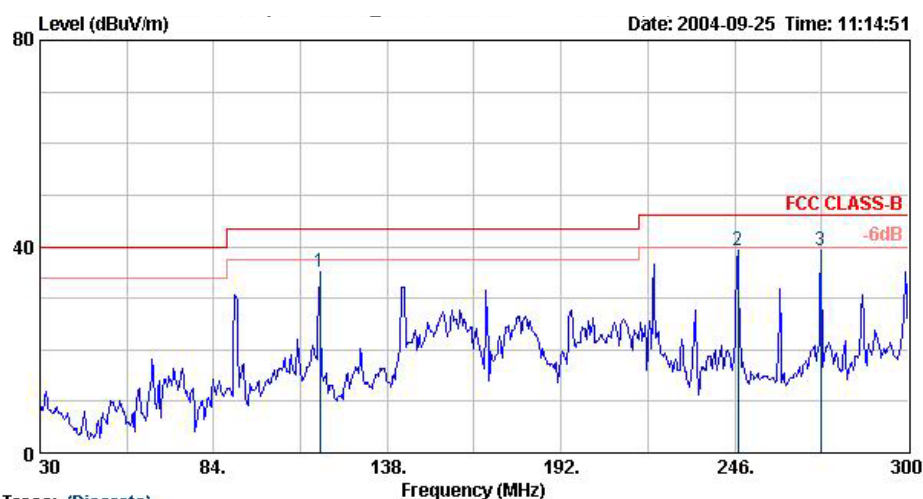
5.9.3 Typical Test Setup Layout of Radiated Emission

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

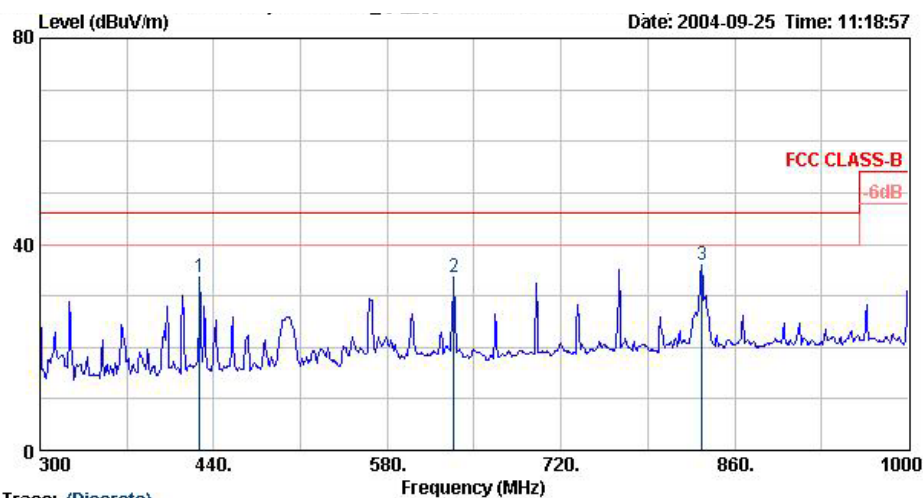
■ The test that passed at the minimum margin was marked by the frame in the following test record

■ Spurious Emission



Site : 03CH06-HY
 Condition : FCC CLASS-B 3m BI LOG 2004 0629 HORIZONTAL
 EUT : Bluetooth Earpiece
 Power : DC3.6V
 Model : BT5000
 Memo : TX CH00 2402MHz

	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Factor	Loss	Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	6.94	35.18	-8.32	43.50	54.13	11.64	31.97	1.38	400	0
2 @	247.08	39.19	-6.81	46.00	57.35	11.67	31.81	1.98	400	0
3 @	272.73	39.35	-6.65	46.00	56.71	12.50	31.95	2.10	400	0

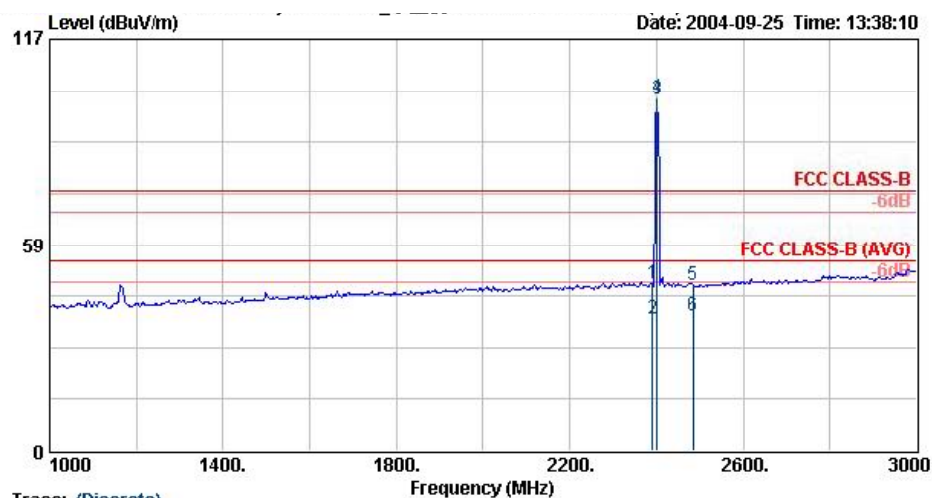


Site : 03CH06-HY
 Condition : FCC CLASS-B 3m BI LOG 2004 0629 HORIZONTAL
 EUT : Bluetooth Earpiece
 Power : DC3.6V
 Model : BT5000
 Memo : TX CH00 2402MHz

	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB		cm	deg
1 @	80	33.49	-12.51	46.00	46.38	16.42	32.15	2.84 Peak	99	0
2 @	633.90	33.74	-12.26	46.00	43.23	18.80	31.48	3.19 Peak	99	0
3 @	833.40	35.85	-10.15	46.00	43.51	20.33	31.81	3.81 Peak	99	0

FCC TEST REPORT

Report No. : FR491513



Trace: (Discrete)

Site : 03CH06-HY
 Condition : FCC CLASS-B 3m HF-HORN AH-118 HORIZONTAL
 EUT : Bluetooth Earpiece
 Power : DC3.6V
 Model : BT5000
 Memo : TX CH00 2402MHz

	Freq	Level	Over	Limit	ReadAntenna	Preamp	Cable		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB		cm	deg
1 @	2390.00	47.22	-26.78	74.00	60.05	28.40	44.55	3.32 Peak	100	360
2 @	2390.00	37.29	-16.71	54.00	50.12	28.40	44.55	3.32 Average	100	360
3 @	2402.00	100.07			112.90	28.40	44.55	3.32 Average	100	360
4 @	2402.00	100.67			113.50	28.40	44.55	3.32 Peak	100	360
5 @	2483.50	47.16	-26.84	74.00	59.86	28.48	44.56	3.38 Peak	100	360
6 @	2483.50	38.30	-15.70	54.00	51.01	28.48	44.56	3.38 Average	100	360

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