



## Test Report

Product Name : BT-DH  
Model No. : MBT-H120  
FCC ID. : HWF-MBTH120

Applicant : Mustek Systems Inc.  
Address : No.25, R&D Road II, Science-Based Industrial  
Park, Hsin-Chu, Taiwan, R.O.C.

Date of Receipt : 2005/02/18  
Issued Date : 2005/03/03  
Report No. : 052H038-F-R02-T

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.

## Test Report Certification

Issued Date : 2005/03/03

Report No. : 052H038-F-R02-T



Product Name : BT-DH  
Applicant : Mustek Systems Inc.  
Address : No.25, R&D Road II, Science-Based Industrial Park,  
Hsin-Chu, Taiwan, R.O.C.  
Manufacturer : Mustek Systems Inc.  
Model No. : MBT-H120  
FCC ID. : HWF-MBTH120  
Rated Voltage : AC 120 V / 60 Hz  
EUT Voltage : Battery 3.6V  
Trade Name : Mustek  
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2003  
Test Result : Complied

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.

Documented By : Sandy chuang

( Sandy Chuang )

Tested By : Louis Hsu

( Louis Hsu )

Approved By : James C

( James Chang )

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**Reference : Laboratory of License**

## 1. General Information

### 1.1. EUT Description

Product Name	BT-DH
Trade Name	Mustek
Model No.	MBT-H120
FCC ID.	HWF-MBTH120
Frequency Range	2402~2480MHz
Channel Number	79
Type of Modulation	Frequency Hopping Spread Spectrum
Antenna Gain	-2dBi
Channel Control	Auto
Antenna Type	Soldered on PCB

Component	
Power Adapter	POTRANS, CP00541050U Cable Out: Non-Shielded, two ferrite cores bonded.

Working 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		

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 79 channels and over the minimum number of hopping channels (75 channels).

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Note:

1. This device is a 2.4GHz BT-DH included a 2.4GHz receiving function, and 2.4GHz transmitting function.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247.
3. Regards to the frequency band operation; the lowest , middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 052H038-F-R01-R under Declaration of Conformity.

**1.3. Test Mode**

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

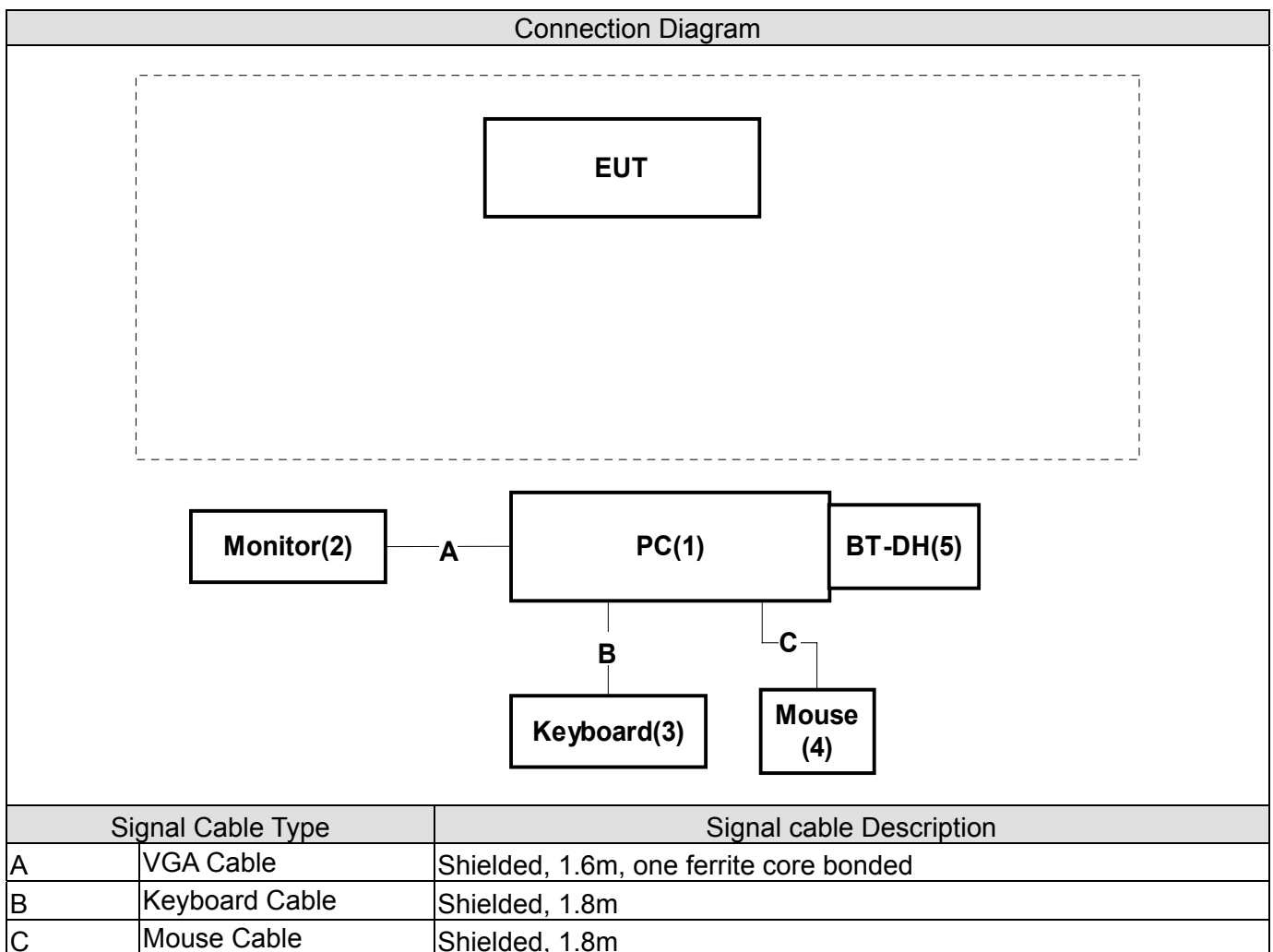
Pre-Test Mode	
EMI	Mode 1: Transmit
Final Test Mode	
TX	Mode 1: Transmit

**1.4. Tested System Details**

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

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	PC	COMPAQ	PD1100	SG30801014	DoC	Non-Shielded, 1.8m
2	Monitor	SAMPO	KM-522	S5110119ET00953	DoC	Non-Shielded, 1.8m
3	Keyboard	HP	SK-2502	M971237059	DoC	--
4	Mouse	IBM	M-SAU-IBM6	23-029334	DoC	--
5	BT-DH	Mustek	MBT-D120	N/A	HWF-MBTD120	--

**1.5. Configuration of tested System**





## 1.6. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.5.
2	Turn on the power of all equipment.
3	PC reads data from disk.
4	Data will be transmitting and receiving through EUT.
5	The transmitting and received status will be shown on the monitor.
6	Repeat the above procedure (4) to (5).

1.7. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Band Edge (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Channel Of Number (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Channel Separation (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Dwell Time (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Peak Power Output (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.247 Radiated Emission (FHSS)	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000

**Site Description:**

January 24, 2005 File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Registration Number: 365520



Accredited by CNLA  
Accreditation Number: 1313  
Effective through: September 27, 2007



1313

ILAC MRA

Accredited by NVLAP  
NVLAP Lab Code: 200347-0  
Effective through: September 30, 2005



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**

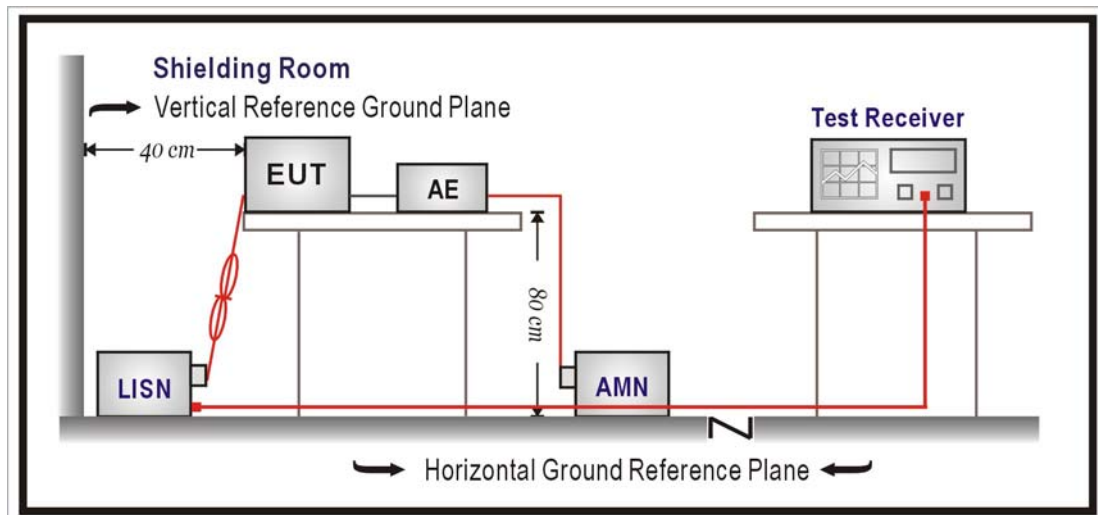
**2.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/018	Sep., 2004	
2	Artificial Mains Network	R & S	ENV4200/848411/10	Feb., 2005	Peripherals
3	LISN	R & S	ESH3-Z5/825562/002	Feb., 2005	EUT
4	Pulse Limiter	R & S	ESH3-Z2/357.8810.52	Feb., 2005	
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**

<b>FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)</b>		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

**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: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

**2.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.207: 2003

**2.6. Test Result**

Product	BT-DH		
Test Item	Conducted Emission		
Test Mode	Charge Mode		
Date of Test	2005/03/02	Test Site	No.2 Shielded Room

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level dBuV	Emission Level dBuV	Limits dBuV
=====					
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
*	0.181	0.10	0.10	47.45	47.65 64.43
	0.242	0.10	0.10	41.98	42.18 62.01
	0.362	0.10	0.10	35.67	35.87 58.68
	1.886	0.12	0.10	32.48	32.70 56.00
	3.839	0.15	0.19	22.26	22.60 56.00
	7.795	0.20	0.35	14.64	15.19 60.00
<b>Average</b>					
*	0.181	0.10	0.10	37.60	37.80 54.44
	0.242	0.10	0.10	32.40	32.60 52.03
	0.362	0.10	0.10	26.00	26.20 48.68
	1.886	0.12	0.10	25.50	25.72 46.00
	3.837	0.15	0.19	14.10	14.44 46.00
	7.795	0.20	0.35	6.50	7.05 50.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product	BT-DH		
Test Item	Conducted Emission		
Test Mode	Charge Mode		
Date of Test	2005/03/02	Test Site	No.2 Shielded Room

Frequency	Cable Loss	LISN Factor	Reading Level	Emission Level	Limits
MHz	dB	dB	dBuV	dBuV	dBuV
=====					
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.181	0.10	0.10	44.24	44.44	64.44
0.242	0.10	0.10	40.88	41.08	62.01
* 0.550	0.11	0.10	36.69	36.90	56.00
1.280	0.11	0.10	34.53	34.74	56.00
2.131	0.13	0.11	34.07	34.31	56.00
4.392	0.16	0.21	26.68	27.05	56.00
<b>Average</b>					
0.181	0.10	0.10	34.80	35.00	54.44
0.242	0.10	0.10	32.00	32.20	52.03
* 0.550	0.11	0.10	30.30	30.51	46.00
1.280	0.11	0.10	27.30	27.51	46.00
2.131	0.13	0.11	24.20	24.44	46.00
4.392	0.16	0.21	17.70	18.07	46.00

Note:

1. All Reading Levels are Quasi-Peak and Average value.
2. " \* ", means this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

**3. Peak Power Output**

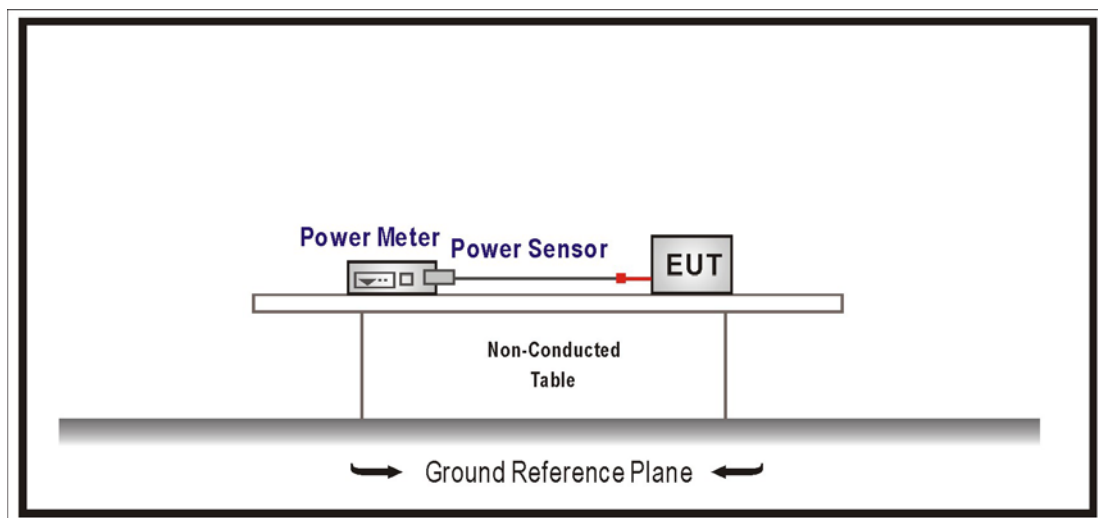
**3.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Power Meter	Agilent	E4416A / GB41291630	May, 2004
2	Power Sensor	Agilent	E9323A / US40411166	Apr., 2004
3	No.1 OATS			Sep., 2004

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

**3.2. Test Setup**



**3.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: 1 Watt for systems employing at least 50 hopping channels; and, 0.25 Watts for systems employing less than 50 hopping channels.

For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1Watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watt.

**3.4. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2003



**3.5. Test Result**

Product	BT-DH		
Test Item	Peak Power Output		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402.00	-1.09	1Watt = 30 dBm	Pass
39	2441.00	-1.03	1Watt= 30 dBm	Pass
78	2480.00	0.05	1Watt= 30 dBm	Pass

## 4. Radiated Emission

### 4.1. Test Equipment

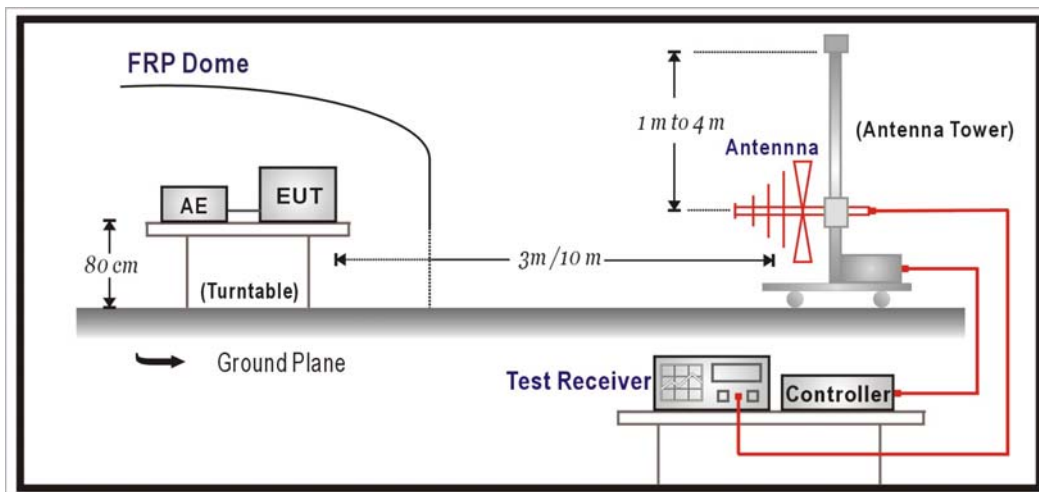
The following test equipment are used during the test:

Item		Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	X	Test Receiver	R & S	ESCS 30 / 825442/017	Jan., 2005
2	X	Spectrum Analyzer	Advantest	R3261C / 81720266	N/A
3	X	Pre-Amplifier	HP	8447D / 2944A09276	N/A
4	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2004
5	X	Spectrum Analyzer	R & S	FSP40 / 100005	Aug., 2004
6	X	Pre-Amplifier	HP	8449B / 3008A01123	Feb., 2005
7	X	Horn Antenna	Schwarzbeck	BBHA 9120D / BBHA9120D312	Jul., 2004
8		No.1 OATS			Sep., 2004

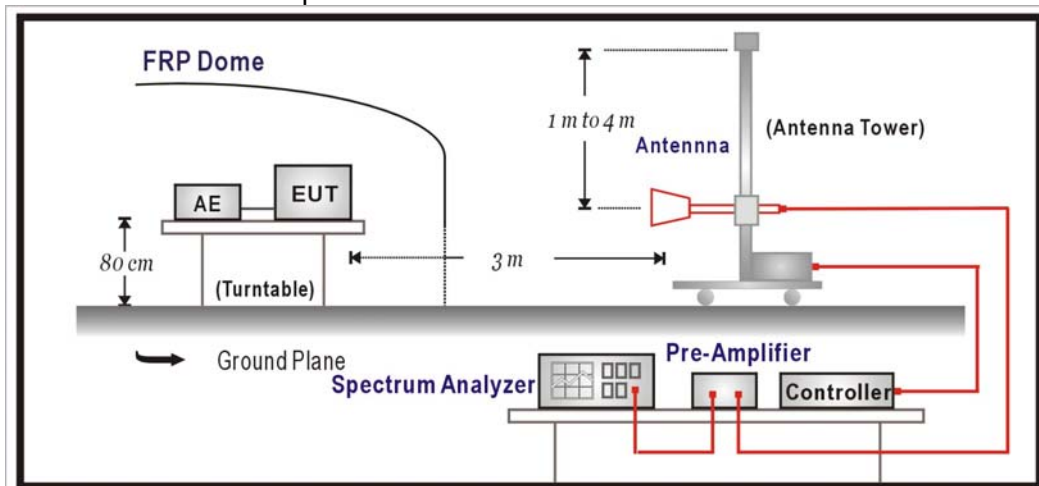
- Note: 1. All equipments that need to calibrate are with calibration period of 1 year.  
 2. Mark "X" test instruments are used to measure the final test results.

### 4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



**4.3. 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.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m	dBuV/m
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.

**4.4. 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 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 C63.4:2003 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

**4.5. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2003

**4.6. Test Result**

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 00

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

=====

**Horizontal**

**Peak**

4804.440	4.23	31.19	31.95	46.28	49.75	24.25	74.00
7206.020	5.61	35.88	32.71	35.73	44.51	29.49	74.00
9607.980	6.98	38.03	31.98	34.54	< 47.57	26.43	74.00
12010.02	8.37	38.62	31.36	32.90	< 48.52	25.48	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 00

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
------------------	---------------------	-------------------------	--------------	--------------------------	-----------------------------	--------------	-----------------

=====

**Vertical**

**Peak**

4803.700	4.23	31.19	31.95	46.56	50.03	23.97	74.00
7206.040	5.61	35.88	32.71	34.77	43.55	30.45	74.00
9608.020	6.98	38.03	31.98	33.87 <	46.90	27.10	74.00
12010.00	8.37	38.62	31.36	33.05 <	48.67	25.33	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 39

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

=====

**Horizontal**

**Peak**

4881.640	4.27	31.32	31.95	47.65	51.29	22.71	74.00
7323.000	5.68	36.12	32.58	36.03	45.25	28.75	74.00
9764.000	7.07	38.07	31.66	34.83	< 48.31	25.69	74.00
12205.00	8.48	38.50	31.20	33.60	< 49.37	24.63	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 39

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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=====

**Vertical**

**Peak**

4882.020	4.28	31.35	31.95	47.55	51.23	22.77	74.00
7323.000	5.68	36.12	32.58	35.04	44.26	29.74	74.00
9764.020	7.07	38.07	31.66	34.39	< 47.87	26.13	74.00
12205.00	8.48	38.50	31.20	33.02	< 48.79	25.21	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 78

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**

**Peak**

4960.060	4.32	31.47	31.96	47.34	51.18	22.82	74.00
7440.040	5.75	36.36	32.46	34.29	43.94	30.06	74.00
9920.020	7.16	38.11	31.34	33.71	< 47.64	26.36	74.00
12400.02	8.59	38.36	31.01	32.63	< 48.57	25.43	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.



Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 78

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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**Vertical**

**Peak**

4959.940	4.32	31.47	31.96	48.97	52.81	21.19	74.00
7440.040	5.75	36.36	32.46	36.12	45.77	28.23	74.00
9920.020	7.16	38.11	31.34	32.86	< 46.79	27.21	74.00
12400.02	8.59	38.36	31.01	32.35	< 48.29	25.71	74.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz.
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz.
4. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 00

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**

**Quasi-Peak**

336.240	0.79	17.26	22.60	35.50	30.94	15.06	46.00
495.600	1.02	20.85	22.60	40.11	39.38	6.62	46.00
562.110	1.12	22.18	22.60	37.25	37.95	8.05	46.00
* 628.630	1.22	23.50	22.60	41.50	43.62	2.38	46.00
760.270	1.41	24.38	22.60	34.63	37.82	8.18	46.00
893.300	1.61	25.22	22.60	31.05	35.28	10.72	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 00

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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=====

**Vertical**

**Quasi-Peak**

235.090	0.63	14.12	22.60	37.88	30.04	15.96	46.00
337.630	0.79	17.83	22.60	33.11	29.12	16.88	46.00
495.600	1.02	19.87	22.60	33.32	31.61	14.39	46.00
* 628.630	1.22	21.17	22.60	38.87	38.66	7.34	46.00
760.270	1.41	21.63	22.60	37.69	38.13	7.87	46.00
976.440	1.73	24.75	22.60	37.63	41.52	12.48	54.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " \* ", means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 39

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**

**Quasi-Peak**

235.090	0.63	10.64	22.60	35.52	24.20	21.80	46.00
344.560	0.80	17.14	22.60	34.61	29.95	16.05	46.00
495.600	1.02	20.85	22.60	38.51	37.78	8.22	46.00
* 630.010	1.22	23.54	22.60	40.59	42.75	3.25	46.00
760.270	1.41	24.38	22.60	35.23	38.42	7.58	46.00
893.300	1.61	25.22	22.60	32.45	36.68	9.32	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 39

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
=====							

**Vertical**

**Quasi-Peak**

230.930	0.63	14.00	22.60	34.75	26.78	19.22	46.00
344.560	0.80	17.78	22.60	33.45	29.42	16.58	46.00
495.600	1.02	19.87	22.60	32.32	30.61	15.39	46.00
* 628.630	1.22	21.17	22.60	37.67	37.46	8.54	46.00
760.270	1.41	21.63	22.60	36.89	37.33	8.67	46.00
904.390	1.63	23.68	22.60	31.94	34.65	11.35	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 78

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
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**Horizontal**

**Quasi-Peak**

341.790	0.79	17.18	22.60	34.72	30.10	15.90	46.00
495.600	1.02	20.85	22.60	37.71	36.98	9.02	46.00
562.110	1.12	22.18	22.60	37.05	37.75	8.25	46.00
* 630.010	1.22	23.54	22.60	41.19	43.35	2.65	46.00
760.270	1.41	24.38	22.60	34.83	38.02	7.98	46.00
905.770	1.63	25.30	22.60	31.75	36.08	9.92	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

Product	BT-DH		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel 78

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
=====							

**Vertical**

**Quasi-Peak**

111.760	0.45	18.32	22.60	29.60	25.77	17.73	43.50
343.170	0.80	17.78	22.60	33.66	29.64	16.36	46.00
495.600	1.02	19.87	22.60	32.32	30.61	15.39	46.00
628.630	1.22	21.17	22.60	37.87	37.66	8.34	46.00
760.270	1.41	21.63	22.60	36.69	37.13	8.87	46.00
* 826.790	1.51	24.35	22.60	35.02	38.29	7.71	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable Loss – PreAMP.

**5. Band Edge**

**5.1. Test Equipment**

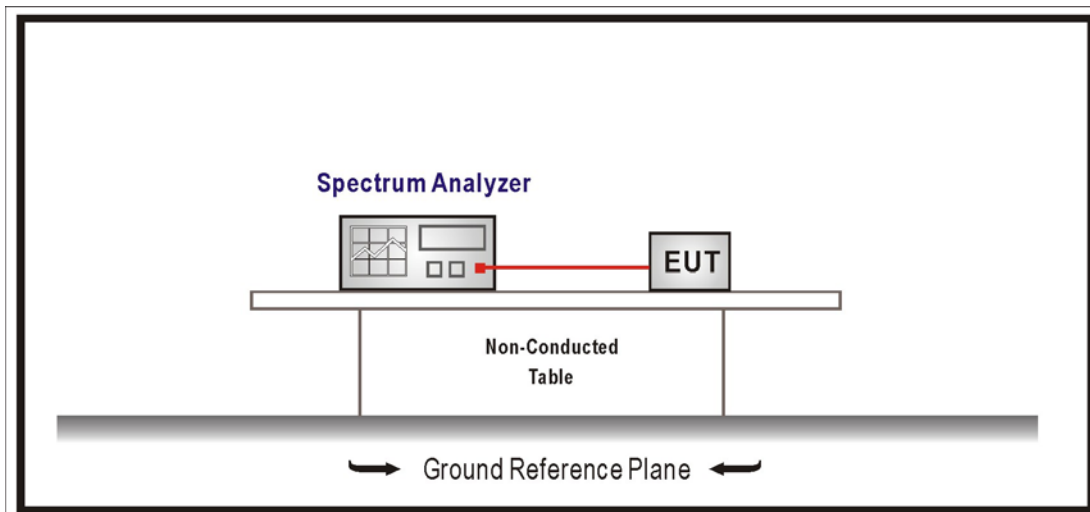
The following test equipment are used during the test:

RF Conducted Measurement:				
Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2005
2	No.1 OATS			Sep., 2004
RF Radiated Measurement:				
Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	X Spectrum Analyzer	R & S	FSP40 / 100005	Aug., 2004
2	X Pre-Amplifier	HP	8449B / 3008A01123	Feb., 2005
3	Loop Antenna	R & S	HFH2-Z2 / 833799/004	Sep., 2004
4	BiconiLog Antenna	Schwarzbeck	VULB 9166 / 1061	Sep., 2004
5	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2004
6	X Horn Antenna	Schwarzbeck	BBHA 9120D / BBHA9120D312	Sep., 2004
7	No.1 OATS			Sep., 2004

- 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.

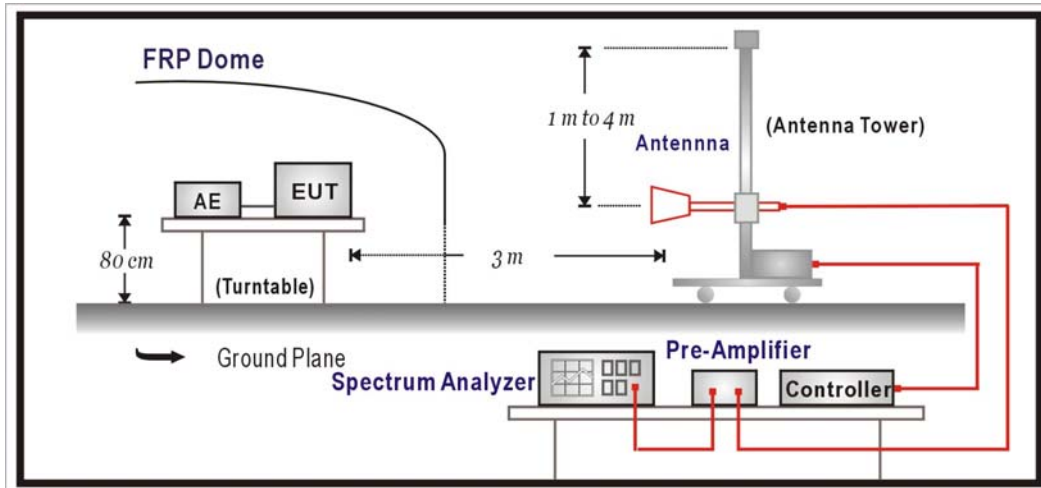
**5.2. Test Setup**

RF Conducted Measurement:





RF Radiated Measurement:



**5.3. Limits**

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)).

**5.4. 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 C63.4:2003 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

**5.5. Test Specification**

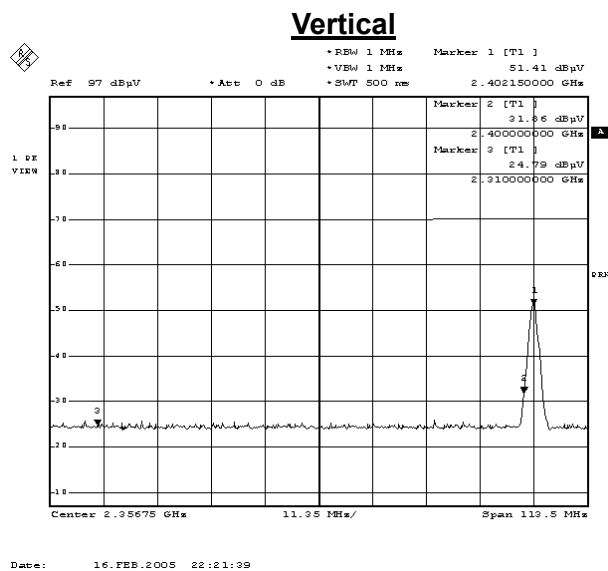
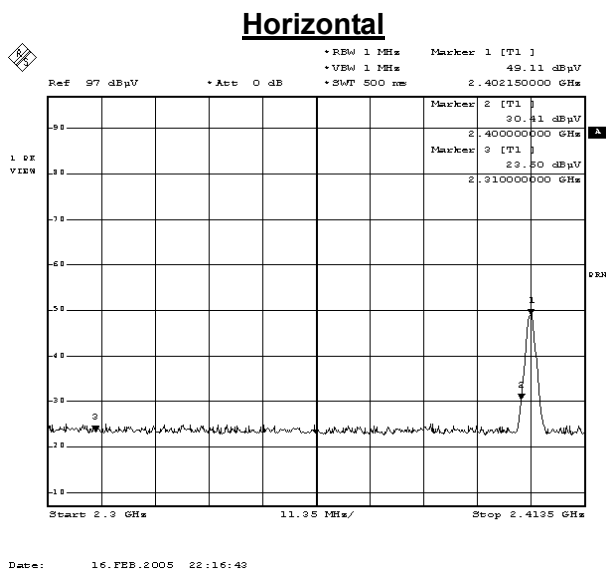
According to FCC Part 15 Subpart C Paragraph 15.247: 2003

## 5.6. Test Result

Product	BT-DH		
Test Item	Band Edge		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

### RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
00(Horizontal)	2400.000	30.41	27.27	2.86	00.00	60.54	74.00	Pass
00(Vertical)	2400.000	31.86	27.27	2.86	00.00	61.99	74.00	Pass



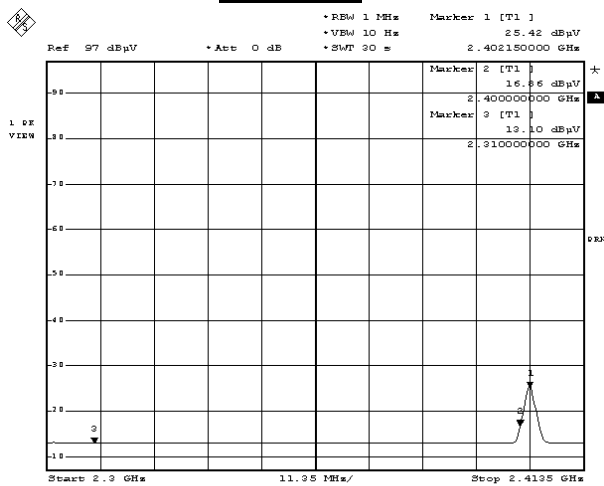
Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	BT-DH		
Test Item	Band Edge		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

### RF Radiated Measurement: (Average Detector)

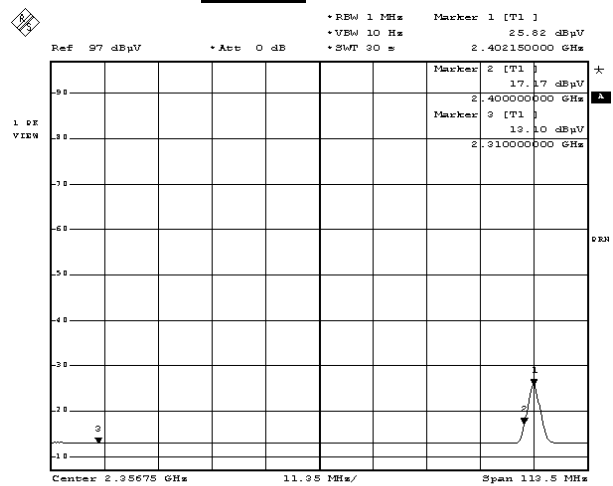
Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
00(Horizontal)	2400.000	16.86	27.27	2.86	00.00	46.99	54.00	Pass
00(Vertical)	2400.000	17.17	27.27	2.86	00.00	47.30	54.00	Pass

#### Horizontal



Date: 16.FEB.2005 22:18:19

#### Vertical



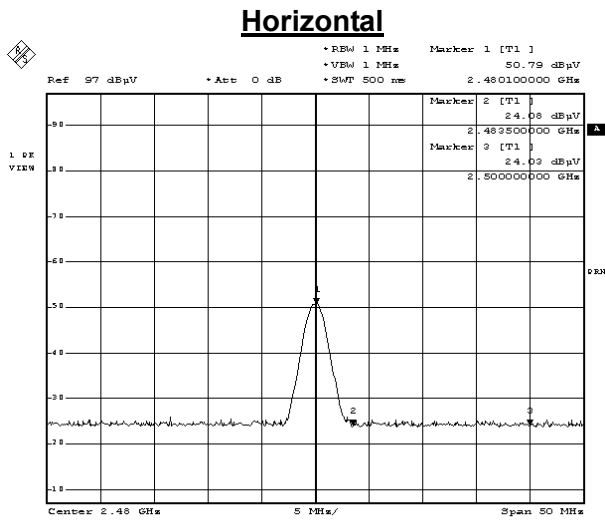
Date: 16.FEB.2005 22:24:41

Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

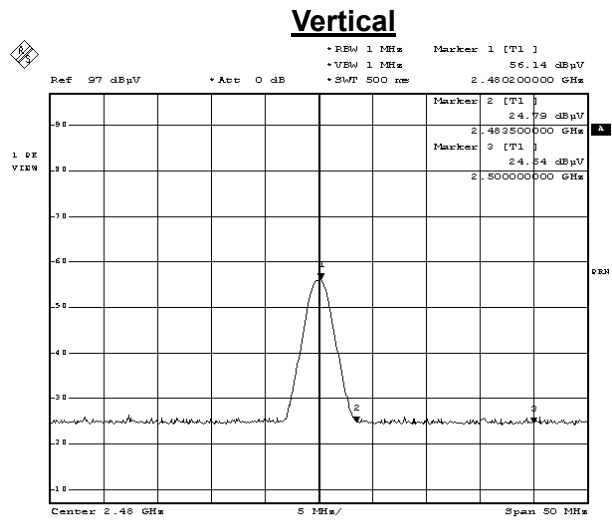
Product	BT-DH		
Test Item	Band Edge		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

### RF Radiated Measurement: (Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
78(Horizontal)	2483.500	24.08	27.58	2.91	00.00	54.57	74.00	Pass
78(Vertical)	2483.500	24.79	27.58	2.91	00.00	55.28	74.00	Pass



Date: 16.FEB.2005 22:35:40



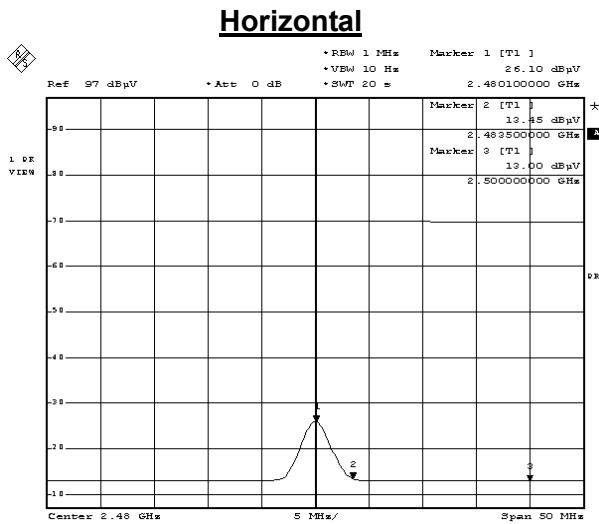
Date: 17.FEB.2005 09:17:55

Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

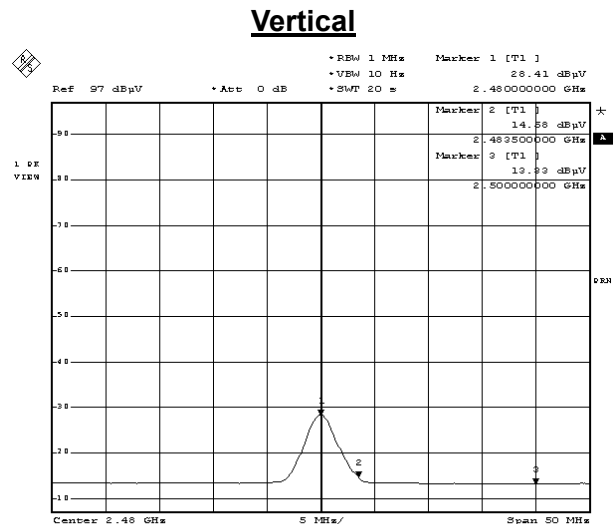
Product	BT-DH		
Test Item	Band Edge		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

### RF Radiated Measurement: (Average Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	PreAMP (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
78(Horizontal)	2483.500	13.45	27.58	2.91	00.00	43.94	54.00	Pass
78(Vertical)	2483.500	14.58	27.58	2.91	00.00	45.07	54.00	Pass



Date: 16.FEB.2005 22:36:52



Date: 17.FEB.2005 09:19:00

Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

**6. Channel of Number**

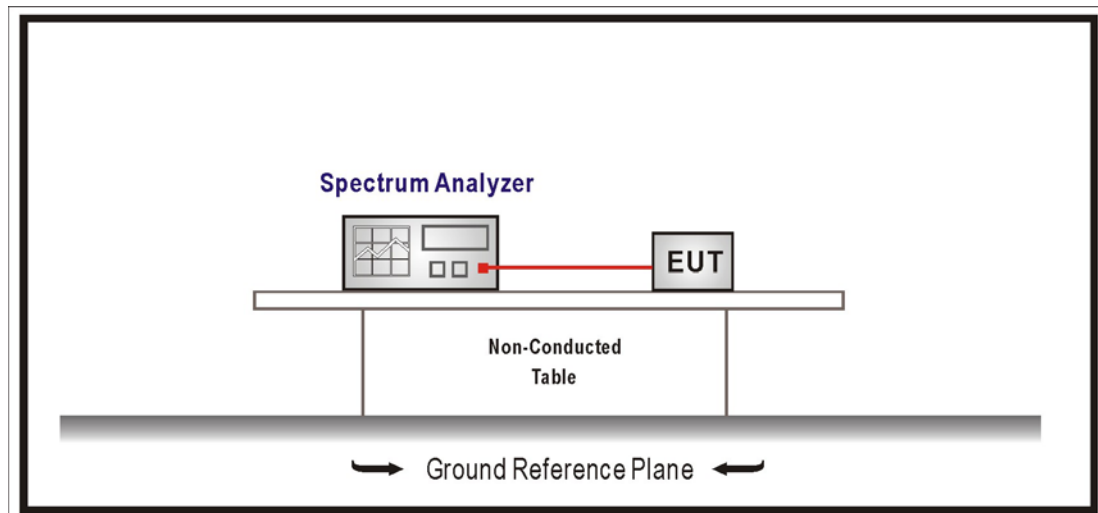
**6.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2005
2	No.1 OATS			Sep., 2004

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

**6.2. Test Setup**



**6.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 2400-2483.5 MHz bands, which use fewer than 75 hopping frequencies, may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

**6.4. Test Specification**

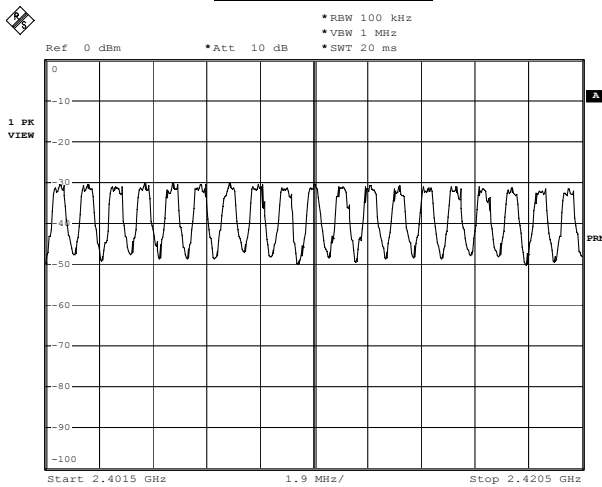
According to FCC Part 15 Subpart C Paragraph 15.247: 2003

## 6.5. Test Result

Product	BT-DH		
Test Item	Channel of Number		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

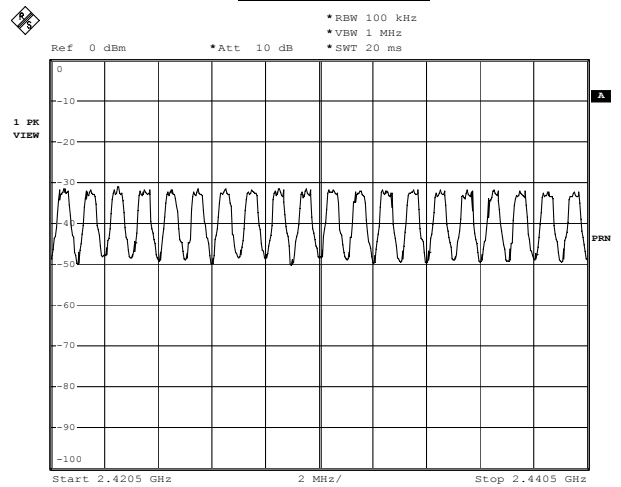
Frequency Range (MHz)	Measure Level (Hopping Channel)	Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

### 2402-2420MHz



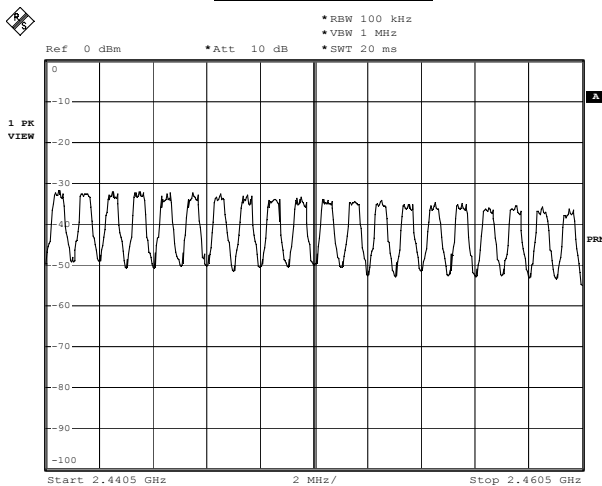
Date: 15.FEB.2005 13:42:26

### 2421-2440Hz



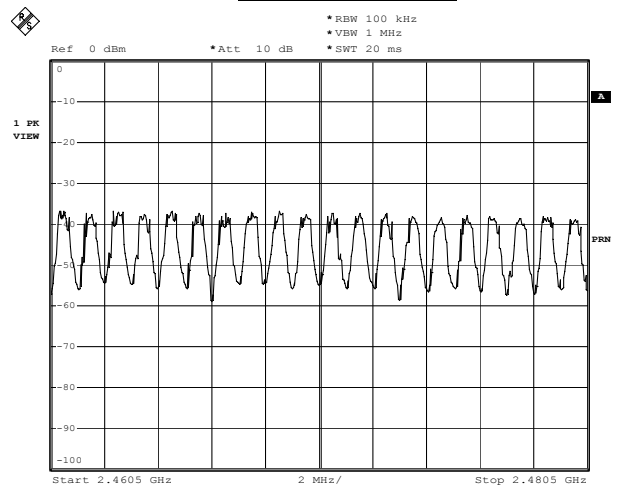
Date: 15.FEB.2005 13:50:51

### 2441-2460MHz



Date: 15.FEB.2005 14:09:48

### 2461-2480MHz



Date: 15.FEB.2005 14:13:21

**7. Channel Separation**

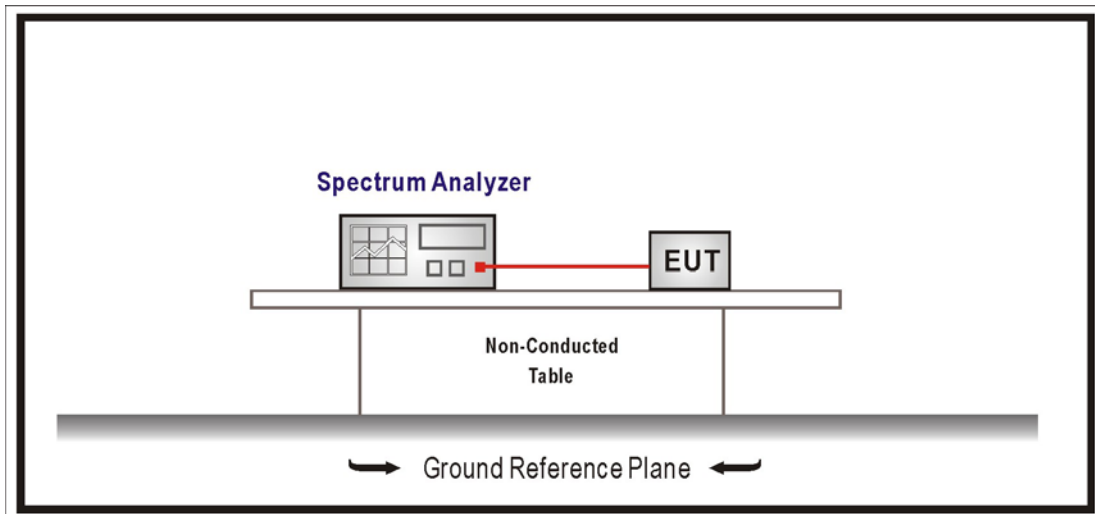
**7.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2005
2	No.1 OATS			Sep., 2004

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

**7.2. Test Setup**



**7.3. Limits**

For 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.

**7.4. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.247: 2003

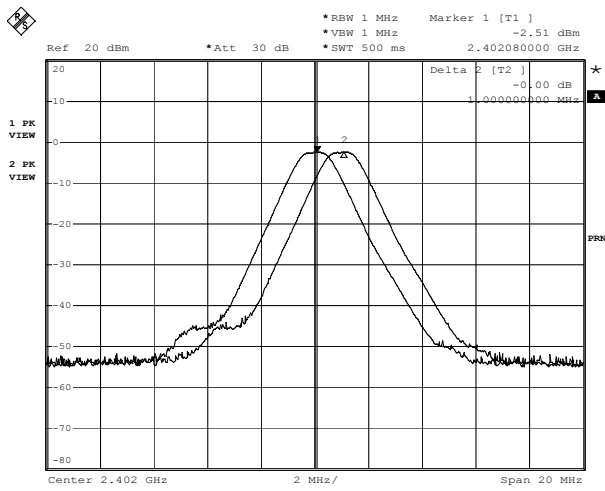


## 7.5. Test Result

Product	BT-DH		
Test Item	Channel Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

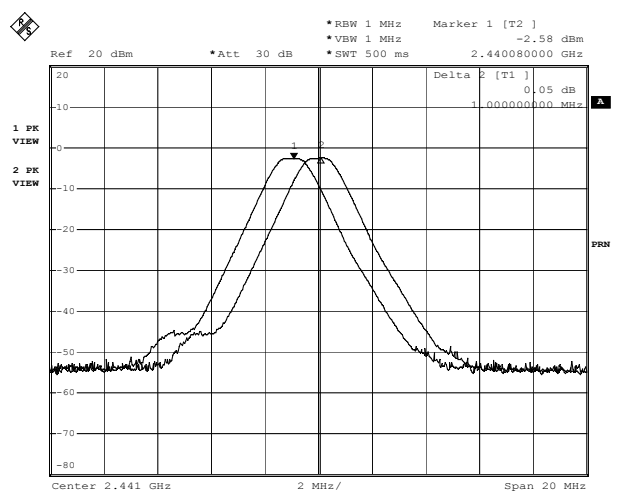
Channel No.	Frequency (MHz)	Measure Level (kHz)	Limit (kHz)	Result
00	2402.00	1000	>25	Pass
39	2441.00	1000	>25	Pass
78	2480.00	1000	>25	Pass

**Channel 00**



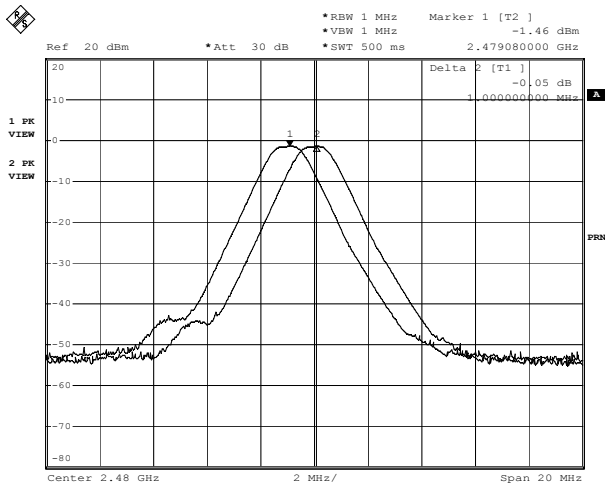
Date: 14.FEB.2005 14:42:16

**Channel 39**



Date: 14.FEB.2005 14:39:59

**Channel 78**



Date: 14.FEB.2005 14:36:41

**8. Occupied Bandwidth**

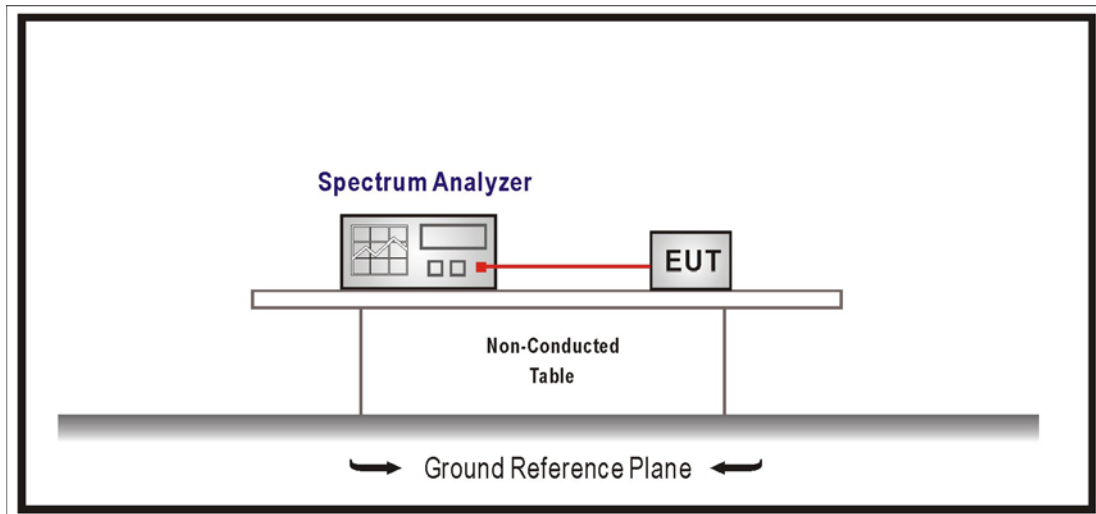
**8.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2005
2	No.1 OATS			Sep., 2004

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

**8.2. Test Setup**



**8.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 5725-5850 MHz bands. The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

For 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.

**8.4. Test Specification**

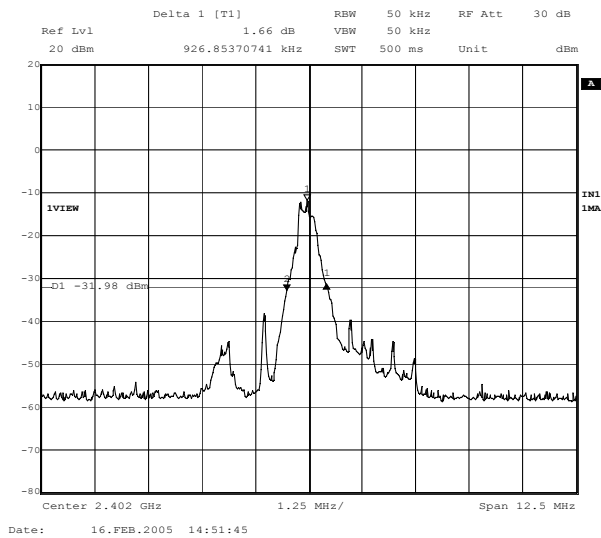
According to FCC Part 15 Subpart C Paragraph 15.247: 2003

## 8.5. Test Result

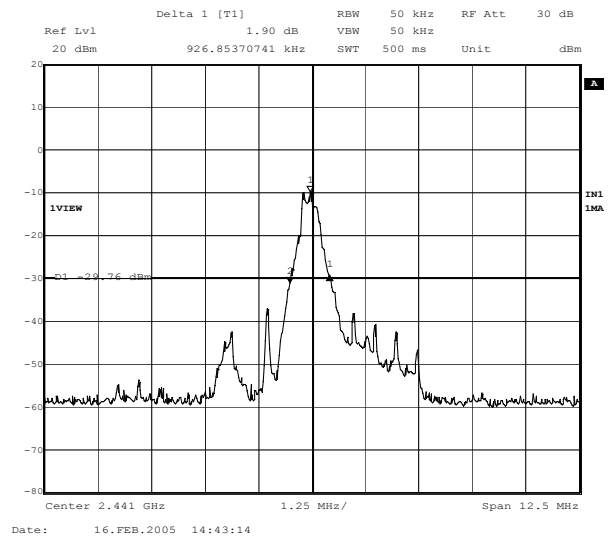
Product	BT-DH		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

Channel No.	Frequency (MHz)	Measure Level (MHz)
00	2402	0.926854
39	2441	0.926854
78	2480	0.926854

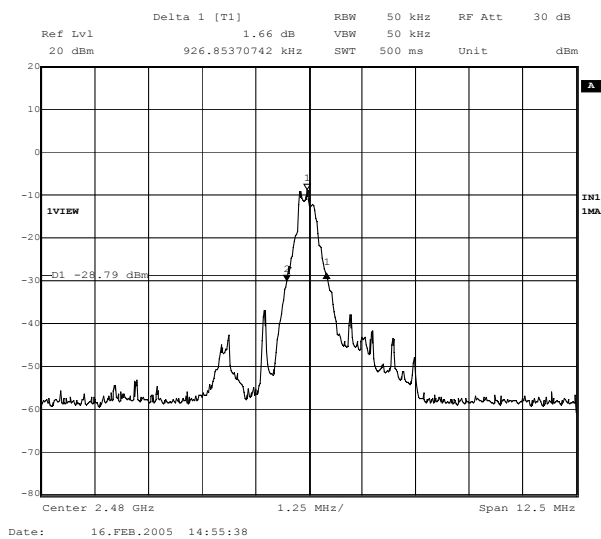
### Channel 00



### Channel 39



### Channel 78



**9. Dwell Time**

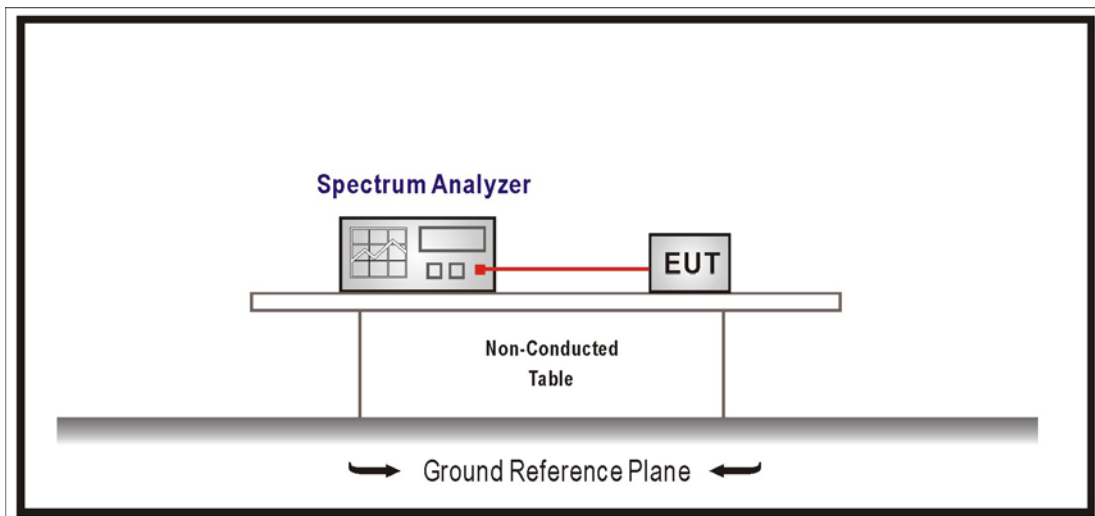
**9.1. Test Equipment**

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	R & S	FSP / 100561	Mar., 2005
2	No.1 OATS			Sep., 2004

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

**9.2. Test Setup**



**9.3. Limits**

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. For frequency hopping systems operating in the 2400-2483.5 MHz bands. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

For frequency hopping systems operating in the 5725-5850 MHz bands. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

**9.4. Test Specification**

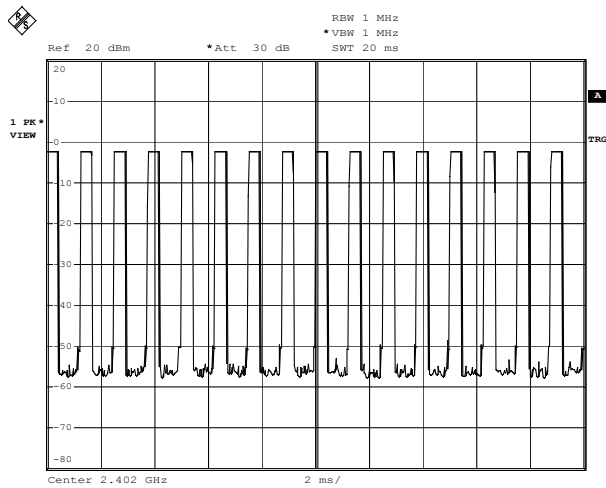
According to FCC Part 15 Subpart C Paragraph 15.247: 2003

9.5. Test Result

Product	BT-DH		
Test Item	Dwell Time		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

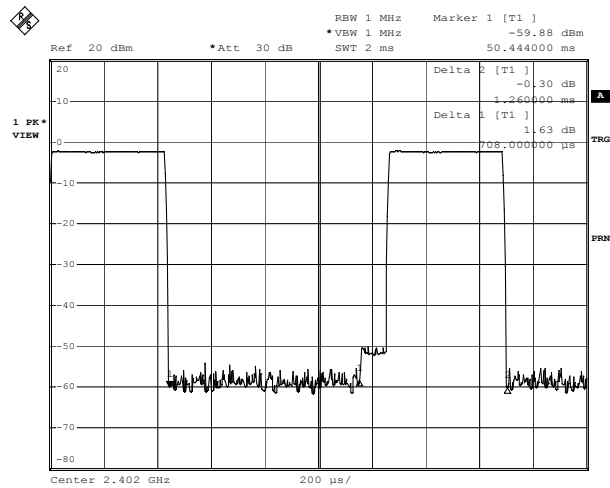
Channel No.	Frequency (MHz)	Measure Level (sec)	Limit (sec)	Result
00	2402.00	Period = 0.4(sec) * 79(number of channel) = 31.6(sec) Hop rate = 16 / 20(ms) = 800/sec Time slot length = 0.000552(sec) Dwell Time = 0.00552 * 800 / 79 * 31.6 = 0.177(sec)	<0.4	Pass

**Hop rate**



Date: 15.FEB.2005 17:24:18

**Time slot length**



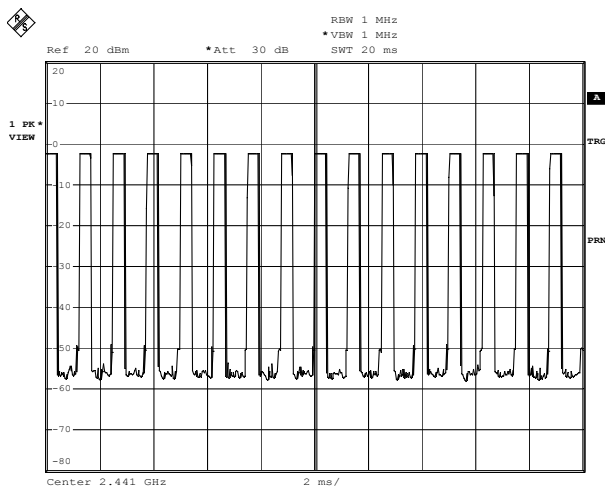
Date: 15.FEB.2005 17:42:40

Note: Dwell time = time slot length \* hop rate / number of hopping channels \* period

Product	BT-DH		
Test Item	Dwell Time		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

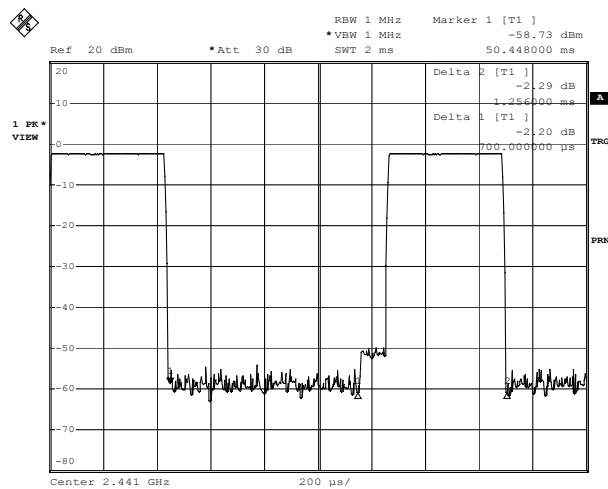
Channel No.	Frequency (MHz)	Measure Level (sec)	Limit (sec)	Result
39	2441.00	Period = 0.4(sec) * 79(number of channel) = 31.6(sec) Hop rate = 16 / 20(ms) = 800/sec Time slot length = 0.000556(sec) Dwell Time = 0.000556 * 800 / 79 * 31.6 = 0.178(sec)	<0.4	Pass

### Hop rate



Date: 15.FEB.2005 17:22:54

### Time slot length



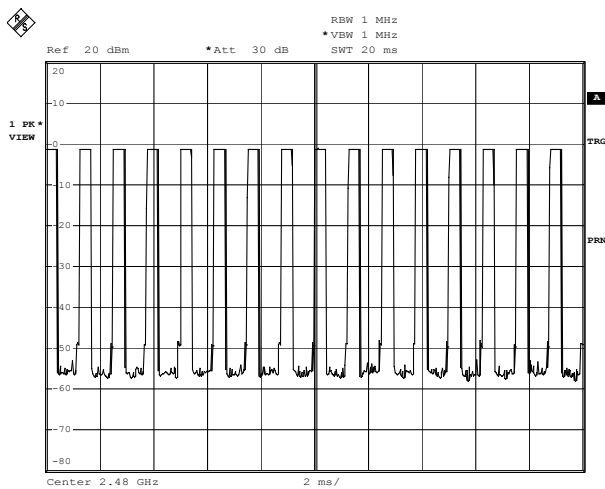
Date: 15.FEB.2005 17:41:30

Note: Dwell time = time slot length \* hop rate / number of hopping channels \* period

Product	BT-DH		
Test Item	Dwell Time		
Test Mode	Mode 1: Transmit		
Date of Test	2005/03/02	Test Site	No.1 OATS

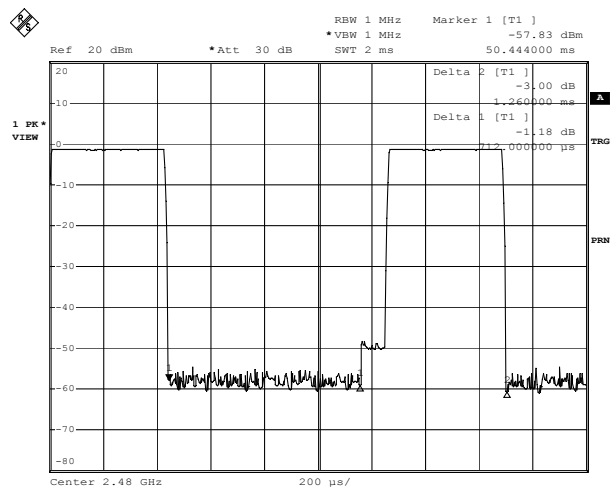
Channel No.	Frequency (MHz)	Measure Level (sec)	Limit (sec)	Result
78	2480.00	Period = 0.4(sec) * 79(number of channel) = 31.6(sec) Hop rate = 16 / 20(ms) = 800/sec Time slot length = 0.000548(sec) Dwell Time = 0.000548 * 800 / 79 * 31.6 = 0.175(sec)	<0.4	Pass

### Hop rate



Date: 15.FEB.2005 17:25:53

### Time slot length



Date: 15.FEB.2005 17:39:28

Note: Dwell time = time slot length \* hop rate / number of hopping channels \* period