



## Test Report

Product Name : Bluetooth USB Dongle  
Model No. : WBT-3020, DBT-120, DWB-120M  
FCC ID.: PSL-WBT-3020

Applicant : W-Link Systems Inc.

Address : 1F, No.20, Park Ave. II, Science-based Industrial  
Park, Hsin Chu, Taiwan, R.O.C.

Date of Receipt : Feb. 7, 2002

Date of Test : Mar. 11, 2002

Report No. : 022H033FI

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Test Date : Mar. 11, 2002

Report No. : 022H033FI



Accredited by NIST (NVLAP)  
NVLAP Lab Code: 200347-0

Product Name : Bluetooth USB Dongle

Applicant : W-Link Systems Inc.

Address : 1F, No.20, Park Ave. II, Science-based Industrial  
Park, Hsin Chu, Taiwan, R.O.C.

Manufacturer : W-Link Systems Inc.

Model No. : WBT-3020, DBT-120, DWB-120M

FCC ID. : PSL-WBT-3020

Rated Voltage : DC 5V (Power by PC)

Trade Name : W-Link, D-Link

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.247

Measurement Procedure : ANSI C63.4:1992

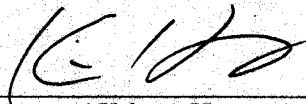
Test Result : Complied




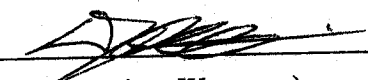
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(Kim Hung)

Tested By :   
(Vincent Lin)

Approved By :   
(Kevin Wang)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name : Bluetooth USB Dongle  
 Trade Name : W-Link, D-Link  
 FCC ID. : PSL-WBT-3020  
 Model No. : WBT-3020, DBT-120, DWB-120M  
 Frequency Range : 2402MHz to 2480MHz  
 Channel Number : 79  
 Type of Modulation : Frequency Hopping Spread Spectrum  
 Antenna Type : Soldered on PCB  
 Operator Selection of Operating Frequency : By software

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

Note:

- The EUT is a Bluetooth USB Dongle. The different between model names was for different brand name shown as list:
  - 1) WBT-3020 for W-Link
  - 2) DBT-120 and DWB-120M for D-Link
- These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
- Regards to the frequency band operation; the lowest 、 middle and highest frequency of channel were selected to perform the test, then shown on this report.
- This device is a composite device in accordance with Part 15 paragraph 15.5. The function for the receiver was, measured and made a test report that the report number is 022H033F, certified under verification.
- Quietek had verified among construction and function in typical operation, then shown in this test report.

## 1.2. Operational Description

The EUT is a 79 hopping channels bluetooth device in PC/notebook.

EUT is an USB interface 2.4GHz wireless LAN with 11 channels.

The device adapts hopping spread spectrum modulation. The antenna soldered on PCB provides diversity function to improve the receiving function. Data can be transmitted by the radio signal connect to the Internet or Local network.

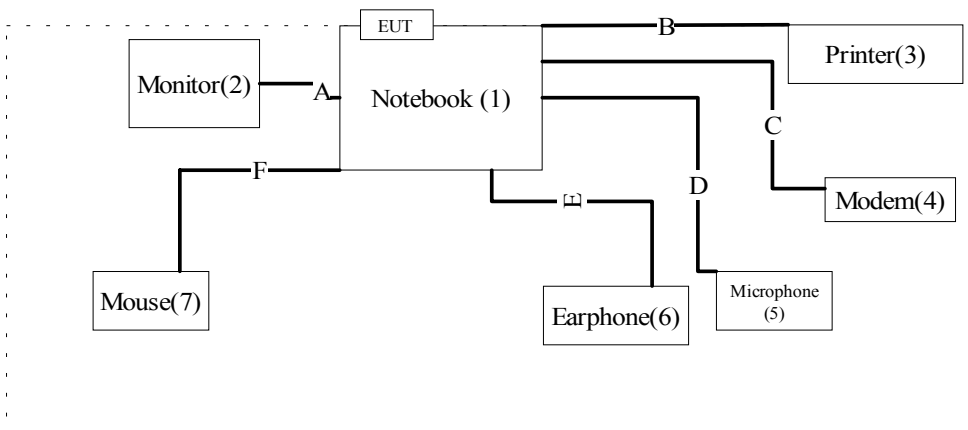
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards ) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord	FCC ID
(1)	Notebook	DELL	PP01L	2724903568	Non-shielded,1.8m	DoC
(2)	Monitor	IBM	6540-02N	66-AC902	Shielded,1.8m	H41CM14018
(3)	Printer	HP	C2642A	MY75L1D2XN	Non-Shielded,0.7m	B94C2642X
(4)	Modem	ACEEX	2814	960018054	--	IFAXDM2814
(5)	Microphone	DYNAMIC	DM-35	N/A	--	DoC
(6)	Earphone	BSD	N/A	N/A	--	DoC
(7)	Mouse	Acer	M-M34	LZA81451644	--	DZL211029

	Signal Cable Type	Signal Cable Description
A.	VGA Cable	Shielded, 1.8m
B.	Printer Cable	Shielded, 1.6m
C.	Modem Cable	Shielded, 1.2m
D.	Microphone Cable	Non-shielded, 1.6m
E.	Earphone Cable	Non-shielded, 1.8m
F.	Mouse Cable	Shielded, 1.8m

**1.4. Configuration of Tested System**



**1.5. EUT Exercise Software**

- 1.5.1 Setup the EUT and simulators as shown on 1.4.
- 1.5.2 Turn on the power of all equipment.
- 1.5.3 Setup the EUT as typical operation.
- 1.5.4 EUT will be in transmission status
- 1.5.5 Repeat the above procedure 1.5.3 to 1.5.4



**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: November 3, 1998 File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2  
 August 30, 2001 Accreditation on NVLAP  
 NVLAP Lab Code: 200347-0



Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,  
 Chiung-Lin, Hsin-Chu County,  
 Taiwan, R.O.C.  
 TEL : 886-3-592-8858 / FAX : 886-3-592-8859  
 E-Mail: [service@quietek.com](mailto:service@quietek.com)

## 2. Conducted Emission

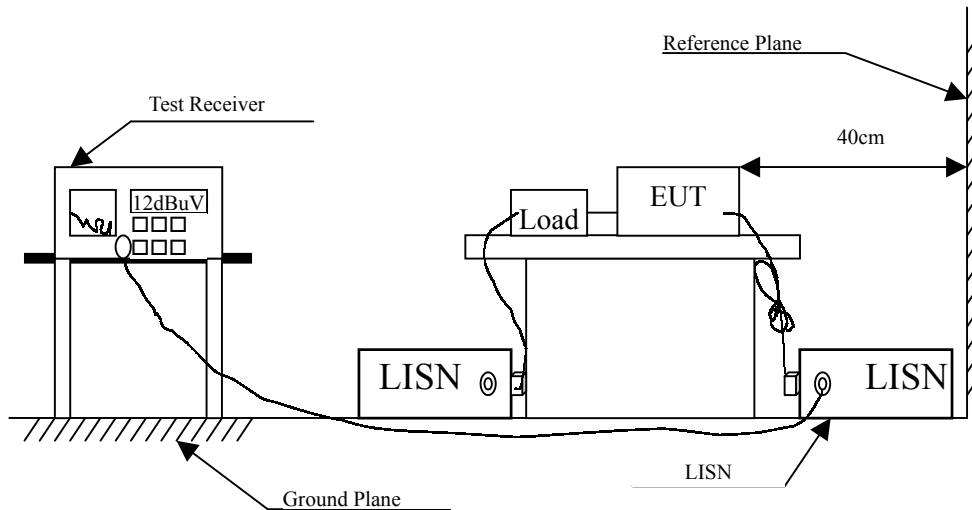
### 2.1. Test Equipment List

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2001	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2001	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2001	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	No.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:1992 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.5. Test Result of Conducted Emission

Product : Bluetooth USB Dongle  
 Test Item : Conducted Emission Test  
 Test Site : No.2 Shielded Room  
 Test Mode : Normal Operation

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level dBuV	Emission Level dBuV	Limits dBuV
<b>Line 1</b>					
<b>Quasi-Peak:</b>					
0.466	0.06	0.21	29.77	30.04	48.00
0.699	0.08	0.25	23.45	23.78	48.00
1.809	0.14	0.34	24.57	25.04	48.00
*3.968	0.19	0.41	29.75	30.34	48.00
23.818	0.37	0.58	27.79	28.74	48.00
28.184	0.39	0.59	28.30	29.29	48.00
<b>Line 2</b>					
<b>Quasi-Peak:</b>					
0.644	0.08	0.24	23.65	23.96	48.00
0.877	0.09	0.27	22.40	22.76	48.00
2.279	0.15	0.36	27.90	28.41	48.00
2.867	0.17	0.38	25.36	25.90	48.00
5.969	0.22	0.45	20.34	21.01	48.00
*29.640	0.40	0.60	28.75	29.75	48.00

Remarks :

1. All Readings below 1GHz are Quasi-Peak value.
2. “ \* ” means that this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable loss

### 3. Peak Power Output

#### 3.1. Test Equipment

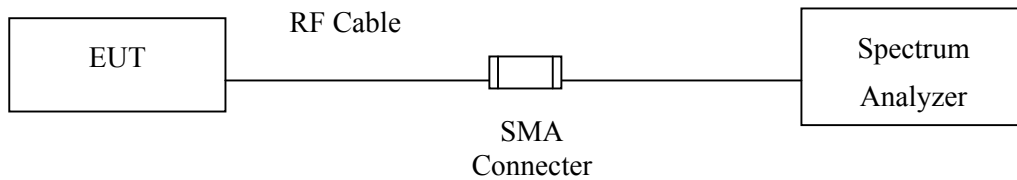
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum	Advantest	R3272 / 72421194	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

#### 3.2. Test Setup

##### Conduction Power Measurement



#### 3.3. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

#### 3.4. Limit

The maximum peak power shall be less 1 Watt.

### 3.5. Test Result of Peak Power Output

Product : Bluetooth USB Dongle  
Test Item : Peak Power Output Data  
Test Site : No.1 OATS  
Test Mode : Normal Operation

Channel No.	Frequency(MHz)	Measurement	Required Limit	Result
Channel 00	2401.77	-25.46 dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.79	-26.49 dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.77	-27.20 dBm	1 Watt= 30 dBm	Pass

#### 4. RF Exposure Evaluation

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

##### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

#### 4.1. Friis Formula

$$\text{Friis transmission formula: } P_d = (P_{out} * G) / (4 * \pi * r^2)$$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

#### 4.2. EUT Operation condition

A software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 4.3. Test Result of RF Exposure Evaluation

Product : Bluetooth USB Dongle  
 Test Item : RF Exposure Evaluation Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

#### 4.3.1 Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.6dBi or 1.45in linear scale.

#### 4.3.2 Output Power Into Antenna & RF Exposure Evaluation Distance

Channel	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Minimum Allowable Distance ® From Skin(cm)
00	2401.77	-25.46	0.02
39	2441.79	-26.49	0.01
78	2480.77	-27.20	0.01

The distance r (4<sup>th</sup> column) calculated from the Friis transmission formula is far shorter than 20 cm separation requirement. So, RF exposure limit warning or SAR test are not required.



## 5. Radiated Emission

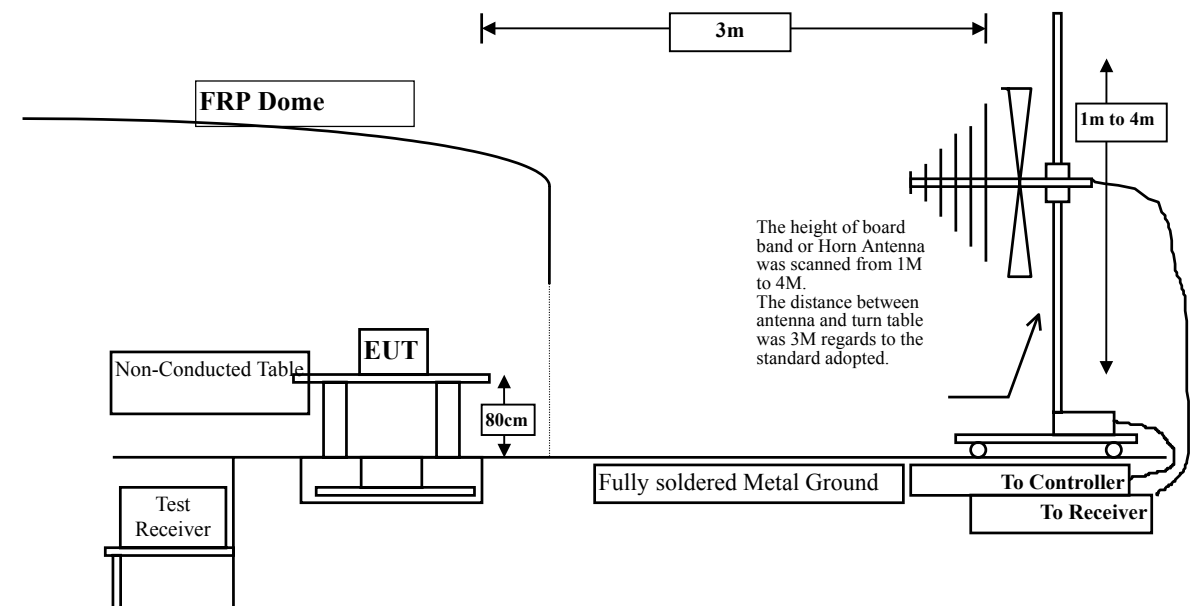
### 5.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	X Test Receiver	R & S	ESCS 30 / 825442/14	May, 2001
	X Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2001
	X Pre-Amplifier	HP	8447D/3307A01812	May, 2001
	X Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2001
	X Horn Antenna	EM	EM6917 / 103325	May, 2001
Site # 2	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2001
	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2001
	Pre-Amplifier	HP	8447D/3307A01814	May, 2001
	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2001
	Horn Antenna	EM	EM6917 / 103325	May, 2001

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

### 5.2. Test Setup



**5.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

**5.4. Limits**

► **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209(a) Limits</b>		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

**5.5. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30 )is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

## 5.6. Test Result of Radiated Emission

Product : Bluetooth USB Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 00

Freq.	Cable Loss	Probe Factor	PreAMP Reading	Emission Level	Margin	Limit	
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>							
<b>Peak Detector</b>							
4803.600	6.25	33.47	35.90	58.08	61.90	12.10	74.00
7205.340	8.28	36.19	34.90	42.91	52.49	21.51	74.00
9607.430	10.15	37.42	35.10	36.52	<48.99	25.01	74.00
12009.34	11.86	39.10	34.69	35.09	<51.36	22.64	74.00
<b>Average Detector</b>							
4803.680	6.25	33.47	35.90	46.69	50.51	3.49	54.00
7205.460	8.28	36.19	34.90	40.26	49.84	4.16	54.00
9607.360	10.15	37.42	35.10	29.52	<41.99	12.01	54.00
12008.95	11.86	39.10	34.69	24.20	<40.47	13.53	54.00
<b>Vertical</b>							
<b>Peak Detector</b>							
4803.680	6.25	33.47	35.90	59.03	62.85	11.15	74.00
7205.340	8.28	36.19	34.90	42.65	52.23	21.77	74.00
9607.090	10.15	37.42	35.10	37.89	<50.36	23.64	74.00
12009.38	11.86	39.10	34.69	36.25	<52.52	21.48	74.00
<b>Average Detector</b>							
4803.670	6.25	33.47	35.90	47.22	51.04	2.96	54.00
7205.460	8.28	36.19	34.90	39.22	48.80	5.20	54.00
9607.300	10.15	37.42	35.10	28.89	<41.36	12.64	54.00
12009.09	11.86	39.10	34.69	23.20	<39.47	14.53	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth USB Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 39

Freq.	Cable	Probe	PreAMP	Reading	Emission Margin Limit		
MHz	Loss	Factor	dB	Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal**
**Peak Detector**

4883.600	6.33	33.57	34.75	56.28	61.43	12.57	74.00
7325.320	8.40	36.34	34.90	44.65	54.49	19.51	74.00
9766.980	10.27	37.45	35.10	34.26	<46.88	27.12	74.00
12208.40	12.00	39.18	34.54	33.65	<50.29	23.71	74.00

**Average Detector**

4883.650	6.33	33.57	34.75	44.31	49.46	4.54	54.00
7325.480	8.40	36.34	34.90	40.58	50.42	3.58	54.00
9766.560	10.27	37.45	35.10	29.62	<42.24	11.76	54.00
12208.53	12.00	39.18	34.54	24.63	<41.27	12.73	54.00

**Vertical**
**Peak Detector**

4883.730	6.33	33.57	34.75	55.53	60.68	13.32	74.00
7325.270	8.40	36.34	34.90	41.35	51.19	22.81	74.00
9767.870	10.27	37.45	35.10	37.64	<50.26	23.74	74.00
12209.45	12.00	39.18	34.52	35.23	<51.89	22.11	74.00

**Average Detector**

4883.650	6.33	33.57	34.75	43.82	48.97	5.03	54.00
7325.530	8.40	36.34	34.90	37.23	47.07	6.93	54.00
9767.030	10.27	37.45	35.10	28.39	<41.01	12.99	54.00
12209.61	12.00	39.18	34.52	24.20	<40.86	13.14	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth USB Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Channel 78

Freq.	Cable	Probe	PreAMP	Reading	Emission Margin Limit		
MHz	Loss	Factor	dB	Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal**
**Peak Detector**

4961.700	6.40	33.66	34.72	52.83	58.17	15.83	74.00
7442.460	8.48	36.43	34.90	44.91	54.92	19.08	74.00
9923.040	10.38	37.48	35.10	38.03	<50.79	23.21	74.00
12404.80	12.14	39.26	34.37	34.52	<51.54	22.46	74.00

**Average Detector**

4961.670	6.40	33.66	34.72	41.24	46.58	7.42	54.00
7442.370	8.48	36.43	34.90	38.45	48.46	5.54	54.00
9923.400	10.38	37.48	35.10	28.84	<41.60	12.40	54.00
12404.72	12.14	39.26	34.37	28.98	<46.00	8.00	54.00

**Vertical**
**Peak Detector**

4961.640	6.40	33.66	34.72	52.31	57.65	16.35	74.00
7442.440	8.48	36.43	34.90	41.37	51.38	22.62	74.00
9923.490	10.38	37.48	35.10	35.26	<48.02	25.98	74.00
12403.30	12.14	39.26	34.37	34.64	<51.66	22.34	74.00

**Average Detector**

4961.600	6.40	33.66	34.72	40.69	46.03	7.97	54.00
7442.490	8.48	36.43	34.90	38.24	48.25	5.75	54.00
9922.520	10.38	37.48	35.10	29.65	<42.41	11.59	54.00
12403.12	12.14	39.26	34.37	24.26	<41.28	12.72	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth USB Dongle  
 Test Item : General Radiated Emission Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

Freq.	Cable	Probe	PreAMP	Reading	Emission Margin Limit		
MHz	Loss	Factor	dB	Level	Level		
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

**Horizontal:**

50.370	1.10	12.24	26.86	39.60	26.08	13.92	40.00
199.750	1.71	15.24	26.91	38.20	28.24	15.26	43.50
270.560	2.00	18.09	26.94	38.00	31.15	14.85	46.00
448.070	2.73	20.11	26.72	38.20	34.32	11.68	46.00
511.120	2.99	20.62	26.62	37.40	34.40	11.60	46.00
*569.320	3.23	21.77	26.53	38.60	37.08	8.92	46.00

**Vertical:**

*68.800	1.18	12.76	26.86	42.00	29.07	10.93	40.00
133.790	1.44	17.82	26.89	35.00	27.37	16.13	43.50
330.700	2.25	19.66	26.90	37.20	32.21	13.79	46.00
397.630	2.53	19.60	26.80	38.40	33.74	12.26	46.00
452.920	2.75	20.15	26.71	39.20	35.39	10.61	46.00
569.320	3.23	21.77	26.53	35.60	34.08	11.92	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable loss- Pre Amp.

## 6. Band Edge

### 6.1. Test Equipment

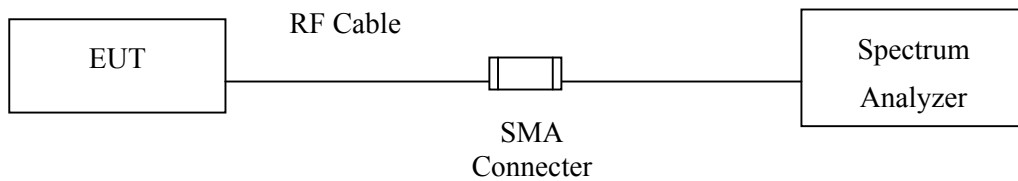
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2001
X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2001
X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2001
X	Pre-Amplifier	HP	8447D/3307A01812	May, 2001
X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2001
X	Horn Antenna	EM	EM6917 / 103325	May, 2001

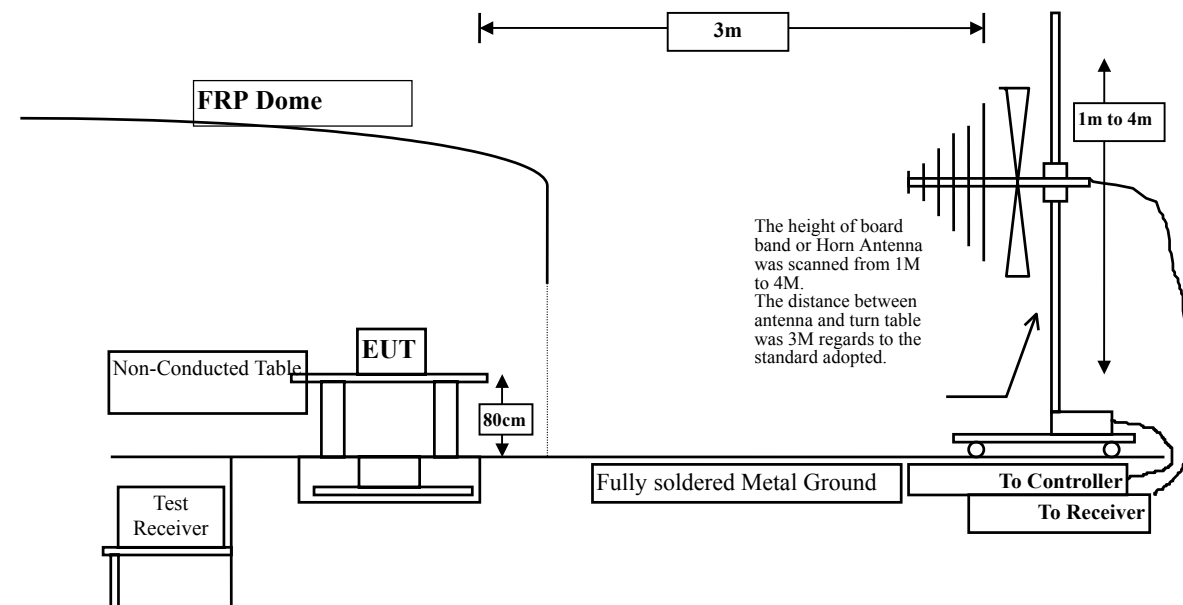
- Note: 1. All equipments that need to calibrate are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

### 6.2. Test Setup

#### RF Conducted Measurement:



#### RF Radiated Measurement:



### **6.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

### **6.4. Limit**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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)).



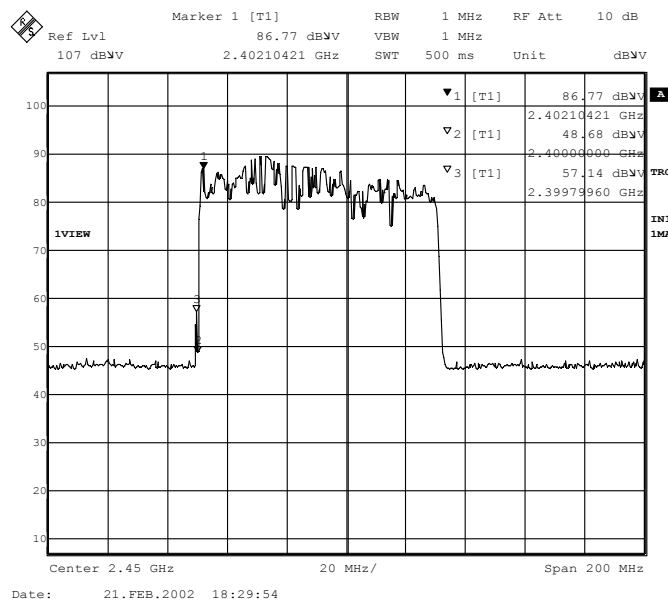
### 6.5. Test Result of Band Edge

Product : Bluetooth USB Dongle  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

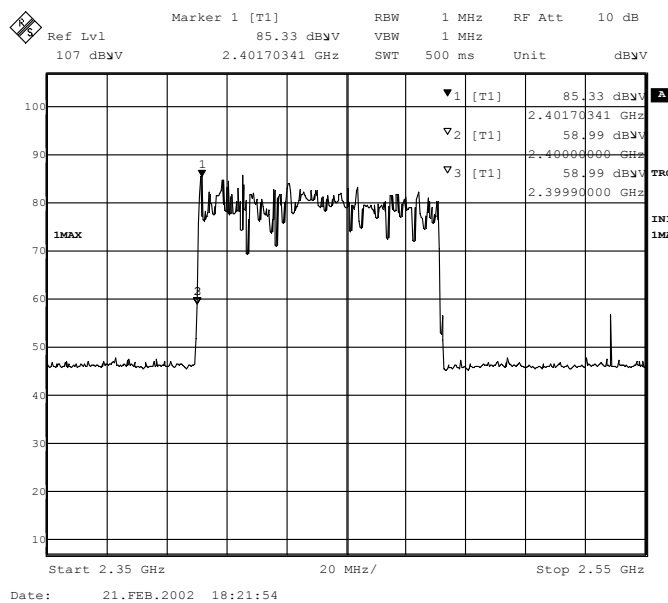
#### RF Radiated Measurement:

Polarization	Frequency (MHz)	Required Limit (dBc)	Result
Horizontal	<2400	>20	Pass
Vertical	<2400	>20	Pass

**Figure Channel 00:** (Horizontal)



**Figure Channel 00:** (Vertical)



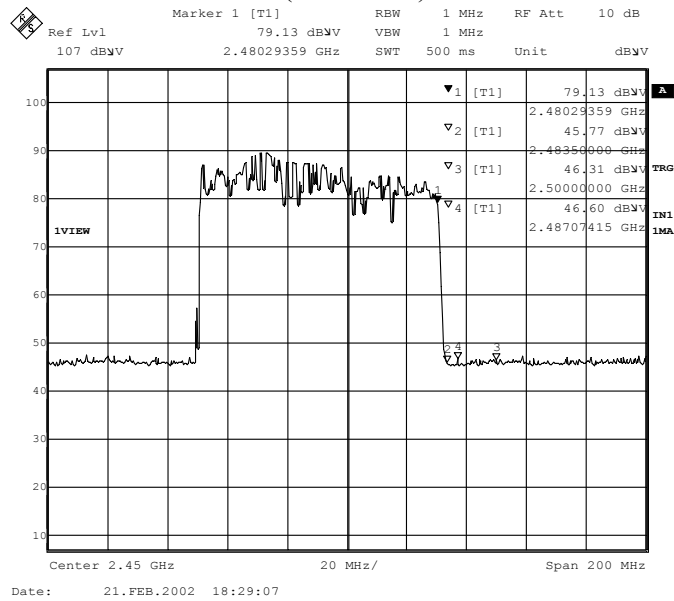
Product : Bluetooth USB Dongle  
 Test Item : Band Edge Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

**RF Radiated Measurement:**

Polarization	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
Horizontal	2487.070	46.60	45.29	54	Pass
Vertical	2488.276	47.20	45.89	54	Pass

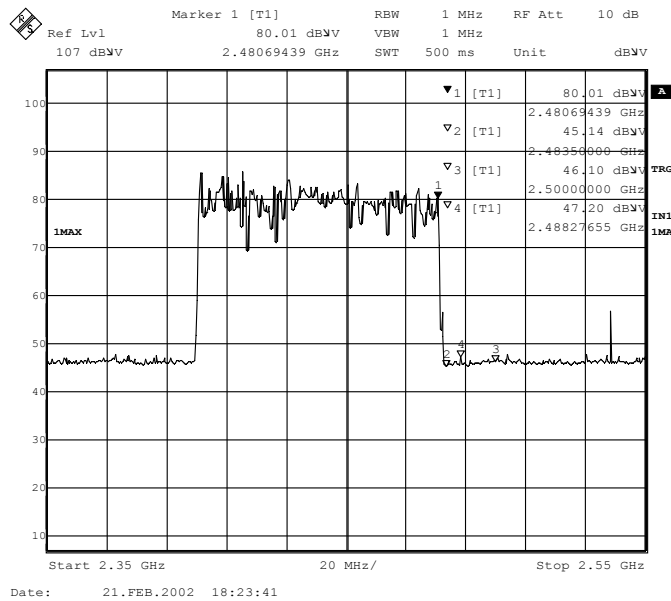
**Figure Channel 78:**

(Horizontal)



**Figure Channel 78:**

(Vertical)



## 7. Occupied Bandwidth

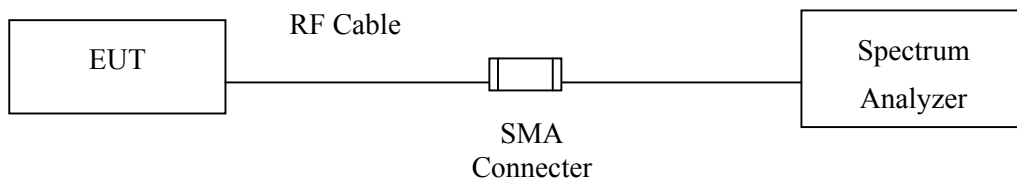
### 7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum	Advantest	R3272 / 72421194	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

### 7.2. Test Setup



### 7.3. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

### 7.4. Limit

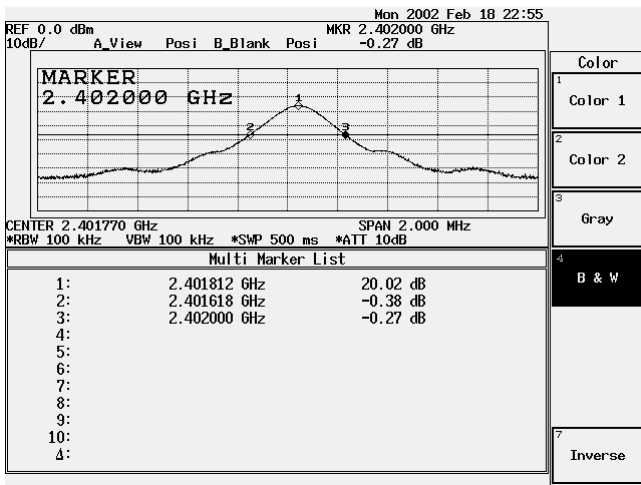
The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

### 7.5. Test Result of Occupied Bandwidth

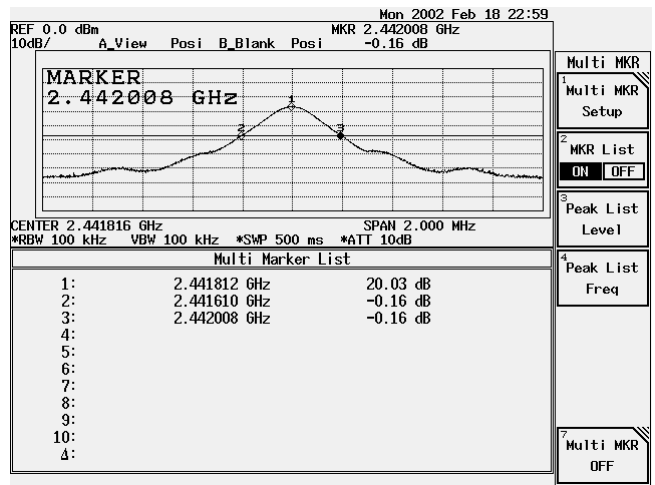
Product : Bluetooth USB Dongle  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (MHz)	Result
00	2402	382	<1	Pass
39	2442	398	<1	Pass
78	2481	392	<1	Pass

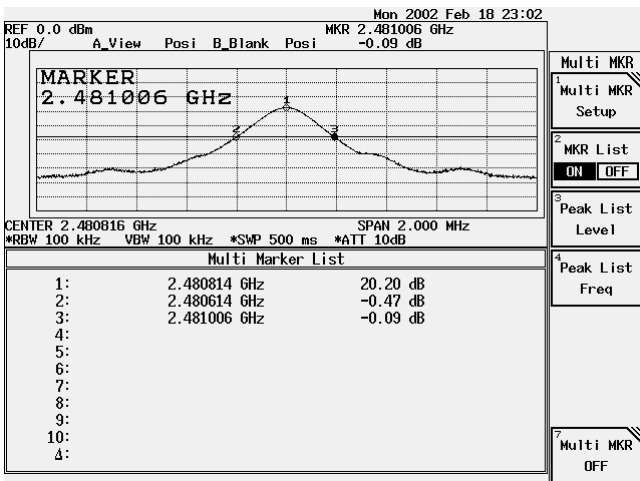
**Channel 00**



**Channel 39**



**Channel 78**



**8. Channel of Number**

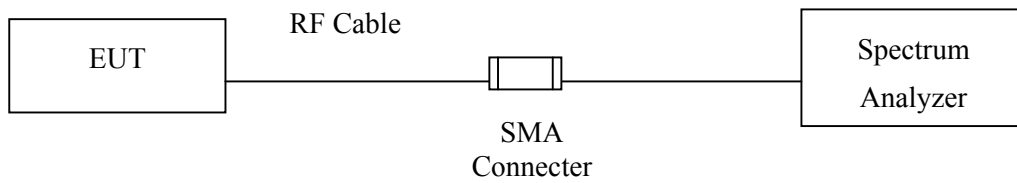
**8.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum	Advantest	R3272 / 72421194	May, 2001

- Note:
1. All equipment upon which need to calibrated are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

**8.2. Test Setup**



**8.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

**8.4. Limit**

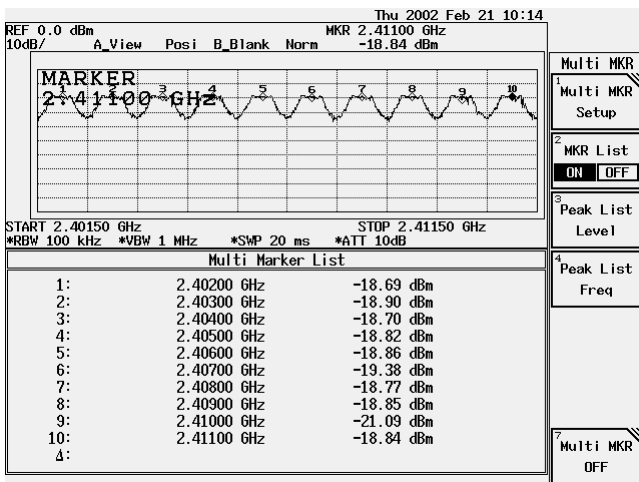
Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

### 8.5. Test Result of Channel Number

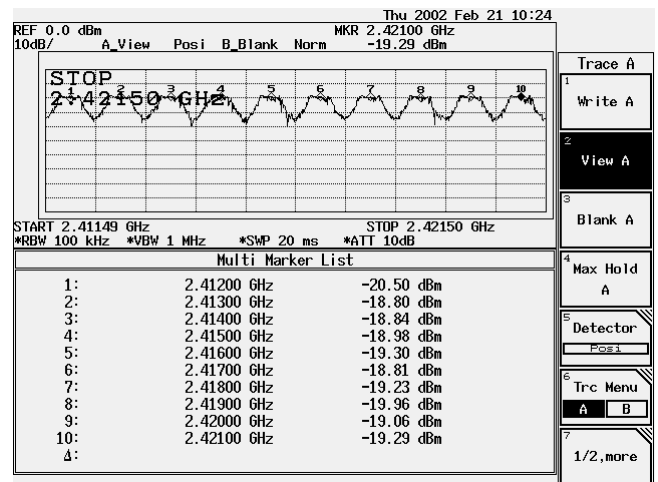
Product : Bluetooth USB Dongle  
 Test Item : Sweep of Channel Number  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

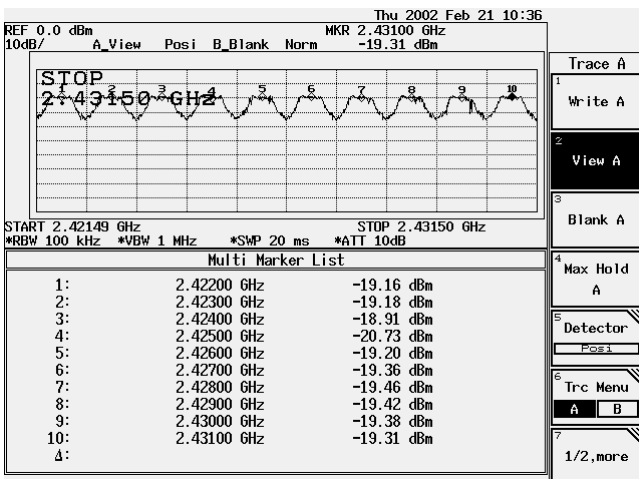
2402-2411MHz



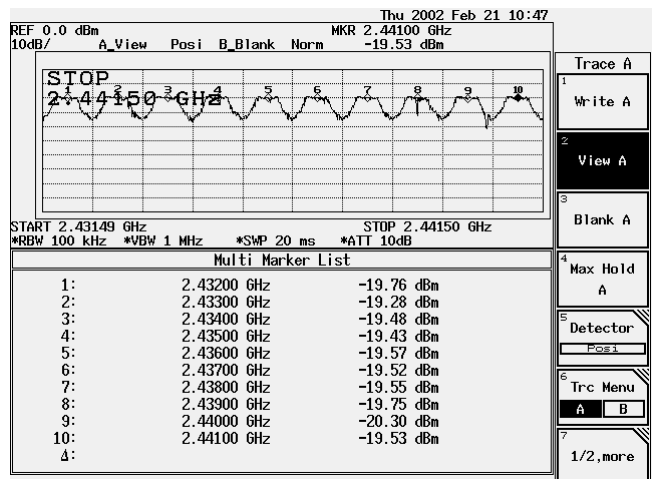
2412-2421MHz



2422-2431MHz

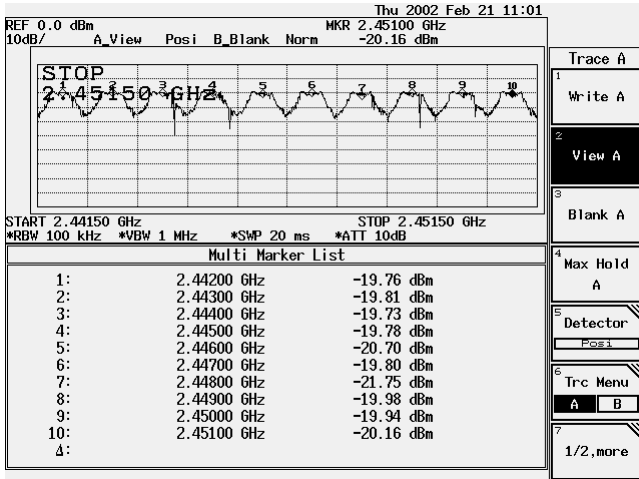


2432-2441MHz

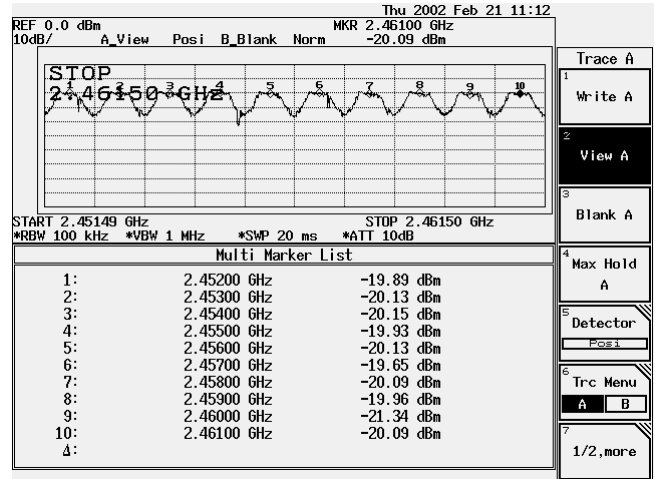


Product : Bluetooth USB Dongle  
 Test Item : Sweep of Channel Number  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

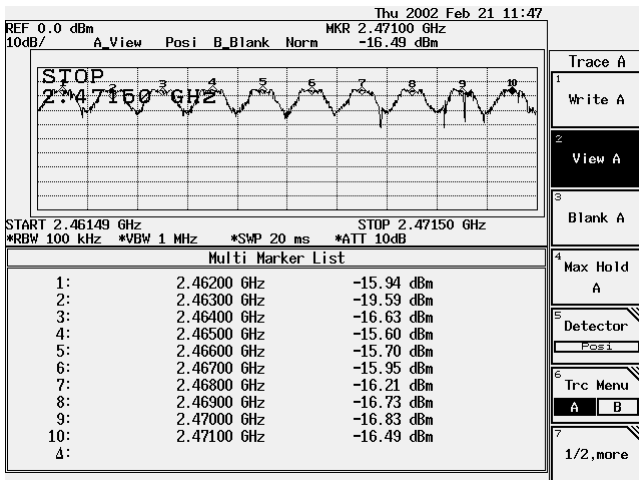
**2442-2451MHz**



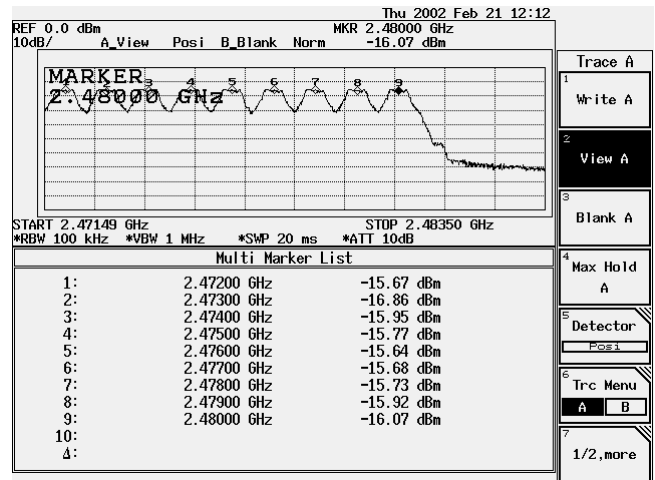
**2452-2461MHz**



**2462-2471MHz**



**2472-2480MHz**



**9. Channel Separation**

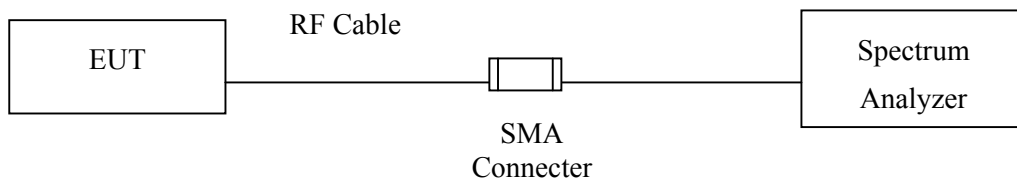
**9.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum	Advantest	R3272 / 72421194	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark “X” test instruments are used to measure the final test results.

**9.2. Test Setup**



**9.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

**9.4. Limit**

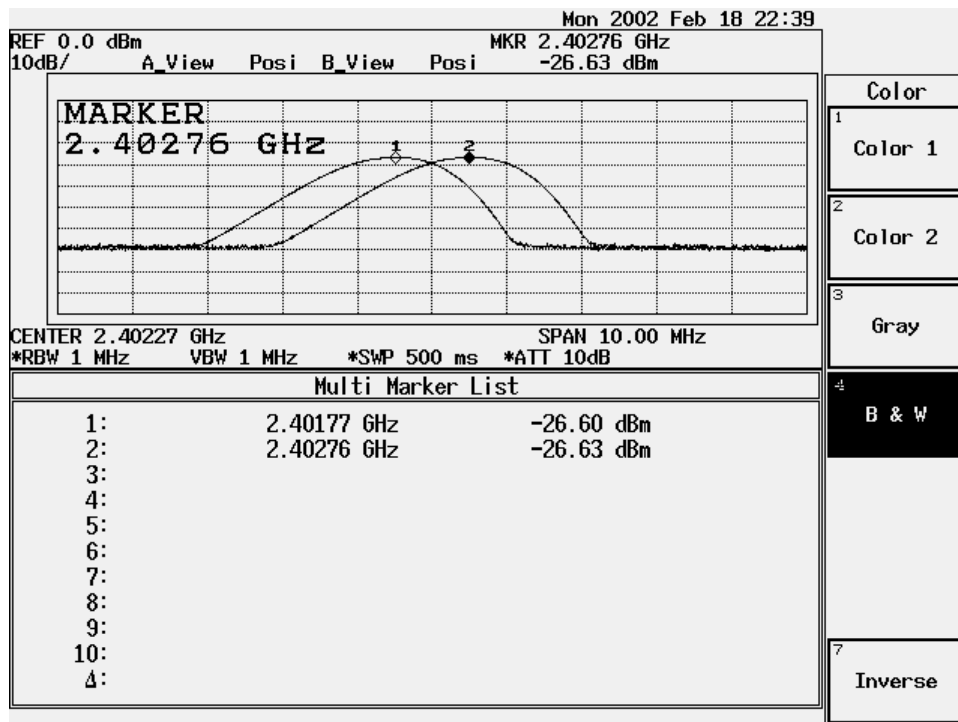
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.



### 9.5. Test Result of Channel Separation

Product : Bluetooth USB Dongle  
 Test Item : Channel Separation Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

Measurement Level (MHz)	Required Limit (kHz)	Result
0.99	>25	Pass



**10. Dwell Time**

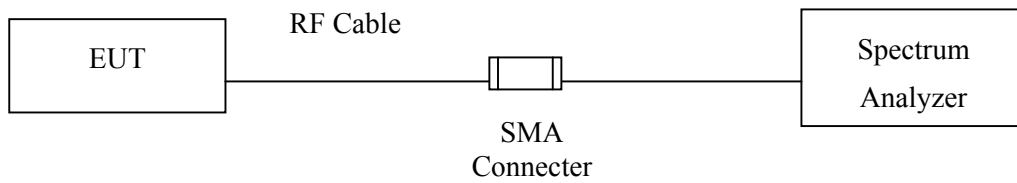
**10.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum	Advantest	R3272 / 72421194	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

**10.2. Test Setup**



**10.3. Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

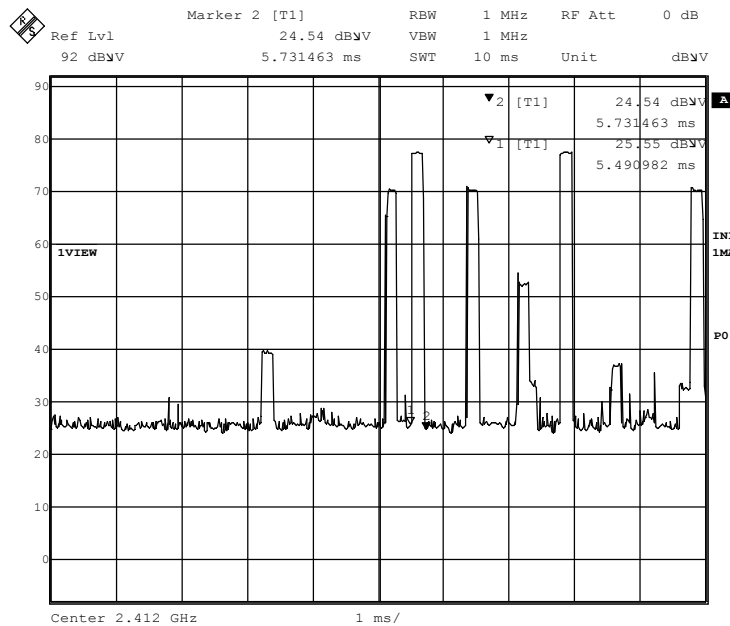
**10.4. Limit**

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

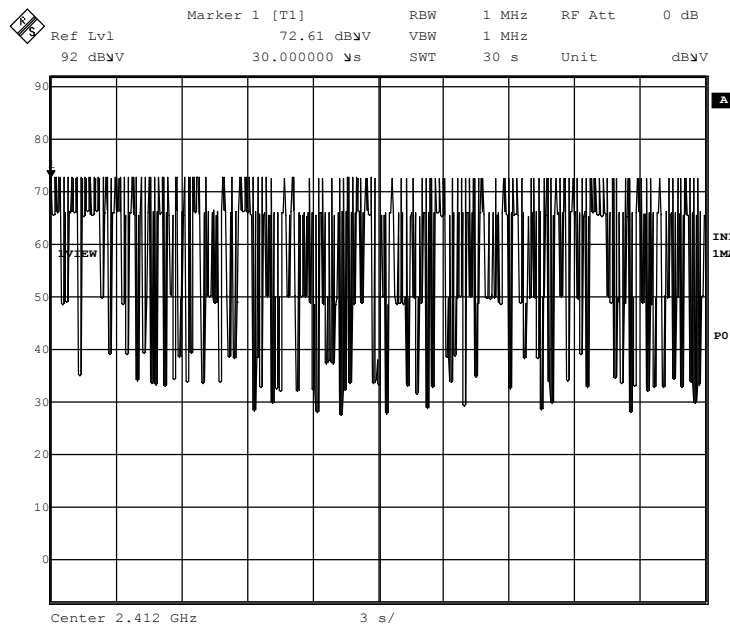
### 10.5. Test Result of Dwell Time

Product : Bluetooth USB Dongle  
 Test Item : Dwell Time Data  
 Test Site : No.1 OATS  
 Test Mode : Normal Operation

Measurement Level (ms)	Required Limit (Sec)	Result
0.24*118=28.32(ms)	<0.4 (sec)	Pass



Date: 27.FEB.2002 15:34:19



Date: 27.FEB.2002 15:35:54

## 11. EMI Reduction Method During Compliance Testing

No modification was made during testing.

## Attachment 1 : EUT Test Photographs

## Attachment 2 : EUT Detailed Photographs