



Test Report

Product Name	Bluetooth GPS Receiver
Model No.	MBT-1000, MBT-1100
FCC ID.	RCCMBT

Applicant	RoyalTek Company Ltd.
Address	10711 Chung Cheng RD., Suite 9F-1 Tao Yuan City, Taiwan, R.O.C

Date of Receipt	Oct. 07, 2007
Issued Date	Feb. 04, 2008
Report No.	07C158R-RFUSP06V01

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: Feb. 04, 2008

Report No.: 07C158R-RFUSP06V01



Product Name	Bluetooth GPS Receiver	
Applicant	RoyalTek Company Ltd.	
Address	10711 Chung Cheng RD., Suite 9F-1 Tao Yuan City, Taiwan, R.O.C	
Manufacturer	RoyalTek Company Ltd.	
Model No.	MBT-1000, MBT-1100	
FCC ID.	RCCMBT	
Rated Voltage	AC 120V/60Hz	
Working Voltage	AC 120V/60Hz(AC Adapter) DC 12V (Car Charger)	
Trade Name	RoyalTek	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2007 ANSI C63.4: 2003	
Test Result	Complied	 <small>NVLAP Lab Code: 200533-0</small>

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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 Receiver
Trade Name	RoyalTek
FCC ID.	RCCMBT
Model No.	MBT-1000, MBT-1100
Frequency Range	2402 - 2480MHz
Channel Number	79
Type of Modulation	FHSS (GFSK)
Antenna type	Soldered on PCB
Channel Control	Auto
Antenna Gain	Refer to the table "Antenna List"
Power Adapter	SEMDICAR, TC-FU-USB Input: 100-240V, 50-60Hz 0.15A Output: 5V-1A
Car Charger (1)	LEN CHENG NASA, CSU-03
Car Charger (2)	PINE-TUM, PT-002X

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	RoyalTek	N/A	2.52 dBi for 2.4 GHz

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:

1. This device is an Bluetooth GPS Receiver with a built-in 2.4GHz Bluetooth Ver.2.0 transceiver.
2. The different of the each model is shown as below:

Model Number	Description
MBT-1000	Without Flash
MBT-1100	With Flash

3. These tests were conducted on a sample for the purpose of demonstrating compliance of bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
4. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operational Description

The EUT is an Bluetooth GPS Receiver with built-in 2.4GHz BluetoothVer.2.0 transceiver. The number of the channels is 79 in 2402-2480MHz. The device adapts the frequency hopping spread spectrum modulation. The antenna is soldered on PCB and provides diversity function to improve the receiving function.

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: USB Link Mode 2: LEN CHENG Car Charger Mode 3: PINETUM ENTER Car Charger Mode 4: SEMDICAR, TC-FU-USB
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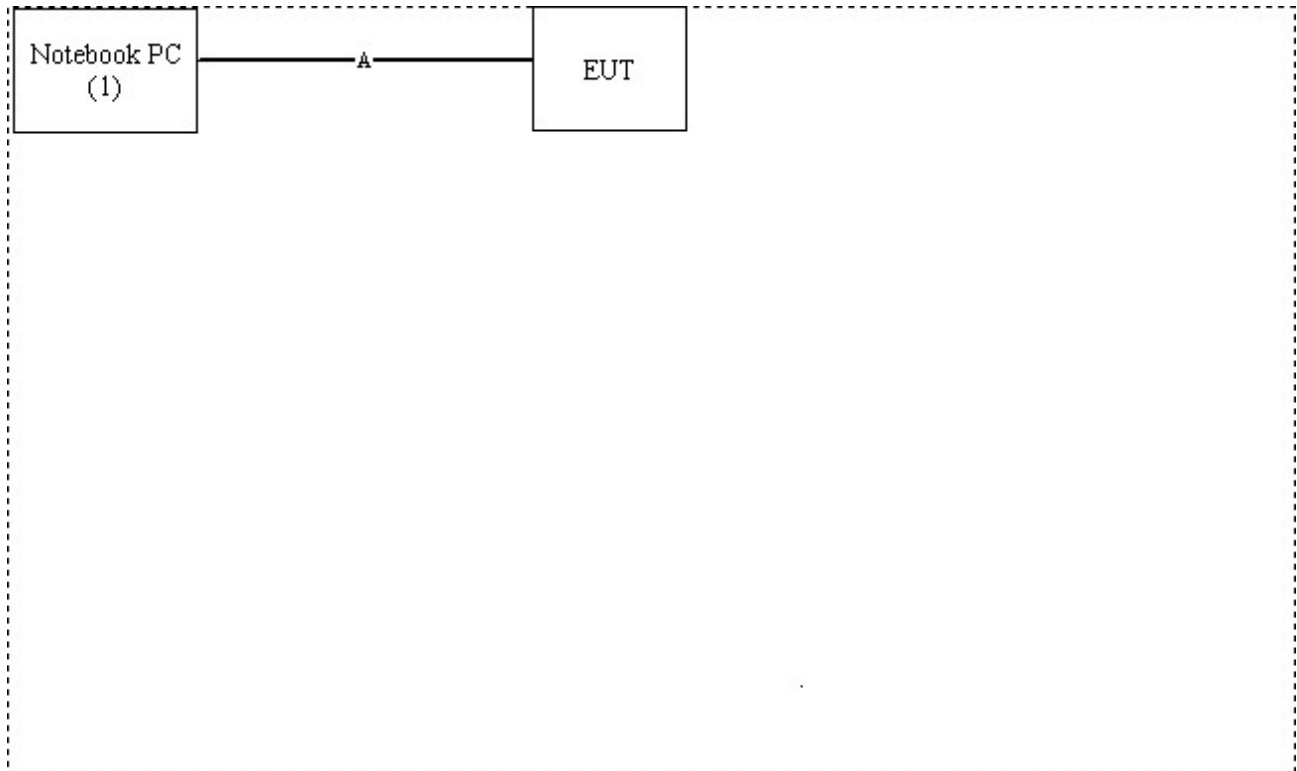
1.3. Tested System Details

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.	Power Cord
(1)	Notebook PC	DELL	PP18L	42649348672	Non-Shielded, 0.8m

	Signal Cable Type	Signal cable Description
A.	USB Cable	Non-Shielded, 1.6m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1.	Setup the EUT as shown in section 1.4.
2.	Execute BT TEST.exe on the notebook.
3.	Configure the test channel and the packet type.
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: File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Reference 31040/SIT1300F2



Accreditation on NVLAP
 NVLAP Lab Code: 200533-0



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FCC Accreditation Number: TW1014



2. Conducted Emission

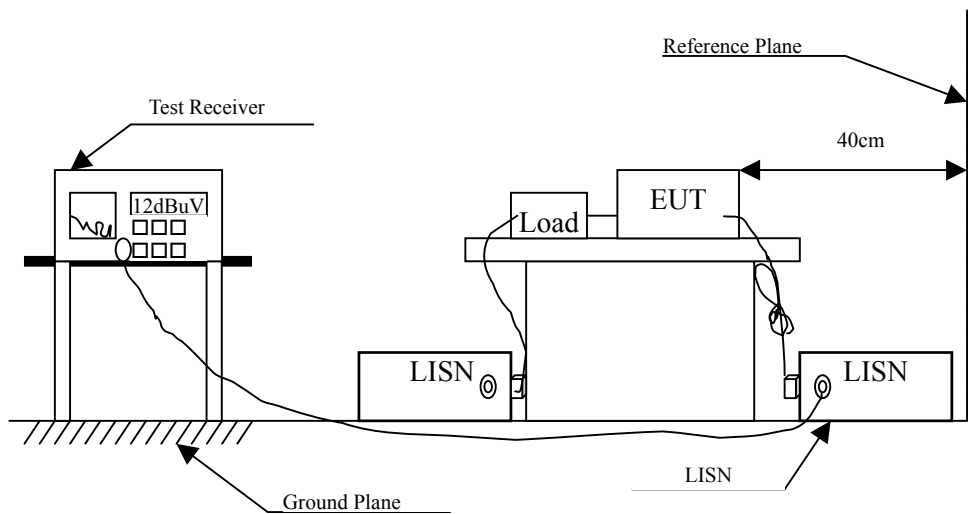
2.1. Test Equipment

The following test equipments 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, 2007	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2007	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2007	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2007	
5	No.1 Shielded Room			N/A	

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

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 was setup according to ANSI C63.4, 2003 and tested according to FCC Public Notice DA 00-705.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Bluetooth GPS Receiver
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: USB Link(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.201	0.643	40.030	40.673	-23.870	64.543
0.306	0.300	41.920	42.220	-19.323	61.543
0.463	0.300	35.420	35.720	-21.337	57.057
0.966	0.310	30.940	31.250	-24.750	56.000
2.021	0.340	25.720	26.060	-29.940	56.000
3.677	0.390	19.640	20.030	-35.970	56.000
Average					
0.201	0.643	33.430	34.073	-20.470	54.543
0.306	0.300	38.400	38.700	-12.843	51.543
0.463	0.300	22.510	22.810	-24.247	47.057
0.966	0.310	20.150	20.460	-25.540	46.000
2.021	0.340	18.100	18.440	-27.560	46.000
3.677	0.390	12.530	12.920	-33.080	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 Receiver
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: USB Link(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.154	0.300	51.820	52.120	-13.766	65.886
0.240	0.300	39.870	40.170	-23.259	63.429
0.423	0.310	35.300	35.610	-22.590	58.200
0.713	0.310	32.130	32.440	-23.560	56.000
1.064	0.320	29.300	29.620	-26.380	56.000
3.103	0.380	22.840	23.220	-32.780	56.000
Average					
0.154	0.300	37.210	37.510	-18.376	55.886
0.240	0.300	25.220	25.520	-27.909	53.429
0.423	0.310	22.170	22.480	-25.720	48.200
0.713	0.310	22.290	22.600	-23.400	46.000
1.064	0.320	21.540	21.860	-24.140	46.000
3.103	0.380	16.150	16.530	-29.470	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 Receiver
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 4: SEMDICAR, TC-FU-USB(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.240	0.369	42.670	43.039	-20.390	63.429
0.474	0.300	42.560	42.860	-13.883	56.743
0.775	0.310	42.950	43.260	-12.740	56.000
1.552	0.330	35.140	35.470	-20.530	56.000
2.982	0.370	31.570	31.940	-24.060	56.000
9.459	0.580	31.660	32.240	-27.760	60.000
Average					
0.240	0.369	39.680	40.049	-13.380	53.429
0.474	0.300	37.810	38.110	-8.633	46.743
0.775	0.310	34.910	35.220	-10.780	46.000
1.552	0.330	27.560	27.890	-18.110	46.000
2.982	0.370	25.150	25.520	-20.480	46.000
9.459	0.580	21.340	21.920	-28.080	50.000

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 Receiver
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 4: SEMDICAR, TC-FU-USB(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.236	0.300	44.080	44.380	-19.163	63.543
0.564	0.310	40.960	41.270	-14.730	56.000
0.830	0.320	42.550	42.870	-13.130	56.000
1.720	0.340	39.680	40.020	-15.980	56.000
3.412	0.380	31.820	32.200	-23.800	56.000
8.775	0.480	32.310	32.790	-27.210	60.000
Average					
0.236	0.300	40.130	40.430	-13.113	53.543
0.564	0.310	32.890	33.200	-12.800	46.000
0.830	0.320	35.980	36.300	-9.700	46.000
1.720	0.340	29.940	30.280	-15.720	46.000
3.412	0.380	23.890	24.270	-21.730	46.000
8.775	0.480	22.000	22.480	-27.520	50.000

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

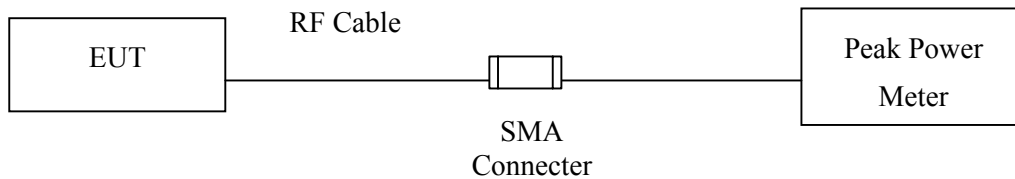
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2007
X	Power Sensor	Anritsu	MA2491A/034457	May, 2007

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

Conducted Measurement



3.3. Test procedures

The EUT was setup according to ANSI C63.4, 2003 for compliance to FCC 47CFR 15.247 requirements

3.4. Limit

For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1Watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watt.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

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

Channel No.	Frequency (MHz)	Cable loss (dB)	Peak Power Output (dBm)	Limit (dBm)	Result
Channel 00	2402.00	0.5	-3.12	30	Pass
Channel 39	2441.00	0.5	-4.48	30	Pass
Channel 78	2480.00	0.5	-1.57	30	Pass

Note: Peak Power Output = Reading value on peak power meter + cable loss

4. Radiated Emission

4.1. Test Equipment

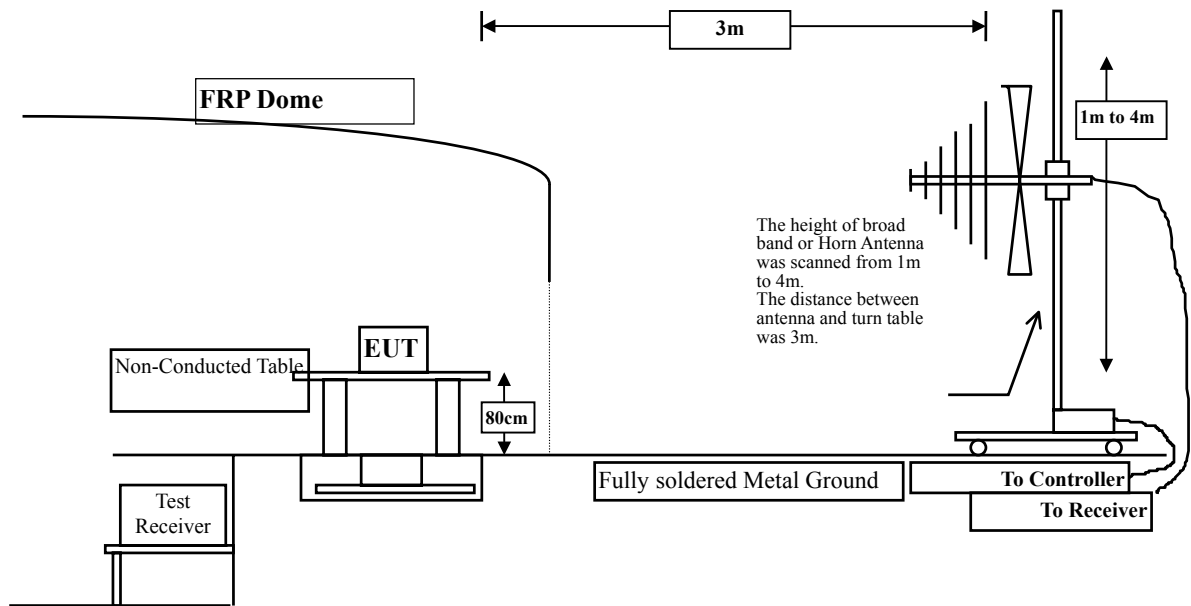
The following test equipments are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	May, 2007
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2007
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2007
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2007
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2007
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2007
	Horn Antenna	ETS	3115 / 0005-6160	Sep., 2007
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2007
<input checked="" type="checkbox"/> Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
	Spectrum Analyzer	HP	E4407B / US39440758	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

4.2. 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 @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: $E \text{ field strength (dBuV/m)} = 20 \log E \text{ field strength (uV/m)}$

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

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

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

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Bluetooth GPS Receiver
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link (2402MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4804.000	-0.205	42.170	41.965	-32.035	74.000
7206.000	3.294	39.090	42.384	-31.616	74.000
9608.000	5.696	39.290	44.986	-29.014	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4804.000	-0.205	41.740	41.535	-32.465	74.000
7206.000	3.294	40.900	44.194	-29.806	74.000
9608.000	5.696	40.850	46.546	-27.454	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 Receiver
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4882.000	-0.276	41.320	41.044	-32.956	74.000
7323.000	3.330	39.840	43.169	-30.831	74.000
9764.000	6.262	37.600	43.863	-30.137	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4882.000	-0.276	39.960	39.684	-34.316	74.000
7323.000	3.330	39.980	43.309	-30.691	74.000
9764.000	6.262	39.740	46.003	-27.997	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 Receiver
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2480MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4960.000	0.591	39.850	40.441	-33.559	74.000
7440.000	3.924	39.300	43.224	-30.776	74.000
9920.000	6.468	39.850	46.318	-27.682	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4960.000	0.591	40.780	41.371	-32.629	74.000
7440.000	3.924	39.850	43.774	-30.226	74.000
9920.000	6.468	38.885	45.353	-28.647	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 Receiver
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
233.700	9.709	15.233	24.942	-21.058	46.000
336.520	12.679	13.971	26.650	-19.350	46.000
431.580	15.810	13.550	29.360	-16.640	46.000
515.000	16.865	9.545	26.410	-19.590	46.000
602.300	17.862	5.608	23.470	-22.530	46.000
745.890	18.274	13.576	31.850	-14.150	46.000
Vertical					
179.380	8.380	22.903	31.283	-12.217	43.500
352.040	13.518	19.792	33.310	-12.690	46.000
528.580	16.927	12.033	28.960	-17.040	46.000
666.320	17.626	15.514	33.140	-12.860	46.000
749.740	20.643	8.047	28.690	-17.310	46.000
965.080	20.060	11.570	31.630	-22.370	54.000

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.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Bluetooth GPS Receiver
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 2: LEN CHENG Car Charger(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
365.620	13.962	18.535	32.497	-13.503	46.000
472.320	16.717	8.368	25.085	-20.915	46.000
602.300	17.862	8.098	25.960	-20.040	46.000
633.340	18.547	6.863	25.410	-20.590	46.000
749.740	18.495	11.945	30.440	-15.560	46.000
833.160	19.199	5.431	24.630	-21.370	46.000
Vertical					
365.620	14.643	15.007	29.650	-16.350	46.000
528.578	16.927	11.733	28.660	-17.340	46.000
602.300	19.662	5.738	25.400	-20.600	46.000
687.660	18.000	8.410	26.410	-19.590	46.000
749.740	20.643	6.317	26.960	-19.040	46.000
967.020	20.068	8.482	28.550	-25.450	54.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Bluetooth GPS Receiver
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 3: PINETUM ENTER Car Charger(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
255.040	12.365	18.782	31.147	-14.853	46.000
460.680	16.605	11.874	28.479	-17.521	46.000
528.580	16.572	8.323	24.895	-21.105	46.000
602.300	17.862	11.293	29.155	-16.845	46.000
749.740	18.495	10.469	28.964	-17.036	46.000
967.020	20.568	8.212	28.780	-25.220	54.000
967.020	20.568	8.177	28.745	-25.255	54.000
Vertical					
266.680	12.759	17.552	30.311	-15.689	46.000
365.620	14.643	14.265	28.908	-17.092	46.000
458.740	16.417	9.176	25.593	-20.407	46.000
602.300	19.662	6.871	26.533	-19.467	46.000
749.740	20.643	8.509	29.152	-16.848	46.000
967.020	20.068	8.097	28.165	-25.835	54.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. “█” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Bluetooth GPS Receiver
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 4: SEMDICAR, TC-FU-USB(2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
362.620	13.812	13.177	26.989	-19.011	46.000
499.480	16.137	8.427	24.564	-21.436	46.000
602.300	17.862	7.632	25.494	-20.506	46.000
749.740	18.495	10.100	28.595	-17.405	46.000
852.560	19.904	6.254	26.158	-19.842	46.000
967.020	20.568	6.399	26.967	-27.033	54.000
Vertical					
365.620	14.643	11.433	26.076	-19.924	46.000
499.480	16.338	6.470	22.808	-23.192	46.000
602.300	19.662	5.589	25.251	-20.749	46.000
667.660	17.605	7.159	24.764	-21.236	46.000
749.740	20.643	8.011	28.654	-17.346	46.000
967.020	20.068	8.347	28.415	-25.585	54.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

5. Spurious RF Conducted Emissions

5.1. Test Equipment

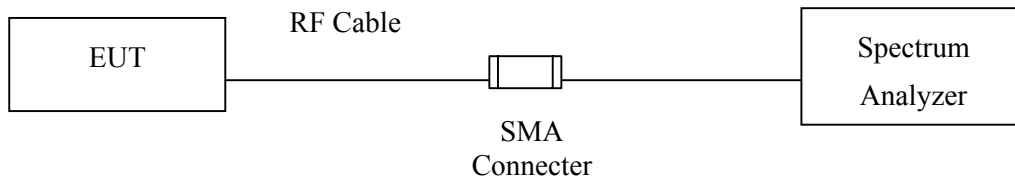
The following test equipments are used during the band edge tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
Test Site	Site 3		

- Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

Spurious RF Conducted 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 was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

Set RBW=100KHz, VBW ≥ RBW, Sweep = auto, Detector function = peak

Trace = max hold

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

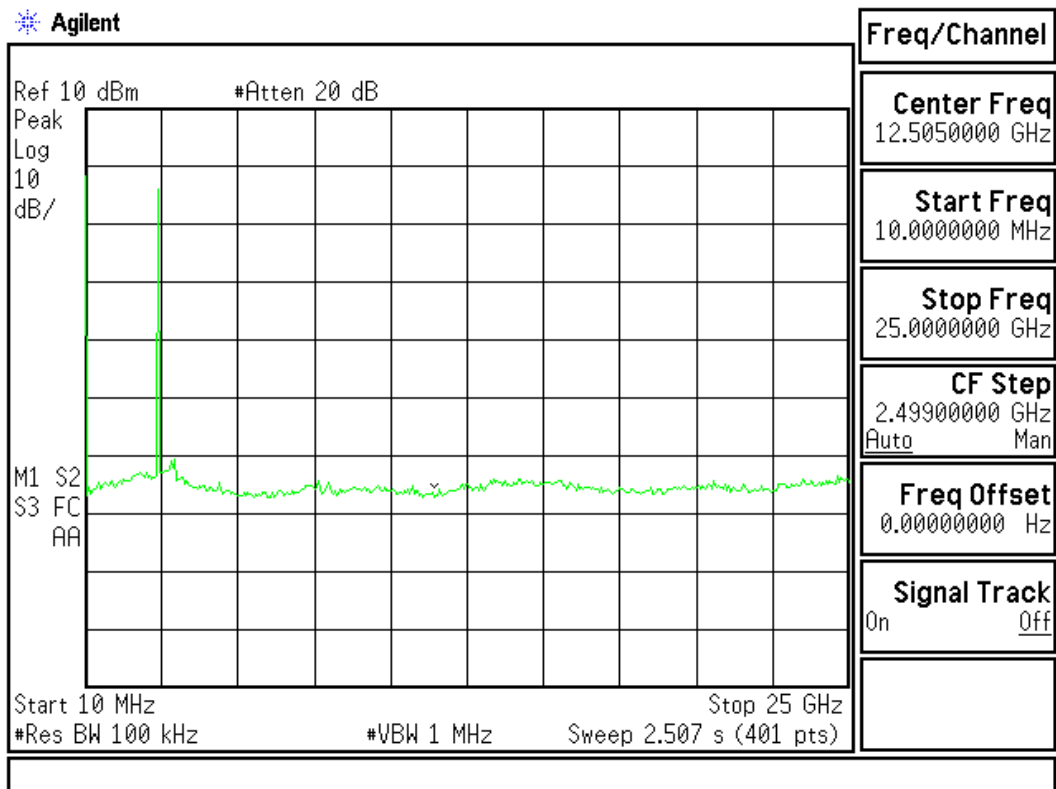
5.6. Test Result of Spurious RF Conducted Emissions

Product : Bluetooth GPS Receiver
 Test Item : Spurious RF Conducted Emissions
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Spurious RF Conducted Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	2402	>20dB	Pass

Figure Channel 00: 10MHz-25GHz

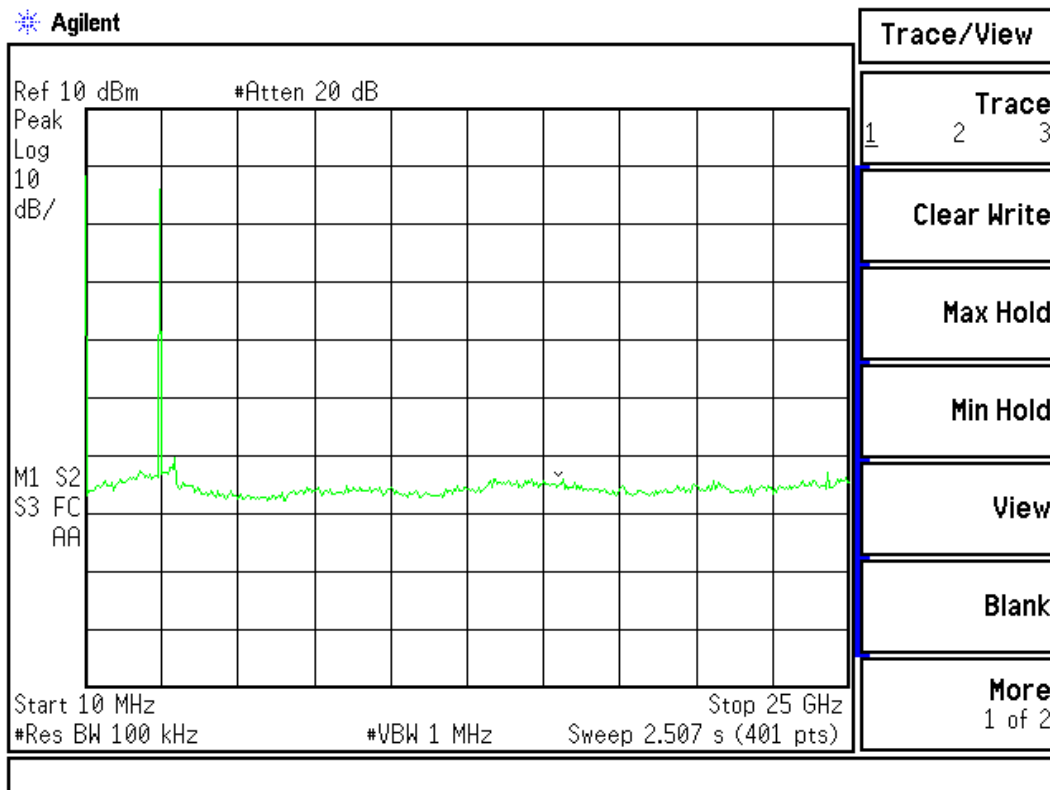


Product : Bluetooth GPS Receiver
 Test Item : Spurious RF Conducted Emissions
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Spurious RF Conducted Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
39	2441	>20dB	Pass

Figure Channel 39: 10MHz-25GHz

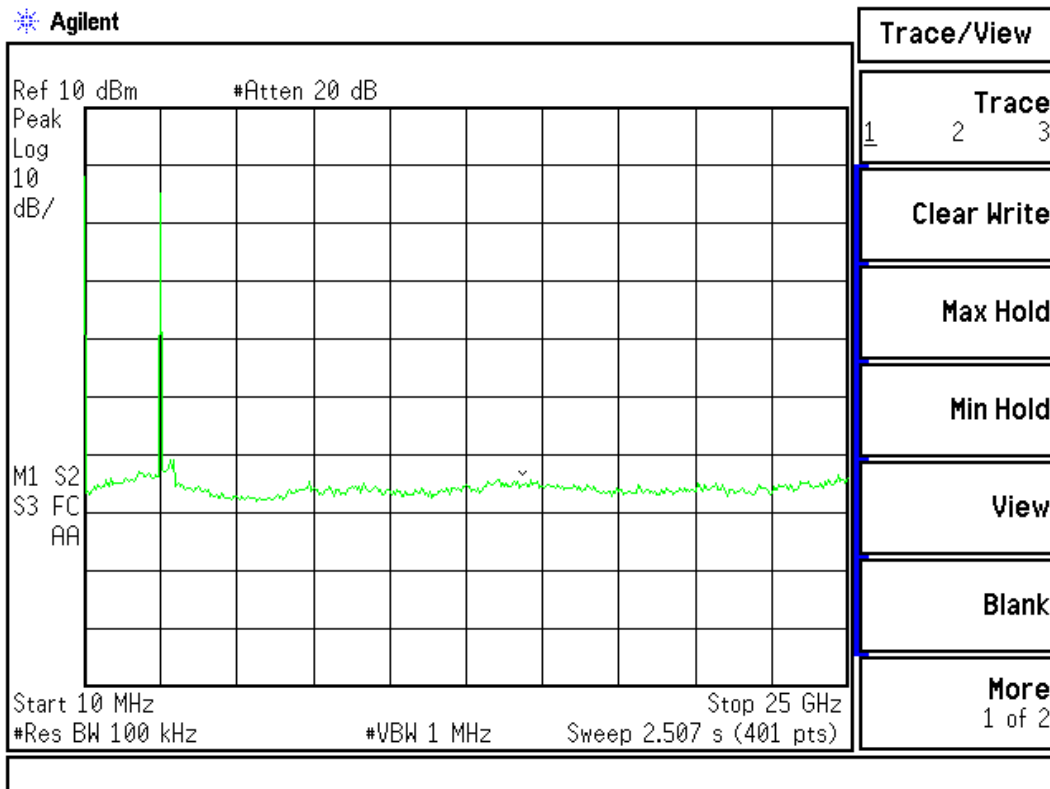


Product : Bluetooth GPS Receiver
 Test Item : Spurious RF Conducted Emissions
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Spurious RF Conducted Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78	2480	>20dB	Pass

Figure Channel 78: 10MHz-25GHz



6. Radiated Emission Band Edge

6.1. Test Equipment

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

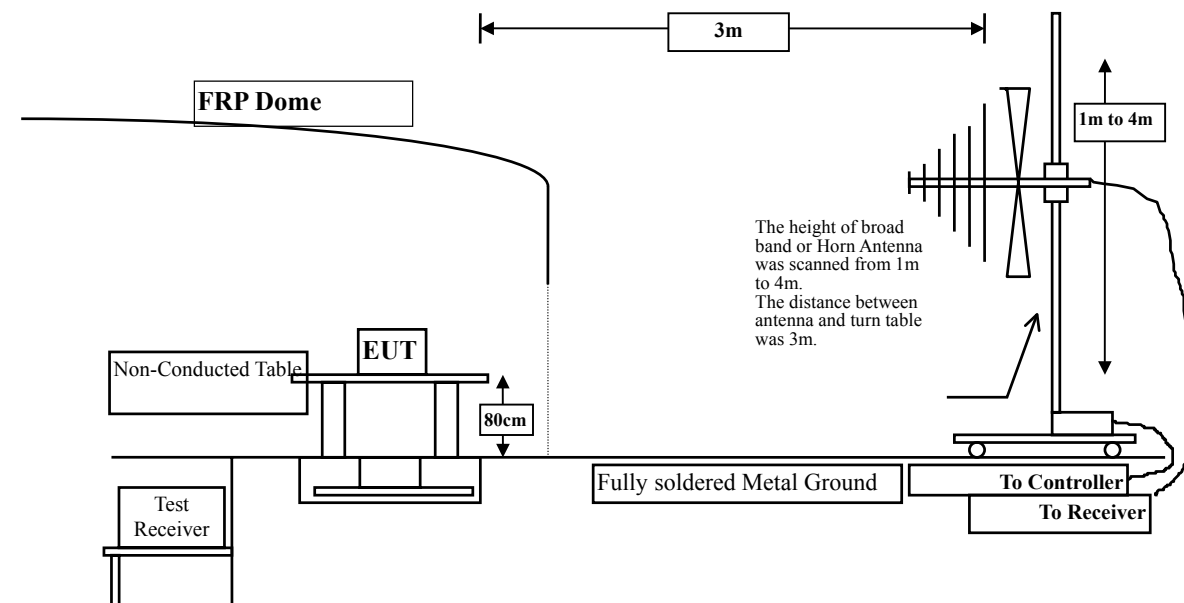
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X	Pre-Amplifier	Agilent	8449B / 3008A01123	July, 2007

Test Site Site 3

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:



6.3. Limit

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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

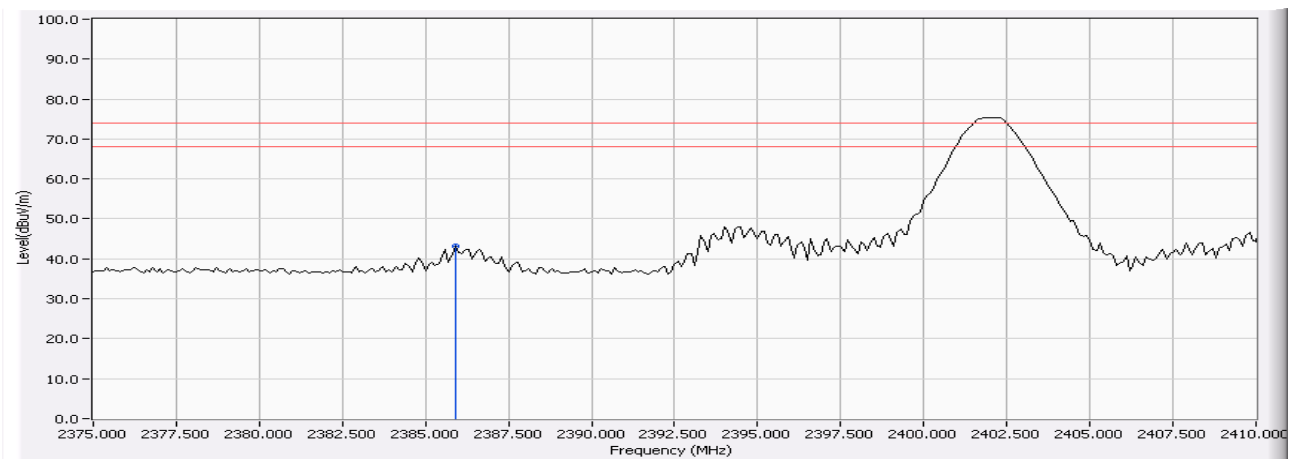
6.6. Test Result of Band Edge

Product : Bluetooth GPS Receiver
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2402MHz)

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2385.900	-6.780	49.962	43.182	74.00	54.00	Pass

Figure Channel 00: (Horizontal) (Peak)



Note:

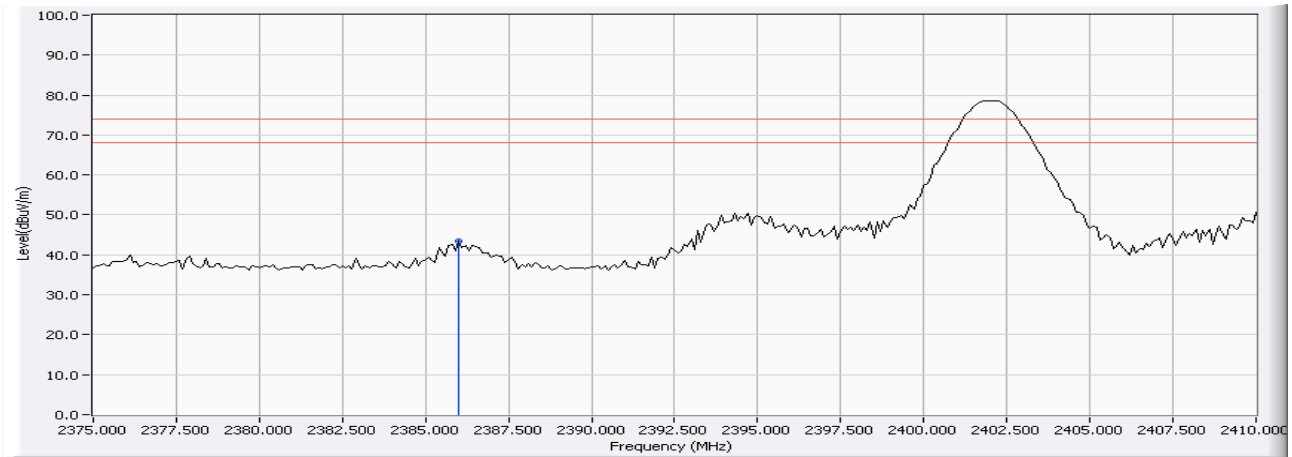
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth GPS Receiver
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2402MHz)

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2386.000	-6.780	50.277	43.497	74.00	54.00	Pass

Figure Channel 00: (Vertical) (Peak)



Note:

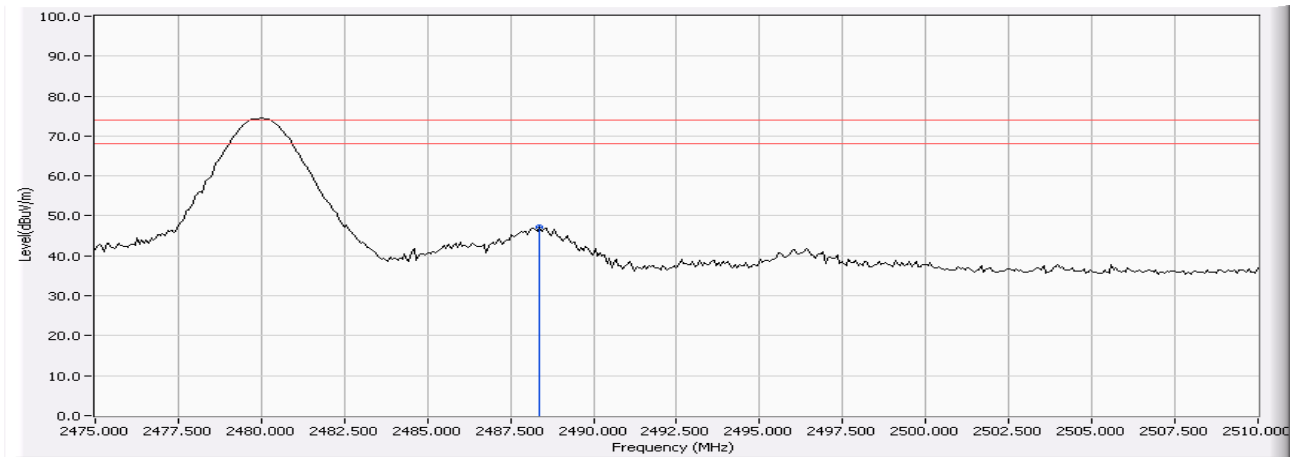
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth GPS Receiver
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2480MHz)

RF Radiated Measurement (Horizontal):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2488.370	-6.462	53.577	47.115	74.00	54.00	Pass

Figure Channel 78: (Horizontal) (Peak)



Note:

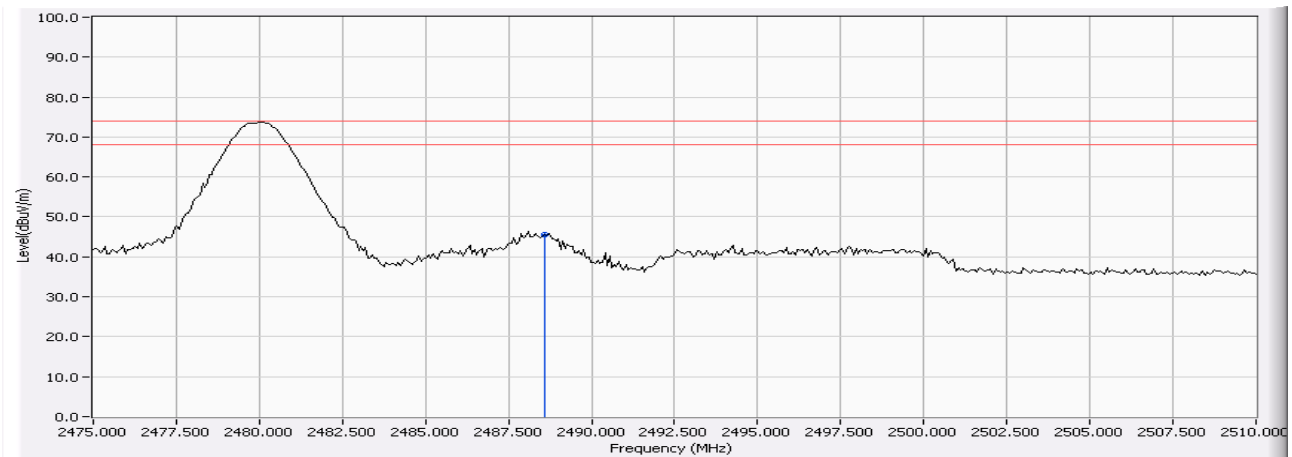
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Bluetooth GPS Receiver
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(2480MHz)

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2488.580	-6.462	52.103	45.641	74.00	54.00	Pass

Figure Channel 78: (Vertical) (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. Channel Number

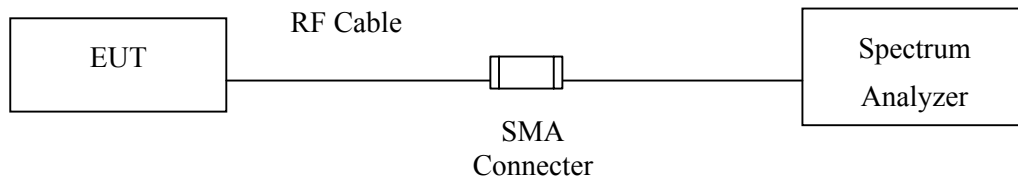
7.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov, 2007

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

7.2. Test Setup



7.3. Limit

Number of hopping frequencies ≥ 75

7.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = the frequency band of operation

RBW $\geq 1\%$ of the span , VBW \geq RBW

Sweep = auto, Detector function = peak, Trace = max hold

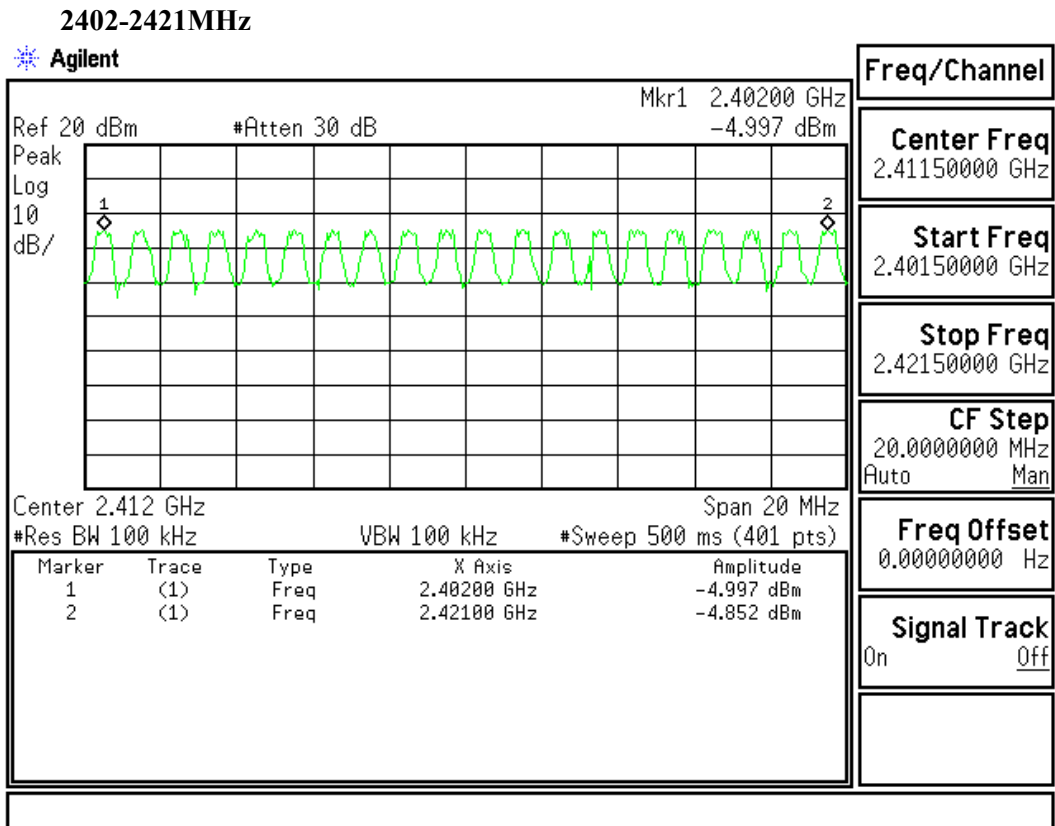
7.5. Uncertainty

N/A

7.6. Test Result of Channel Number

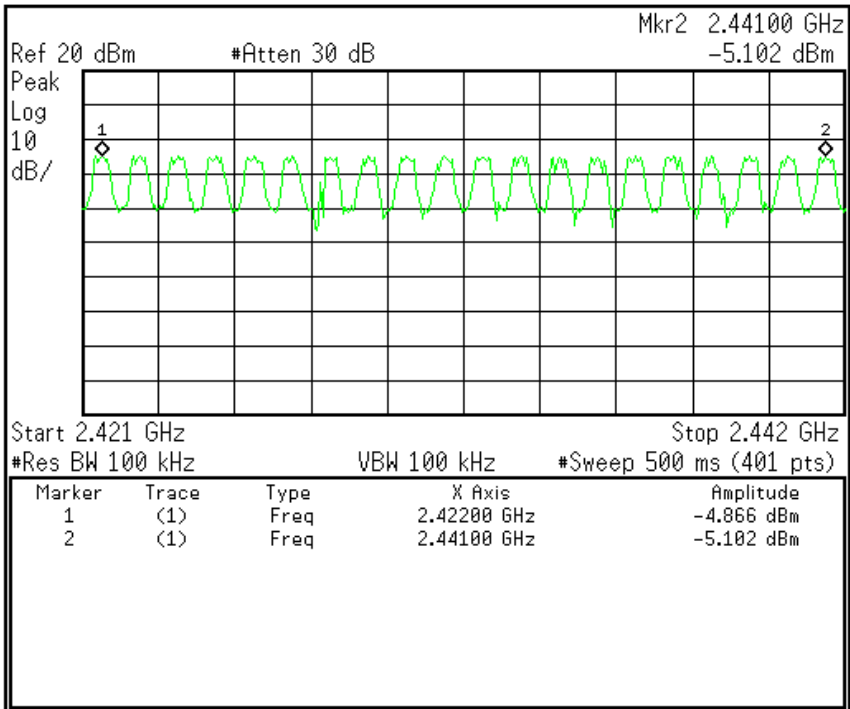
Product : Bluetooth GPS Receiver
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

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



2422-2441MHz

Agilent



Sweep

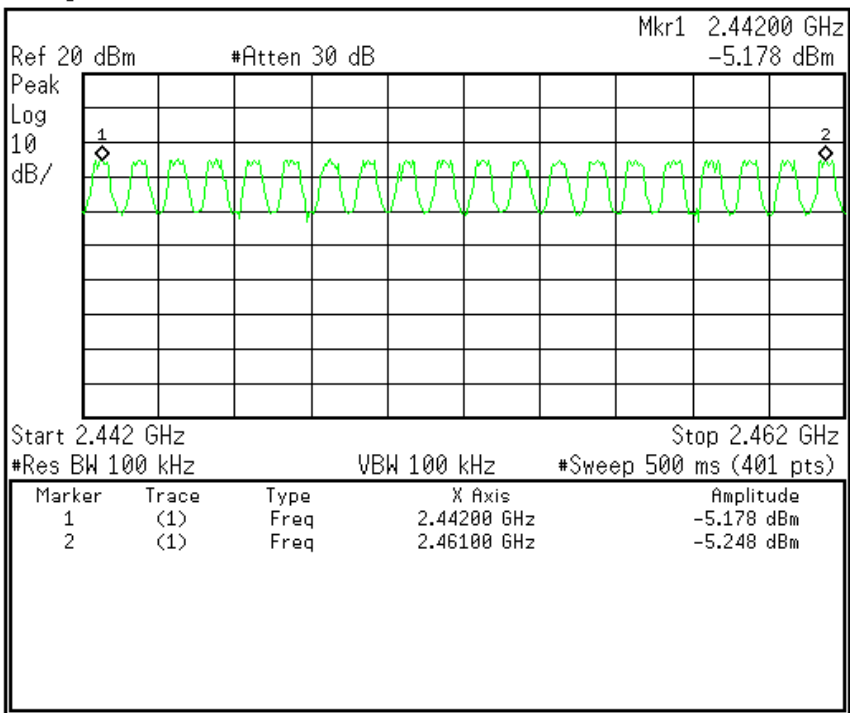
Sweep Time
4.000 ms
Auto Man

Sweep
Single Cont

Auto Sweep Coupling
SR SA

2442-2461MHz

Agilent



Freq/Channel

Center Freq
2.45150000 GHz

Start Freq
2.44150000 GHz

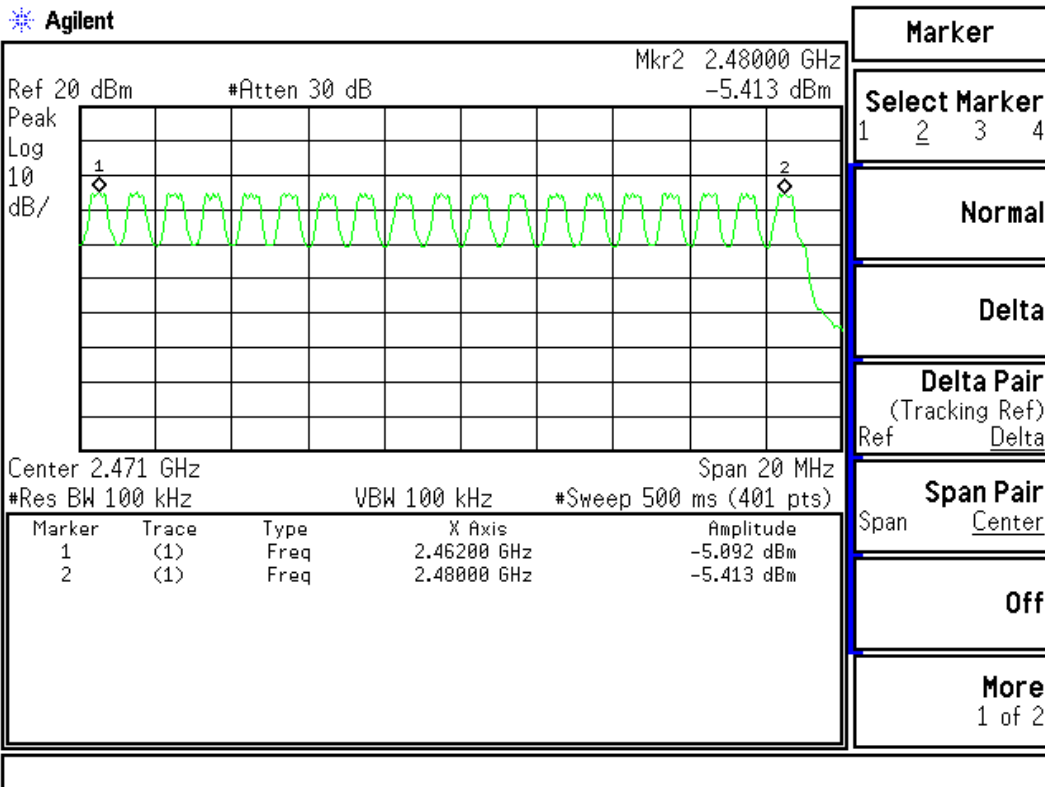
Stop Freq
2.46150000 GHz

CF Step
20.0000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

2462-2480MHz



8. Channel Separation

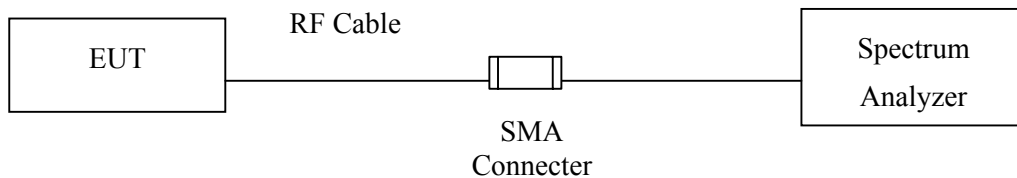
8.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov, 2007

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

8.2. Test Setup



8.3. 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.

8.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = Capture the peaks of two adjacent channels

Resolution Bandwidth (RBW) \geq 1% of the span, VBW \geq RBW

Sweep = auto, Detector function = peak, Trace = max hold

8.5. Uncertainty

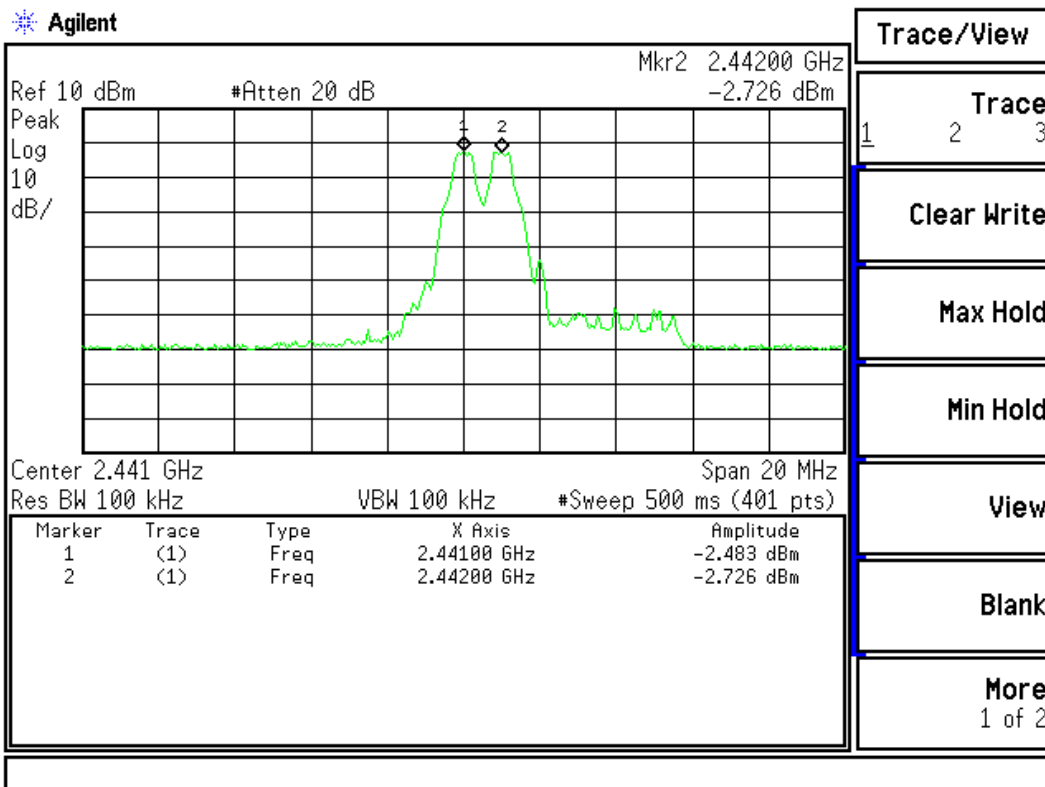
\pm 150Hz

8.6. Test Result of Channel Separation

Product : Bluetooth GPS Receiver
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Measured Result (MHz)	Required Limit	Result
1.00	>25 kHz or 2/3 * 20 dB BW	Pass

Hopping on, Carrier frequency separation of channel 39(2441MHz) and channel 40(2442MHz)



9. Dwell Time

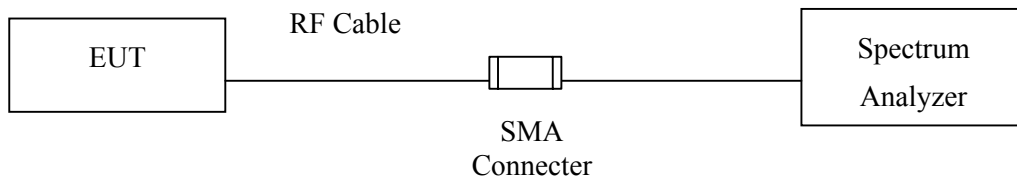
9.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

9.2. Test Setup



9.3. Limit

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.

9.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

The hopping function of the EUT is enabled.

Span = zero span, centered on a hopping channel

RBW = 1 MHz, VBW ≥ RBW

Sweep = Capture the entire dwell time per hopping channel

Detector function = peak, Trace = max hold

9.5. Uncertainty

± 25msec

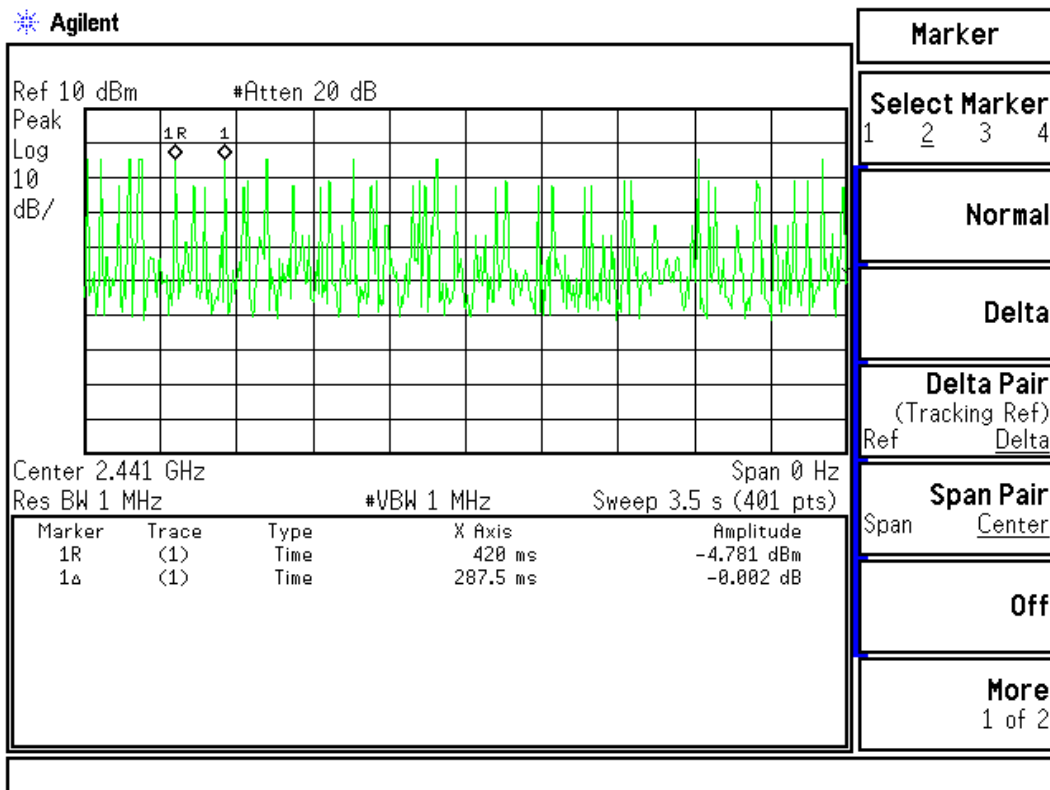
9.6. Test Result of Dwell Time

Product : Bluetooth GPS Receiver
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link(DH5)

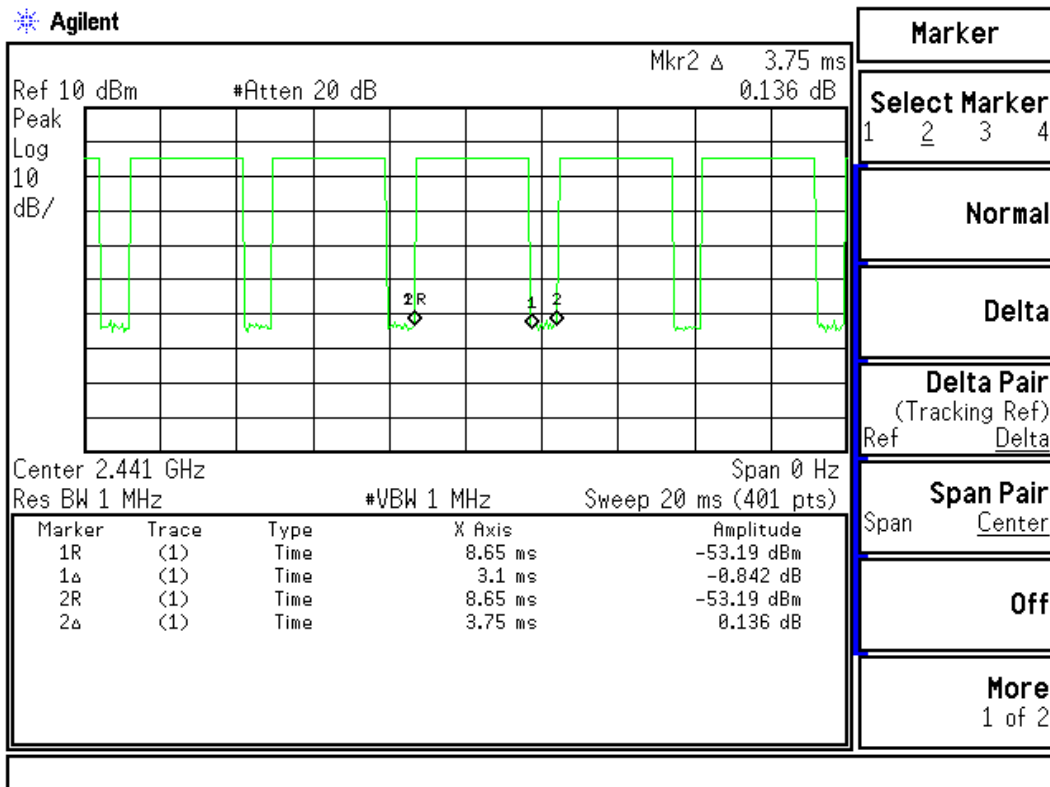
Channel No.	Frequency (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
39	2441	287.5	3100	340.7304348	400	Pass

Note: Dwell Time = 79 * 400 / Time Interval Between Hops * Transmission Time / 1000

CH39 Time Interval between hops



CH39 Transmission Time



Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case DH5 is shown on the report.

10. Occupied Bandwidth

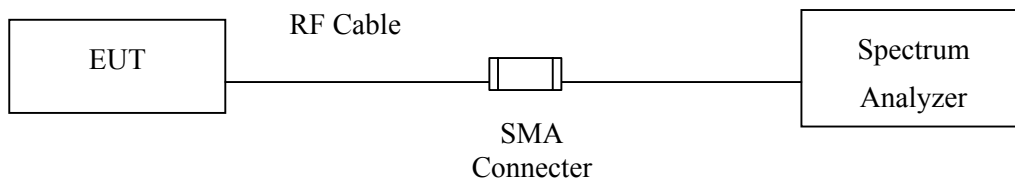
10.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov, 2007

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

10.2. Test Setup



10.3. Limits

N/A

10.4. Test Procedures

The EUT was setup according to ANSI C63.4, 2003 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW \geq 1% of the 20 dB bandwidth, VBW \geq RBW

Sweep = auto, Detector function = peak, Trace = max hold

The EUT should be transmitting at its maximum data rate.

10.5. Uncertainty

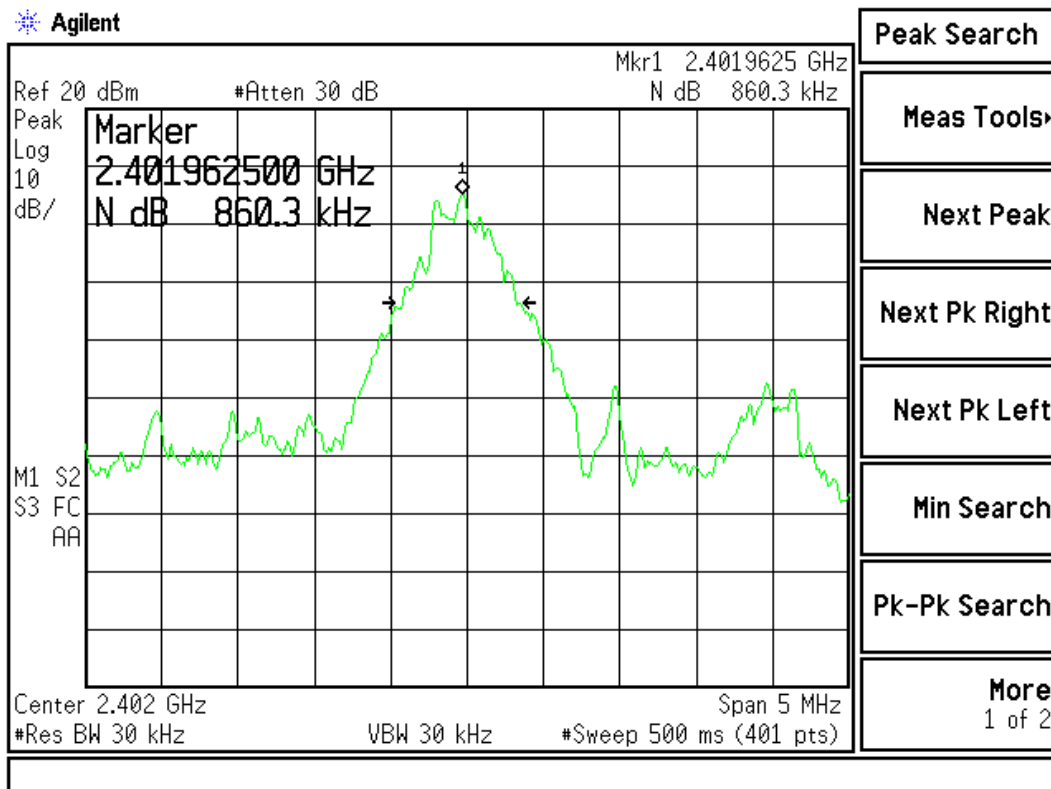
\pm 150Hz

10.6. Test Result of Occupied Bandwidth

Product : Bluetooth GPS Receiver
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Channel No.	Frequency (MHz)	20 dB bandwidth (kHz)	Required Limit (kHz)	Result
00	2402	860.3	NA	NA

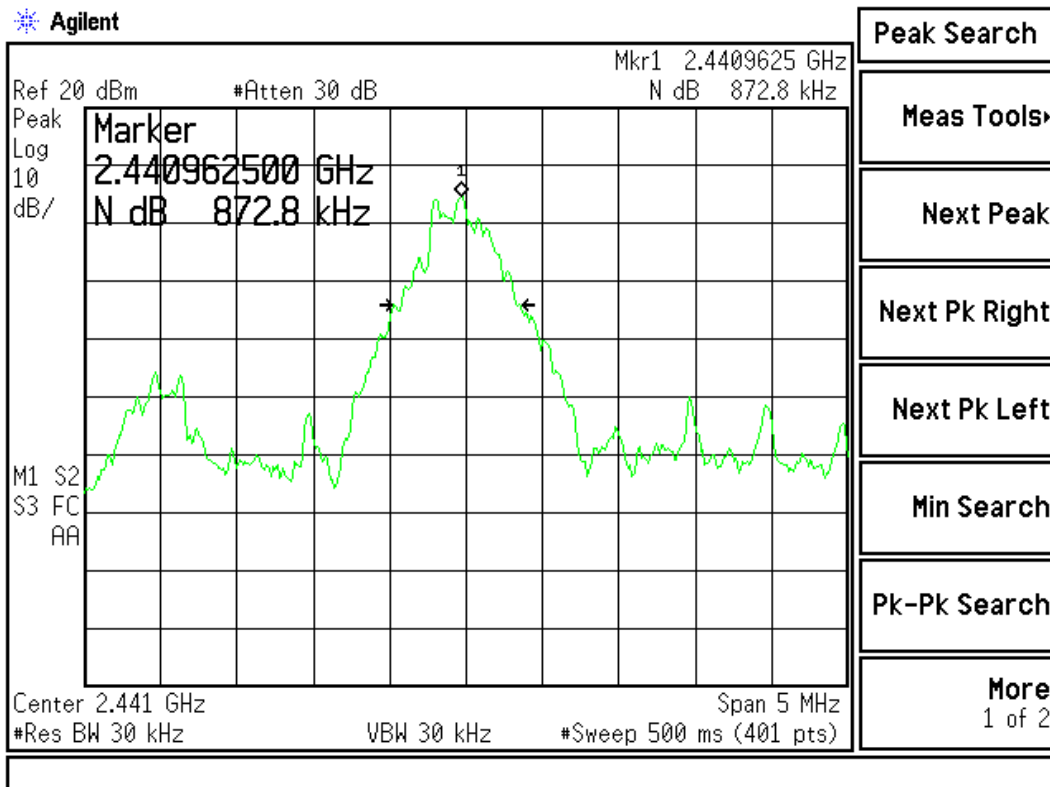
Figure Channel 00:



Product : Bluetooth GPS Receiver
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Channel No.	Frequency (MHz)	20dB bandwidth (kHz)	Required Limit (kHz)	Result
39	2441	872.8	NA	NA

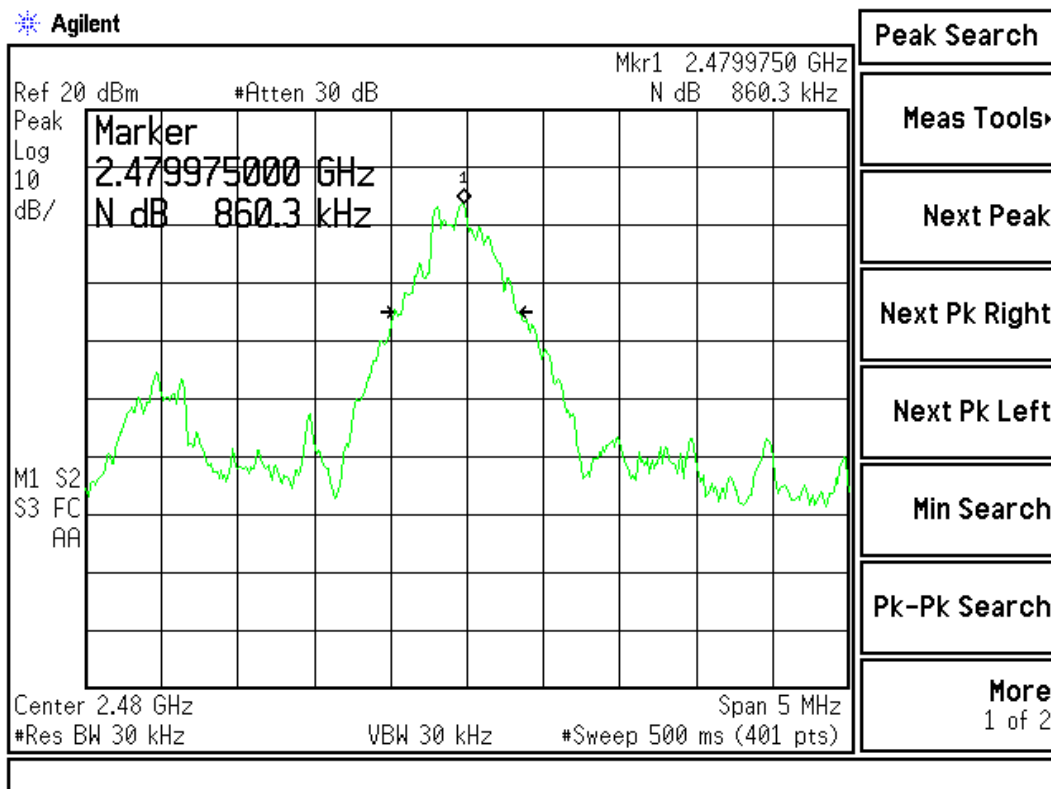
Figure Channel 39:



Product : Bluetooth GPS Receiver
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: USB Link

Channel No.	Frequency (MHz)	20dB bandwidth (kHz)	Required Limit (kHz)	Result
78	2480	860.3	NA	NA

Figure Channel 78:



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.