

FC

Test Report

Product Name	Bluetooth GPS
Model No.	iGPS-BT II
FCC ID.	Q7M-IGPS-BTII

Applicant	Pharos Science & Applications, Inc.
Address	411 Amapola Avenue, Torrance, CA90501, U.S.A.

Date of Receipt	May 18, 2006
Issued Date	June 06, 2006
Report No.	065L117-RF-US-P06V01

The Test Results relate only to the samples tested.

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

Test Report Certification

Issued Date: June 06, 2006

Report No.: 065L117-RF-US-P06V01



Product Name	Bluetooth GPS
Applicant	Pharos Science & Applications, Inc.
Address	411 Amapola Avenue, Torrance, CA90501, U.S.A.
Manufacturer	LOGITECH ELECTRONICS(CHINA) LTD.
Model No.	iGPS-BT II
FCC ID.	Q7M-IGPS-BTII
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 5V
Trade Name	PHAROS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2005 ANSI C63.4: 2003 CISPR 22: 2005
Test Result	Complied



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Bluetooth GPS
Trade Name	PHAROS
FCC ID.	Q7M-IGPS-BTII
Model No.	iGPS-BT II
Frequency Range	2402 - 2480MHz
Channel Number	79
Type of Modulation	Frequency Hopping Spread Spectrum
Antenna type	Chip Antenna
Channel Control	Auto
Antenna Gain	1dBi
USB Cable	Non-Shielded, 0.8m
Plug Connection	2 Set

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 Bluetooth GPS with a built-in 2.4GHz transceiver.
2. The iGPS-BT II is composed of iGPS-500 (500-1000-0X) and BT-Dock II (501-1000-0X).
3. 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.
4. 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.
5. Quietek verified among construction and function in typical operation, then shown in this test report.

1.2. Operational Description

The EUT is a Bluetooth GPS with a built-in 2.4GHz transceiver. The signals are modulated by frequency hopping spread spectrum technology over 79 channels.

This device provides wireless technology that revolutionizes personal connectivity. It is the solution for the seamless integration of Bluetooth technology into personal computer enabling short-range wireless connections between desktop/laptop computers, Bluetooth-enabled peripherals, and portable handheld devices.

Test Mode	Mode 1: Transmitter
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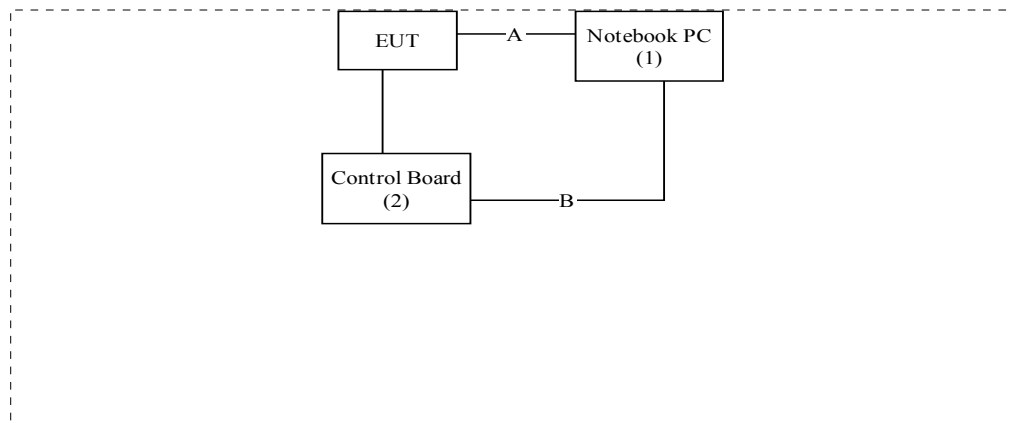
1.3. Tested System Details

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.	FCC ID	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	DoC	Non-Shielded, 0.8m
(2)	Control Board	Kinpo	N/A	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A. USB Cable	Non-Shielded, 0.8m
B. Modem Cable	Non-Shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute the BlueTest program (v1.2.1) on the notebook.
- (3) Configure the test channel, the power level, and the packet length=DH5.
- (4) Press OK to start the continuous transmission.
- (5) Verify that the EUT works properly.

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	30-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: June 22, 2001 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2



July 03, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200533-0



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2. Conducted Emission

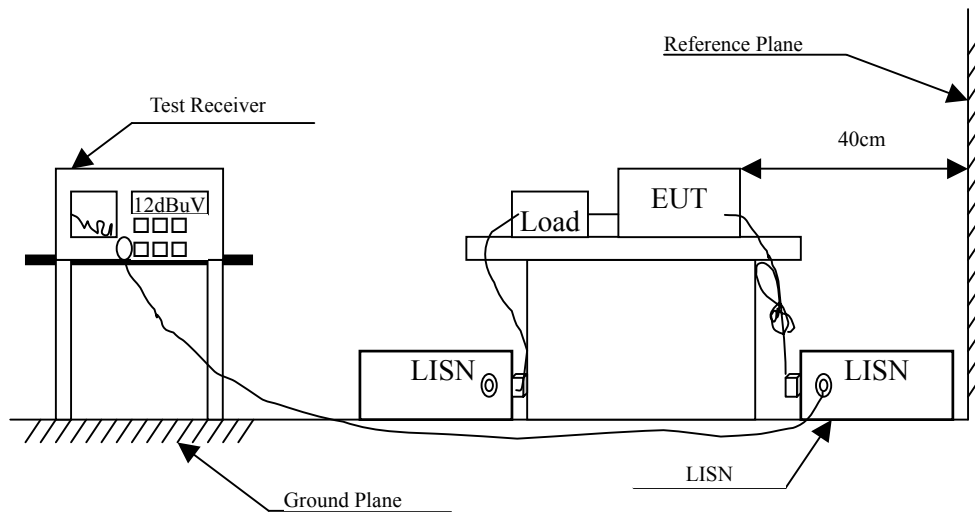
2.1. Test Equipment

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

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	EMI Test Receiver	R&S	ESCS 30/100367	Aug, 2005	
2	LISN	R&S	ESH3-Z5/836679/023	July, 2005	EUT
3	LISN	R&S	ESH3-Z5/836679/017	Feb, 2006	Peripherals
4	Pulse Limiter	R&S	ESH3-Z2/357.8810.52	Sep, 2005	
5	No.7 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	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. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Bluetooth GPS
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Quasi-Peak					
0.170	0.621	49.500	50.121	-15.308	65.429
0.185	0.753	40.660	41.413	-23.587	65.000
0.224	0.478	43.740	44.218	-19.668	63.886
0.284	0.300	34.840	35.140	-27.031	62.171
0.324	0.300	32.100	32.400	-28.629	61.029
1.623	0.330	34.850	35.180	-20.820	56.000
Average					
0.170	0.621	37.610	38.231	-17.198	55.429
0.185	0.753	20.280	21.033	-33.967	55.000
0.224	0.478	32.660	33.138	-20.748	53.886
0.284	0.300	21.220	21.520	-30.651	52.171
0.324	0.300	22.020	22.320	-28.709	51.029
1.623	0.330	27.760	28.090	-17.910	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Bluetooth GPS
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Quasi-Peak					
0.170	0.300	48.630	48.930	-16.499	65.429
0.210	0.300	41.920	42.220	-22.066	64.286
0.240	0.300	38.850	39.150	-24.279	63.429
0.270	0.300	34.420	34.720	-27.851	62.571
0.340	0.303	32.020	32.323	-28.248	60.571
1.705	0.340	35.980	36.320	-19.680	56.000
Average					
0.170	0.300	36.940	37.240	-18.189	55.429
0.210	0.300	27.300	27.600	-26.686	54.286
0.240	0.300	22.000	22.300	-31.129	53.429
0.270	0.300	22.170	22.470	-30.101	52.571
0.340	0.303	20.950	21.253	-29.318	50.571
1.705	0.340	28.710	29.050	-16.950	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

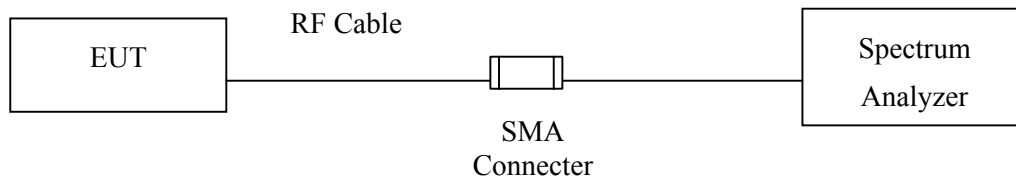
3.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	EMI Test Receiver	R&S	ESI 26 / 838786/004	May, 2006

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



3.3. Limit

The maximum peak power shall be less 1Watt.

3.4. Uncertainty

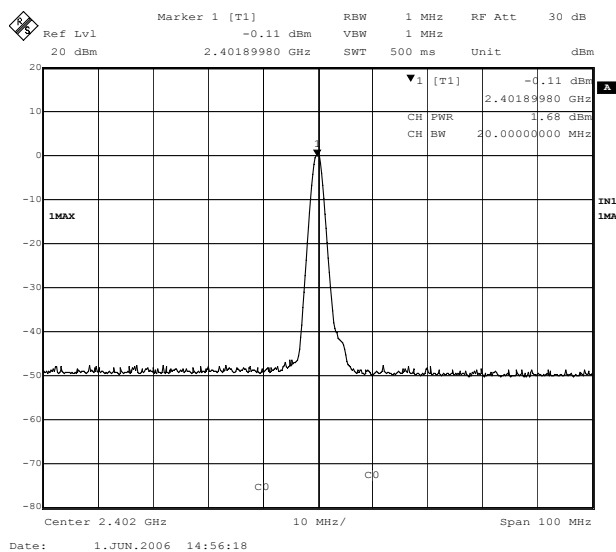
The measurement uncertainty is defined as ± 1.27 dB

3.5. Test Result of Peak Power Output

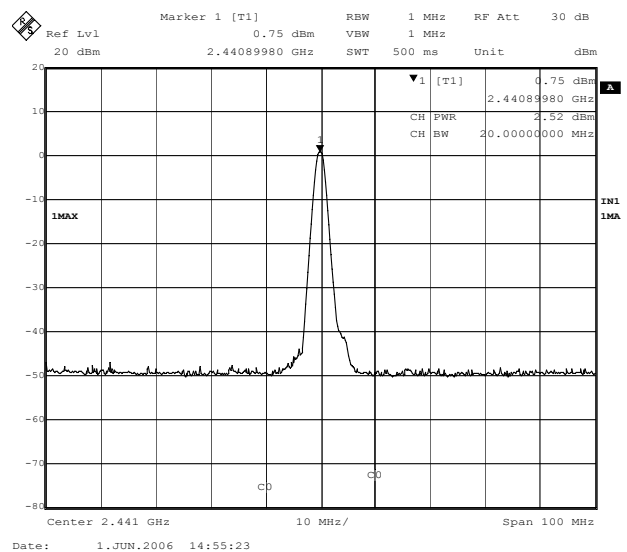
Product : Bluetooth GPS
 Test Item : Peak Power Output
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 00	2402.00	1.68dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.52dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.20dBm	1 Watt= 30 dBm	Pass

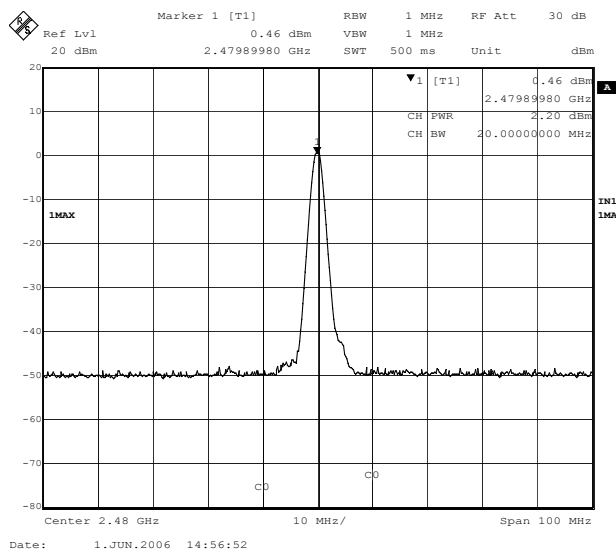
Channel 00



Channel 39



Channel 78



4. Radiated Emission

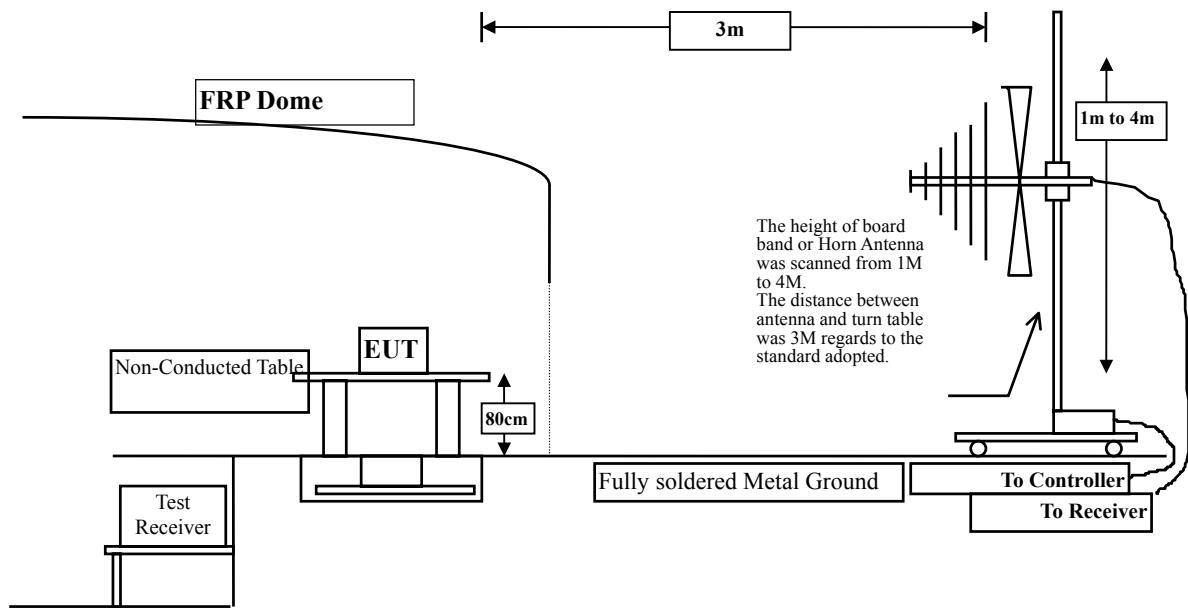
4.1. Test Equipment

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

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐ Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	May, 2006
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2006
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2005
☐ Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2006
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2006
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2006
	Horn Antenna	ETS	3115 / 0005-6160	Sep., 2005
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2006
☒ Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
	Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2005
	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2005
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2005
	Pre-Amplifier	HP	8449B / 3008A01123	July, 2005

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



4.3. 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.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
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.

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 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 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.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
under 1G is defined as ± 3.8 dB

4.6. Test Result of Radiated Emission

Product : Bluetooth GPS
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter (Channel 00)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4804.000	3.737	35.330	39.067	-34.933	74.000
7206.000	10.741	34.160	44.902	-29.098	74.000
9608.000	14.854	33.840	48.694	-25.306	74.000

Average Detector:

--

Vertical

Peak Detector:

4804.000	3.737	38.100	41.837	-32.163	74.000
7206.000	10.741	33.540	44.282	-29.718	74.000
9608.000	14.854	33.570	48.424	-25.576	74.000

Average Detector:

--

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 + Correct Factor.
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 : Bluetooth GPS
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4882.000	3.932	36.590	40.522	-33.478	74.000
7323.000	11.633	36.240	47.872	-26.128	74.000
9764.000	13.740	37.410	51.151	-22.849	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4882.000	3.932	36.920	40.852	-33.148	74.000
7323.000	11.633	36.180	47.812	-26.188	74.000
9764.000	13.740	37.250	50.991	-23.009	74.000
Average Detector:					
--					

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 + Correct Factor.
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 : Bluetooth GPS
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter (Channel 78)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

4960.000	4.151	37.160	41.310	-32.690	74.000
7440.000	12.067	36.290	48.357	-25.643	74.000
9920.000	13.472	37.150	50.622	-23.378	74.000

Average Detector:

--

Vertical

Peak Detector:

4960.000	4.151	36.780	40.930	-33.070	74.000
7440.000	12.067	36.720	48.787	-25.213	74.000
9920.000	13.472	37.840	51.312	-22.688	74.000

Average Detector:

--

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 + Correct Factor.
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 : Bluetooth GPS
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
136.914	12.419	13.200	25.619	-17.881	43.500
164.128	10.330	16.347	26.677	-16.823	43.500
253.547	13.638	14.049	27.687	-18.313	46.000
547.074	20.556	8.299	28.855	-17.145	46.000
615.110	20.868	5.703	26.571	-19.429	46.000
986.393	23.471	8.309	31.780	-22.220	54.000
Vertical					
78.597	8.305	17.173	25.477	-14.523	40.000
158.297	9.971	13.659	23.630	-19.870	43.500
344.910	14.798	10.520	25.318	-20.682	46.000
550.962	20.997	8.687	29.684	-16.316	46.000
615.110	21.647	5.124	26.771	-19.229	46.000
881.423	22.702	3.220	25.922	-20.078	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

5. Band Edge

5.1. Test Equipment

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

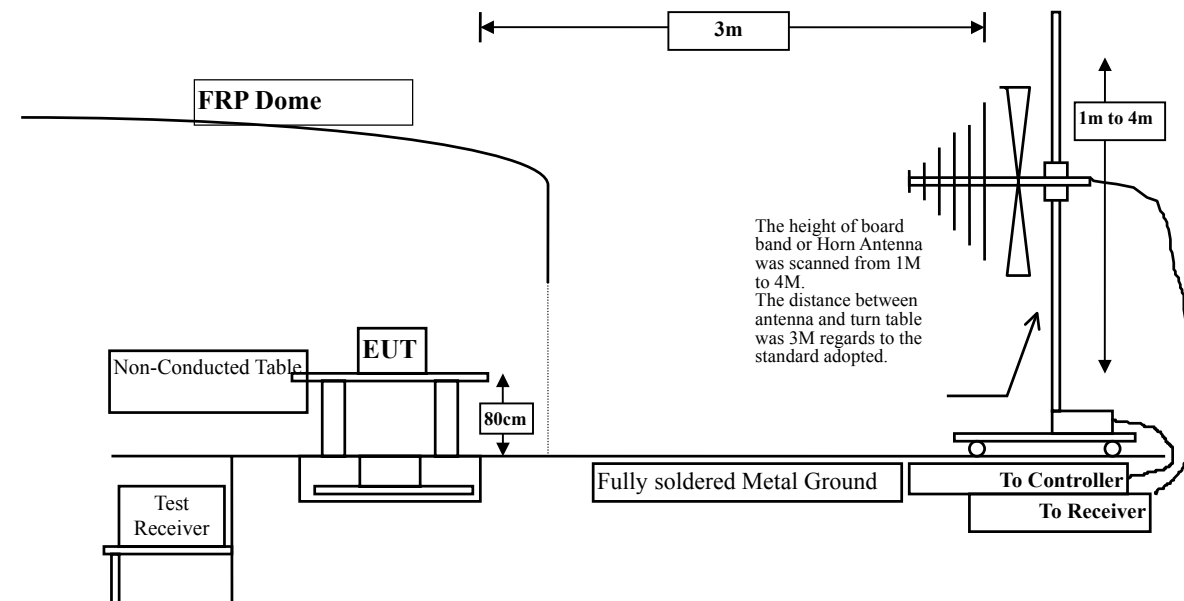
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
X Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2005
X Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2005
X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2005
X Pre-Amplifier	HP	8449B / 3008A01123	July, 2005

OATS No.3

- 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 Radiated Measurement:



5.3. 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)).

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 (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

5.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
under 1G is defined as ± 3.8 dB

5.6. Test Result of Band Edge

Product : Bluetooth GPS
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00)

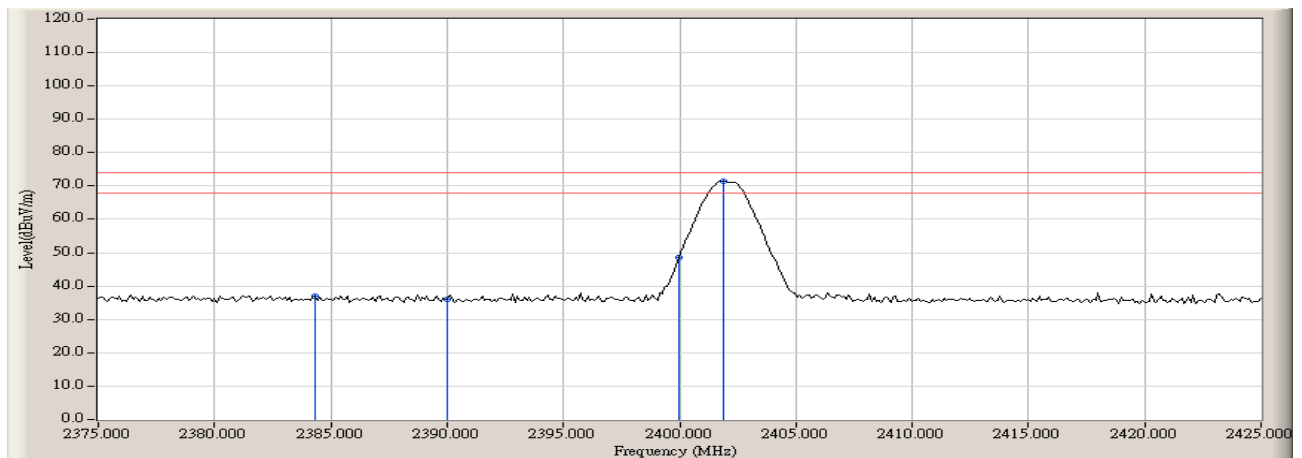
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2384.319	39.155	36.879	74.00	54.00	Pass
00 (Average)	--	--	--	74.00	54.00	Pass

Figure Channel 00: (Horizontal)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Bluetooth GPS
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00)

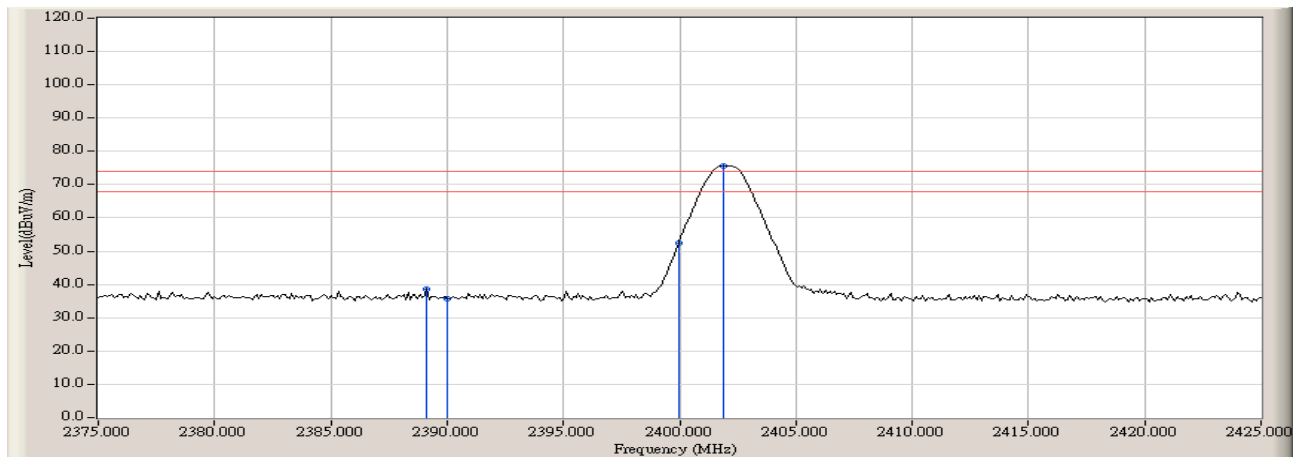
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Reading Level (dBUV)	Emission Level (dBUV/m)	Peak Limit (dBUV/m)	Average Limit (dBUV/m)	Result
00 (Peak)	2389.128	40.733	38.473	74.00	54.00	Pass
00(Average)	--	--	--	74.00	54.00	Pass

Figure Channel 00: (Vertical)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Bluetooth GPS
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 78)

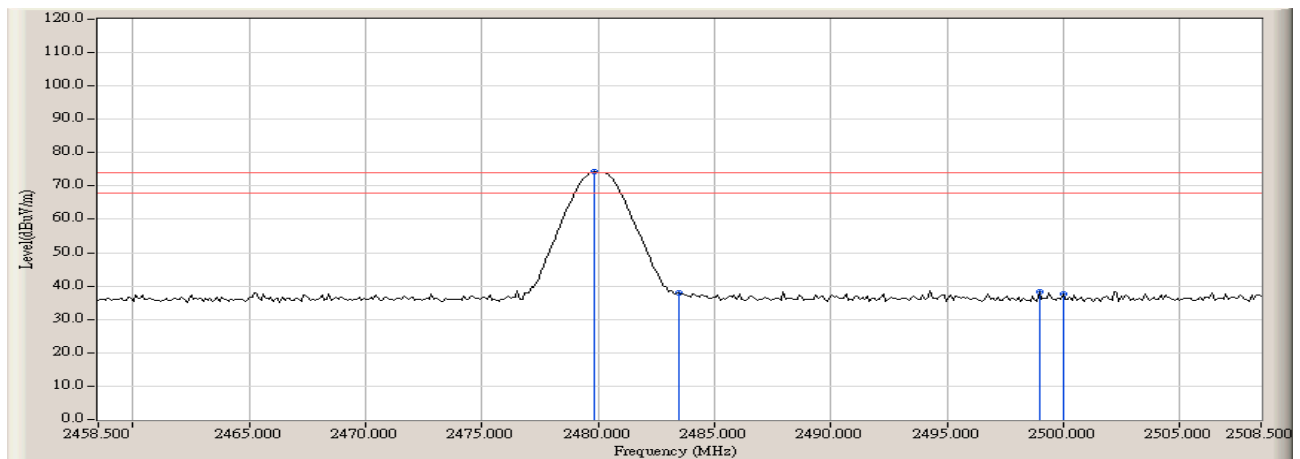
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2498.981	40.096	38.254	74.00	54.00	Pass
78(Average)	--	--	--	74.00	54.00	Pass

Figure Channel 78: (Horizontal)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Bluetooth GPS
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 78)

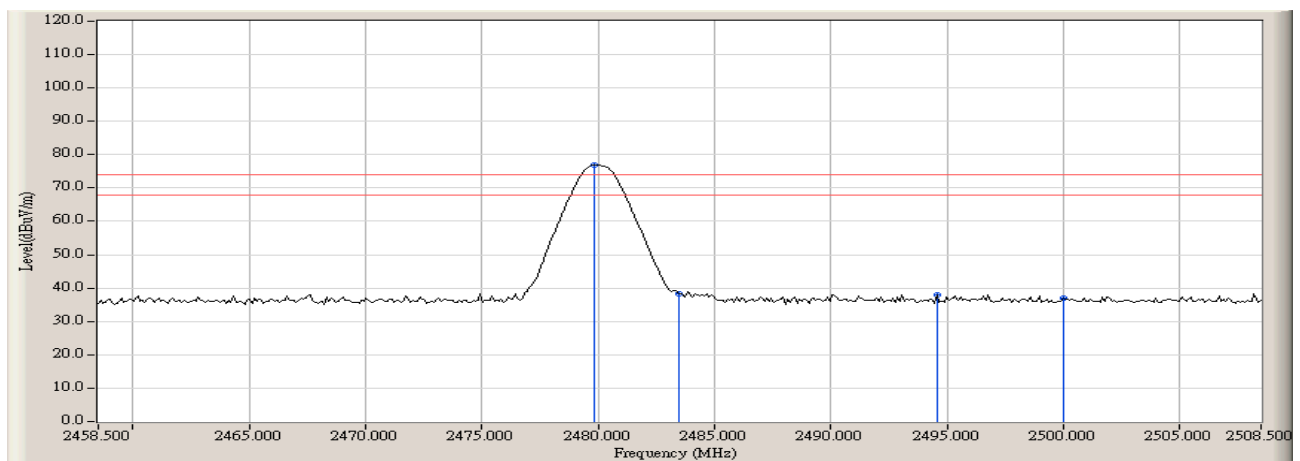
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2494.572	39.933	38.076	74.00	54.00	Pass
78(Average)	--	--	--	74.00	54.00	Pass

Figure Channel 78: (Vertical)



Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

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 Number

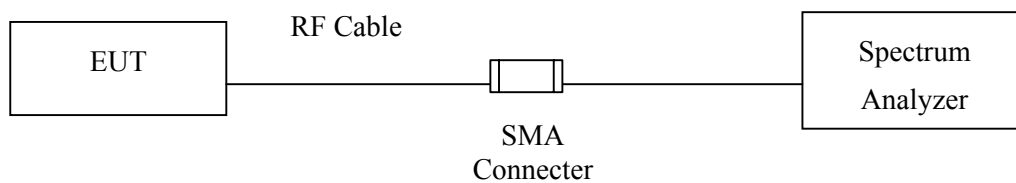
6.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	EMI Test Receiver	R&S	ESI 26 / 838786/004	May, 2006

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.

6.2. Test Setup



6.3. Limit

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

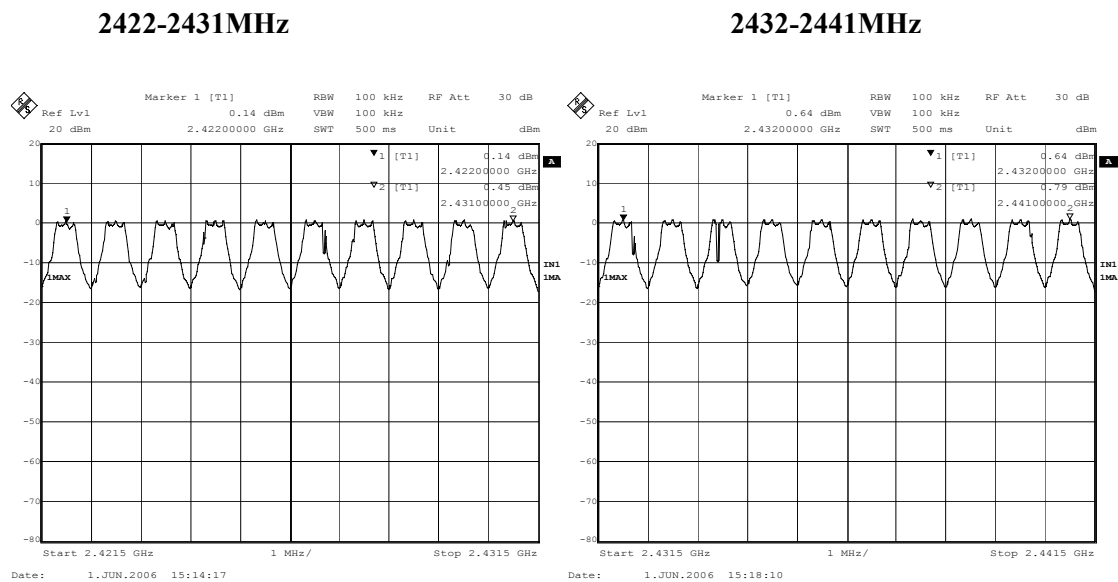
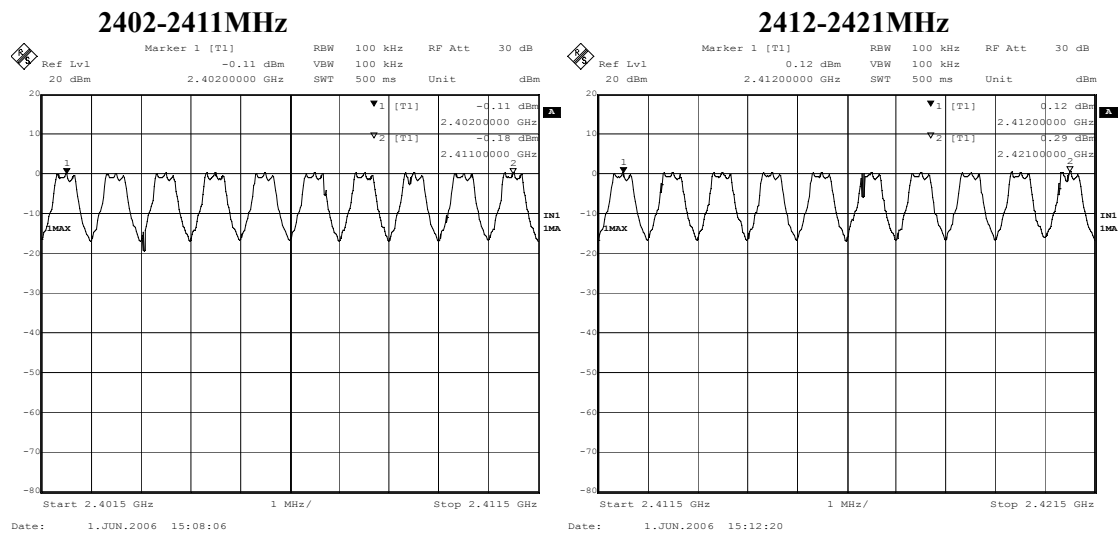
6.4. Uncertainty

N/A

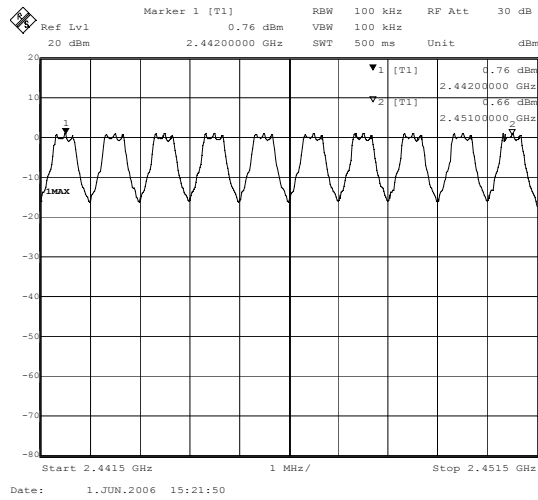
6.5. Test Result of Channel Number

Product : Bluetooth GPS
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

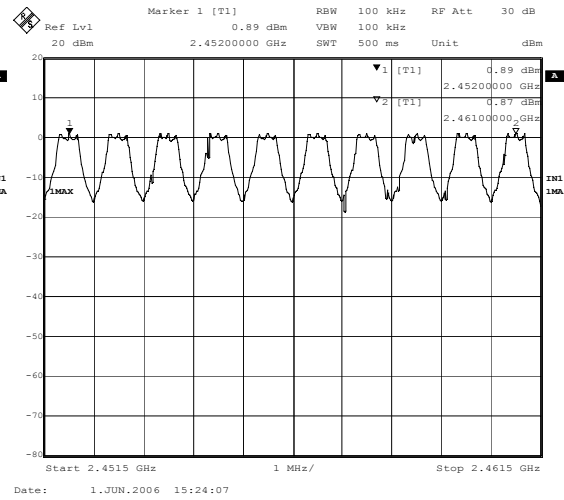
Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass



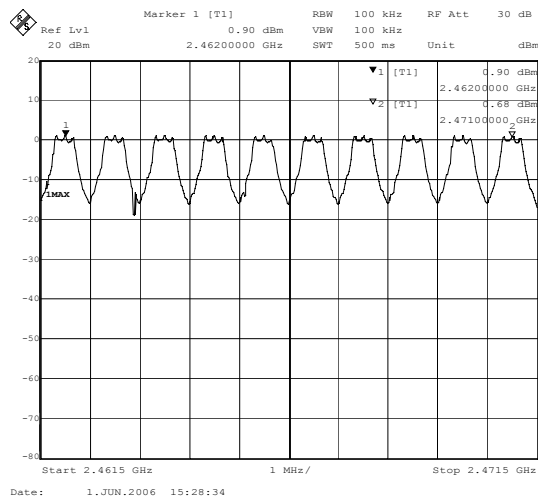
2442-2451MHz



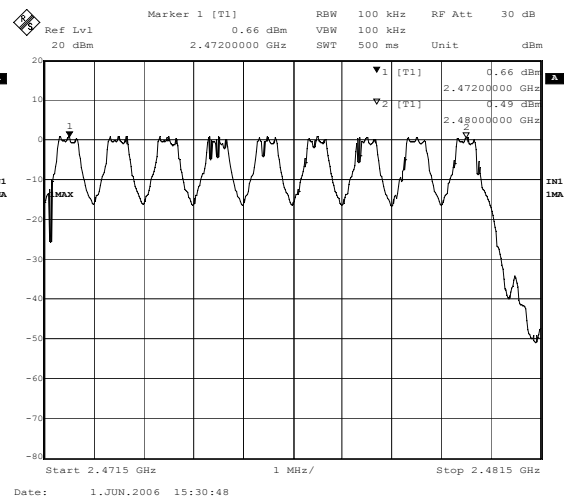
2452-2461MHz



2462-2471MHz



2472-2481MHz



7. Channel Separation

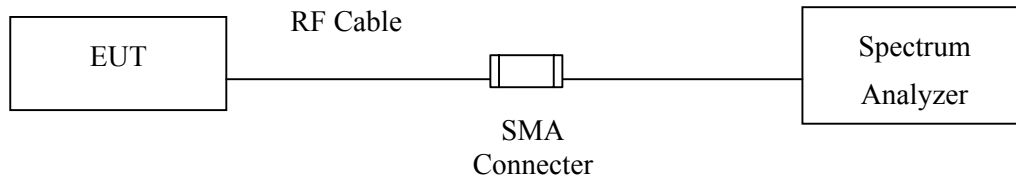
7.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	EMI Test Receiver	R&S	ESI 26 / 838786/004	May, 2006

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. 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.

7.4. Uncertainty

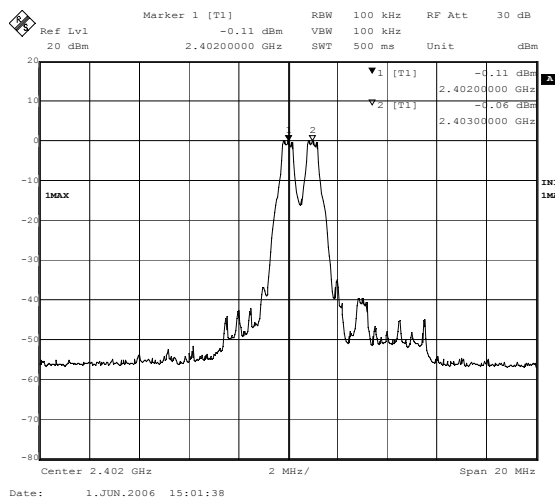
The measurement uncertainty is defined as $\pm 150\text{Hz}$

7.5. Test Result of Channel Separation

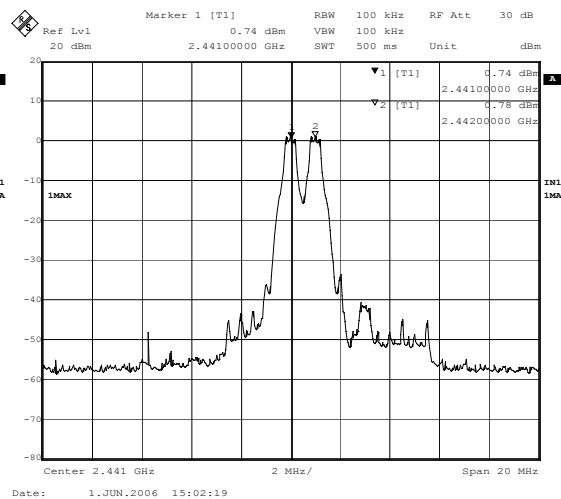
Product : Bluetooth GPS
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

Frequency (MHz)	Measurement Level (MHz)	Required Limit	Result
2402	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2441	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2480	1.00	>25 kHz or 2/3 * 20 dB BW	Pass

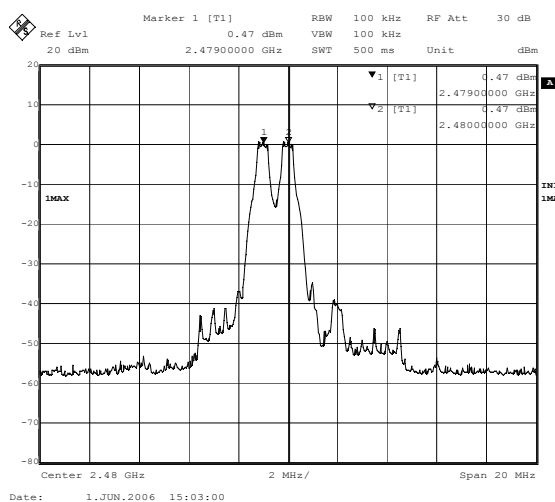
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz



8. Dwell Time

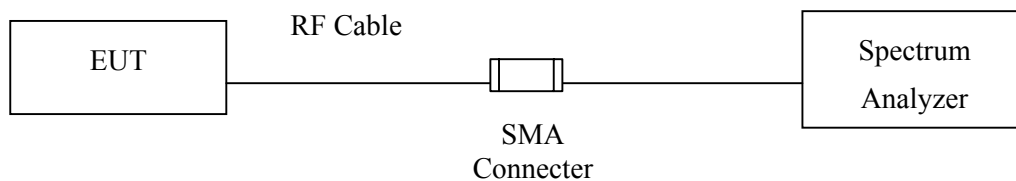
8.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	EMI Test Receiver	R&S	ESI 26 / 838786/004	May, 2006

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. 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.

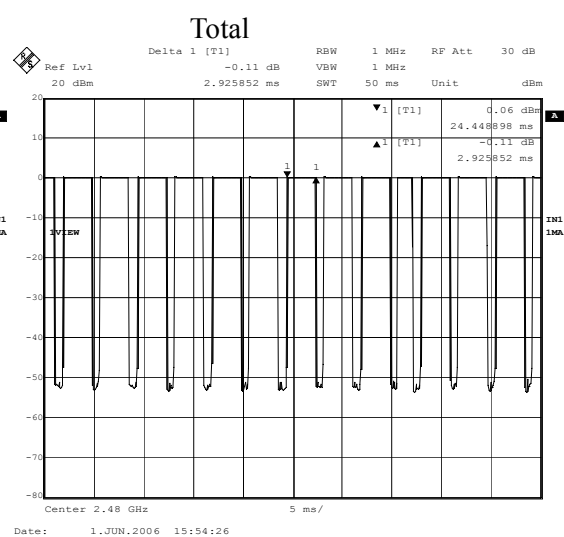
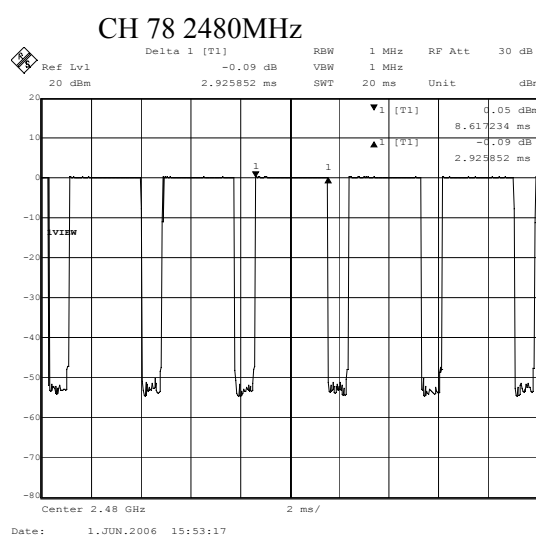
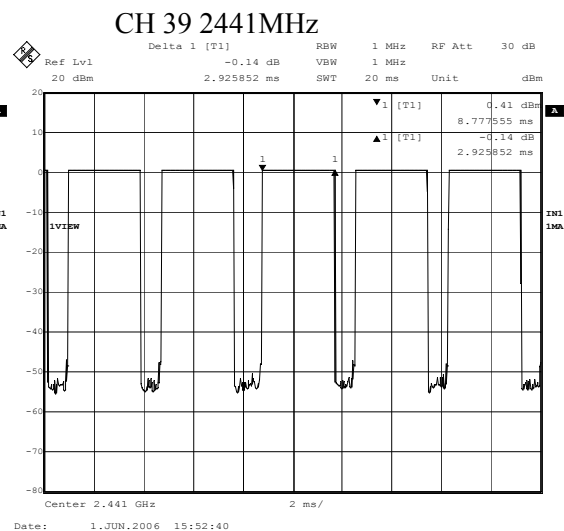
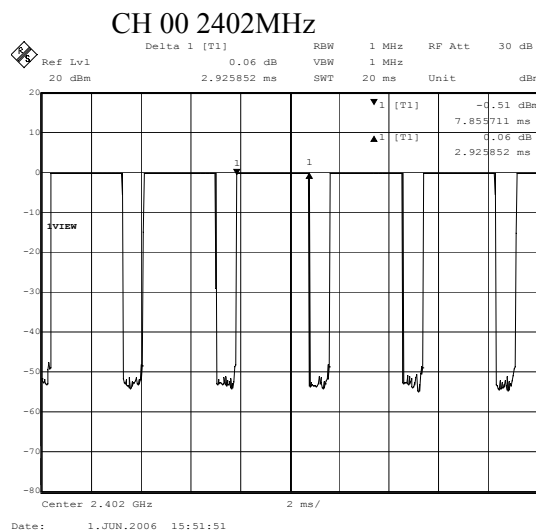
8.4. Uncertainty

The measurement uncertainty is defined as $\pm 25\text{msec}$

8.5. Test Result of Dwell Time

Product : Bluetooth GPS
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00,39,78 –DH5)

Channel (MHz)	Measurement Level (ms)	Required Limit (sec.)	Result
CH 00 2402	327.6	< 0.4	Pass
CH 39 2441	327.6	< 0.4	Pass
CH 78 2480	327.6	< 0.4	Pass



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

Occupancy Time of Frequency Hopping System

Test Time Period: $0.4 \times 79 = 31.6\text{sec}$, Hopping Times Within 1sec: $14/50\text{msec} = 0.28 \text{ hops/msec}$.

A) 2402MHz The Maximum Occupancy Time Within 31.6sec: $2925 \mu\text{s} \times 280 / 79 \times 31.6 = 327.6\text{msec}$ °

B) 2441MHz The Maximum Occupancy Time Within 31.6sec: $2925 \mu\text{s} \times 280 / 79 \times 31.6 = 327.6\text{msec}$ °

C) 2480MHz The Maximum Occupancy Time Within 31.6sec: $2925 \mu\text{s} \times 280 / 79 \times 31.6 = 327.6\text{msec}$ °

Test Result: The Average Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard °

PS: (1) From Bluetooth Specification , It Hops 1640 Times in 1sec ° The Average Occupancy Time of Each 79 Channels is $1600/79$ Times , Therefore , We Calculate The Maximum Occupancy Time (worse cars)As Below:

A) 2402Mhz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640 / 79 \times 31.6 = 289.056\text{msec}$

B) 2441MHz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640 / 79 \times 31.6 = 289.056\text{msec}$

C) 2480MHz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640 / 79 \times 31.6 = 289.056\text{msec}$

Test Result: The Maximum Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard °

9. Occupied Bandwidth

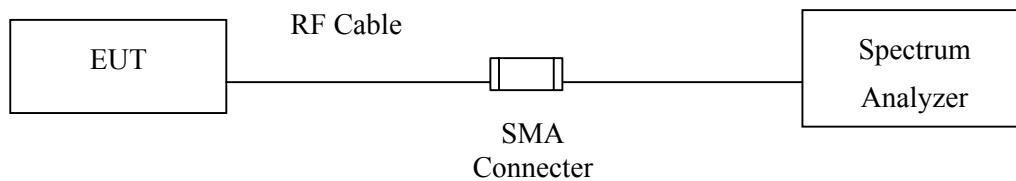
9.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	EMI Test Receiver	R&S	ESI 26 / 838786/004	May, 2006

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. Limits

The minimum bandwidth shall be at least 500kHz.

9.4. Uncertainty

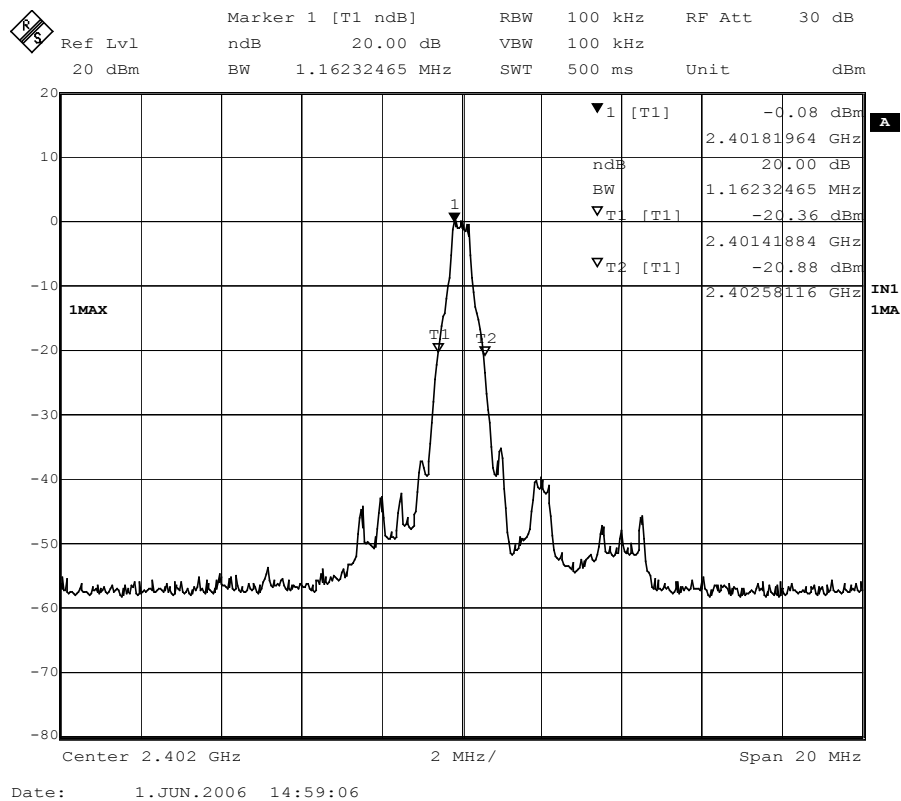
The measurement uncertainty is defined as ± 1.27 dB

9.5. Test Result of Occupied Bandwidth

Product : Bluetooth GPS
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1162	--	NA

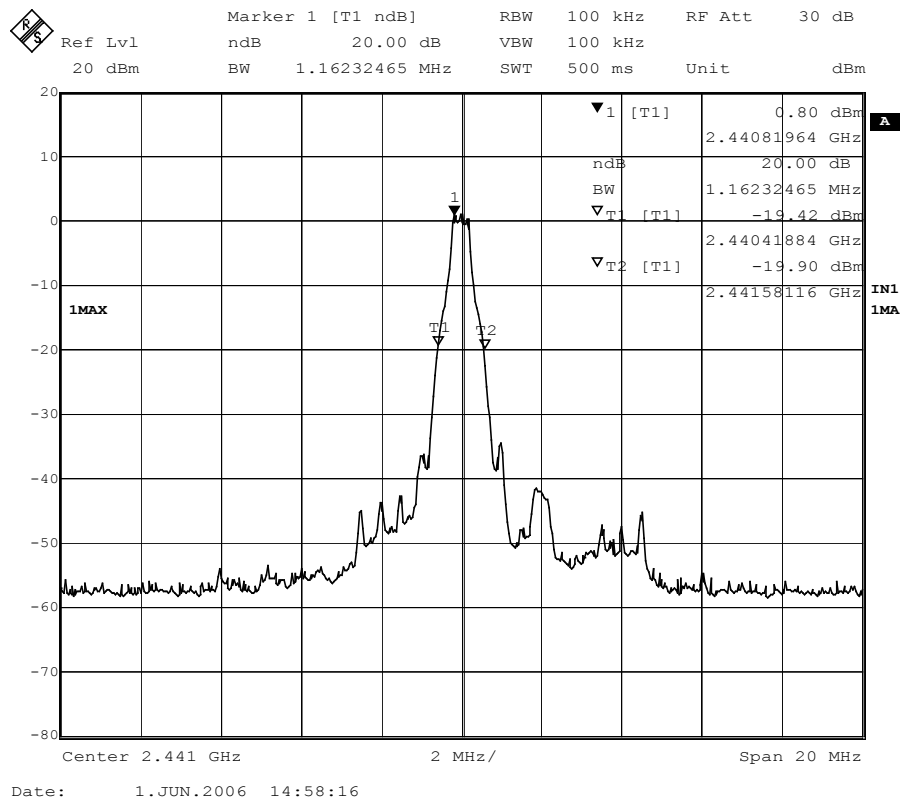
Figure Channel 00:



Product : Bluetooth GPS
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1162	--	NA

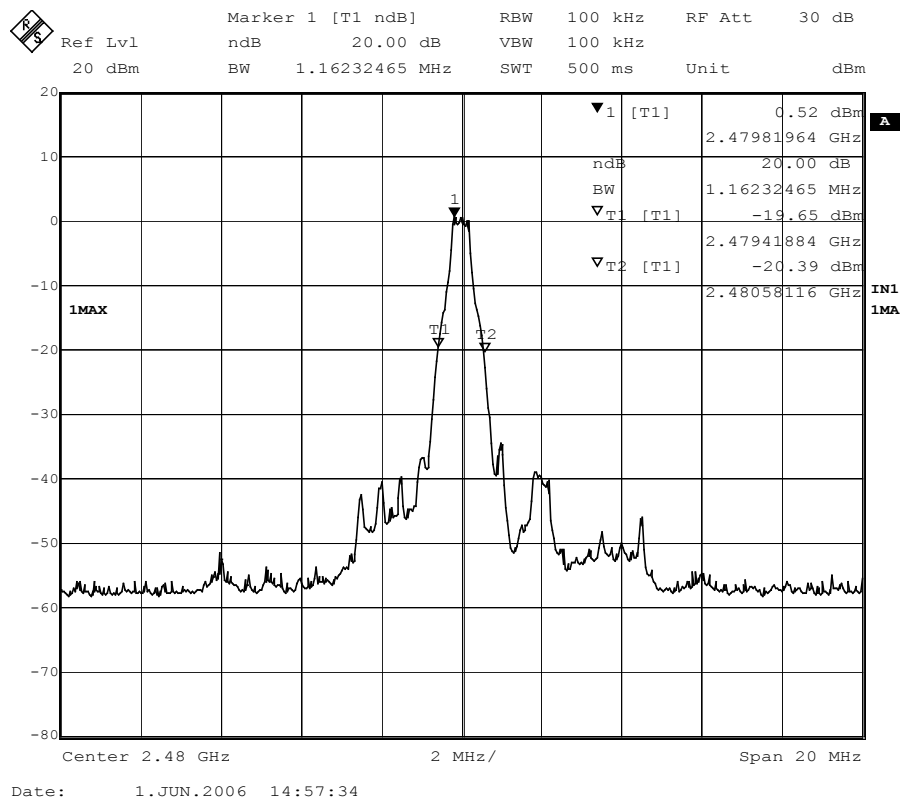
Figure Channel 39:



Product : Bluetooth GPS
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1162	--	NA

Figure Channel 78:



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.