

FC

Test Report

Product Name	BLUETOOTH DATA LOGGER & RECEIVER
Model No.	LR9553D
FCC ID.	I2ILR9553D

Applicant	Leadtek Research Inc.
Address	18F, No. 166, Chien yi Rd., Chung Ho, Taipei County, Taiwan, (23511) R.O.C.

Date of Receipt	Aug. 17, 2007
Issued Date	Sep. 05, 2007
Report No.	078241R-RFUSP06V01

The Test Results relate only to the samples tested.

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

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

Test Report Certification

Issued Date: Sep. 05, 2007

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Applicant	Leadtek Research Inc.
Address	18F, No. 166, Chien yi Rd., Chung Ho, Taipei County, Taiwan, (23511) R.O.C.
Manufacturer	Leadtek Research Inc.
Model No.	LR9553D
FCC ID.	I2ILR9553D
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 5V
Trade Name	LEADTEK
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



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Vincent Lin

(Deputy Manager / Vincent Lin)



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	BLUETOOTH DATA LOGGER & RECEIVER
Trade Name	LEADTEK
FCC ID.	I2ILR9553D
Model No.	LR9553D
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS / GFSK
Antenna type	Chip
Antenna interface	Soldered on PCB
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: EDACPOWER,M/N:SA0105-A Input: 100-240V,50-60Hz,0.3A Output: DC 5V,1.4A Cable IN: Non-Shielded,1.2m
Car Charge	MFR:SEMDICAR,M/N:IC-MUB-YT1D Input: DC 12V-24V Output: DC 5V,1A

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	Walsin	RFANT5220110A0T	2.66 Bi 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		

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 BLUETOOTH DATA LOGGER & RECEIVER with a built-in 2.4GHz Bluetooth transceiver.
2. 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.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. 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 DATA LOGGER & RECEIVER with a built-in 2.4GHz Bluetooth transceiver. The number of the channels is 79 in 2402-2480MHz. The device adapts the frequency hopping spread spectrum modulation. The antenna is connector-type 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: Transmitter (AC adapter) Mode 2: Transmitter(Car Charge) Mode 3: Transmitter(USB Link PC)
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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:

Model1,2

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m

	Signal Cable Type	Signal cable Description
A.	N/A	N/A

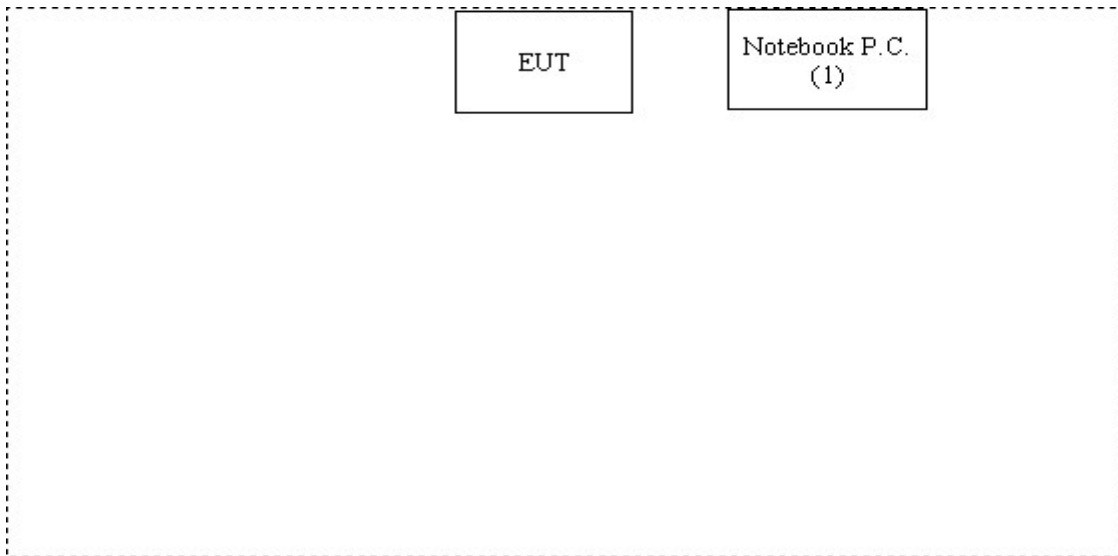
Mode3

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m

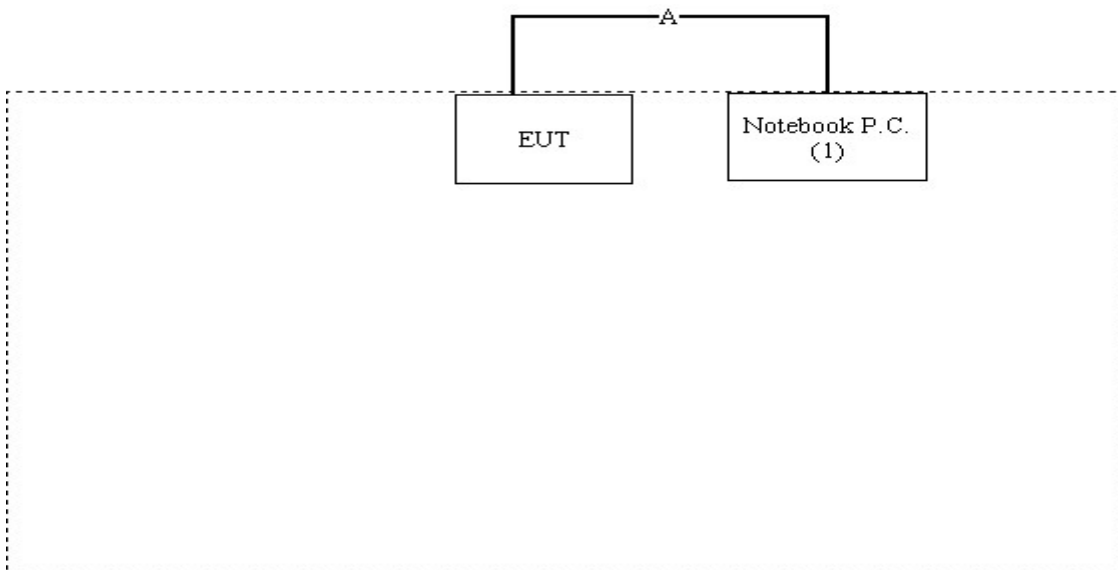
	Signal Cable Type	Signal cable Description
A.	USB Cable	Shielded,1m

1.4. Configuration of Tested System

Model,2



Mode3



1.5. EUT Exercise Software

- (1) Connect the EUT to the notebook via a test fixture.
- (2) Provide DC 5V to the test fixture.
- (3) Execute RF_TEST V1.0 on the notebook.
- (4) Configure the test channel and the packet type.
- (5) Press OK to start the transmission.
- (6) Verify that the EUT works correctly.

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

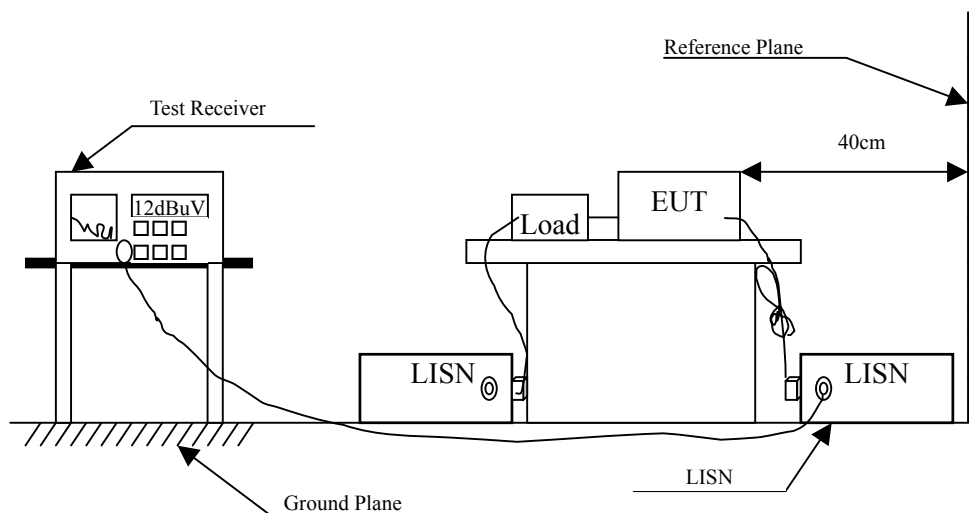
2.1. Test Equipment

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

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 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: 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 refer 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 the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (AC adapter)(2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.404	0.300	41.110	41.410	-17.333	58.743
0.701	0.310	42.370	42.680	-13.320	56.000
1.502	0.330	41.310	41.640	-14.360	56.000
2.505	0.360	41.520	41.880	-14.120	56.000
3.505	0.384	40.910	41.294	-14.706	56.000
4.607	0.420	38.290	38.710	-17.290	56.000
Average					
0.404	0.300	39.180	39.480	-9.263	48.743
0.701	0.310	42.340	42.650	-3.350	46.000
1.502	0.330	40.960	41.290	-4.710	46.000
2.505	0.360	39.640	40.000	-6.000	46.000
3.505	0.384	37.390	37.774	-8.226	46.000
4.607	0.420	34.400	34.820	-11.180	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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (AC adapter)(2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.201	0.300	41.390	41.690	-22.853	64.543
0.400	0.310	41.310	41.620	-17.237	58.857
0.603	0.310	42.350	42.660	-13.340	56.000
2.505	0.360	39.580	39.940	-16.060	56.000
3.505	0.390	39.280	39.670	-16.330	56.000
4.509	0.410	32.090	32.500	-23.500	56.000
Average					
0.201	0.300	36.180	36.480	-18.063	54.543
0.400	0.310	41.200	41.510	-7.347	48.857
0.603	0.310	40.000	40.310	-5.690	46.000
2.505	0.360	37.450	37.810	-8.190	46.000
3.505	0.390	35.870	36.260	-9.740	46.000
4.509	0.410	30.150	30.560	-15.440	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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmitter(Car Charge) -Voltage (VCC) (2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.181	0.400	61.230	61.630	-3.484	65.114
0.365	0.400	54.440	54.840	-5.017	59.857
10.084	0.400	11.940	12.340	-47.660	60.000
14.193	0.600	24.690	25.290	-34.710	60.000
23.080	0.600	18.710	19.310	-40.690	60.000
29.939	0.600	12.020	12.620	-47.380	60.000
Average					
0.181	0.400	48.440	48.840	-6.274	55.114
0.365	0.400	45.070	45.470	-4.387	49.857
10.084	0.400	6.280	6.680	-43.320	50.000
14.193	0.600	20.450	21.050	-28.950	50.000
23.080	0.600	11.750	12.350	-37.650	50.000
29.939	0.600	4.390	4.990	-45.010	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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmitter(Car Charge) -Voltage (GND) (2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.158	0.400	59.540	59.940	-5.831	65.771
4.556	0.310	27.410	27.720	-28.280	56.000
9.509	0.390	22.900	23.290	-36.710	60.000
12.287	0.503	33.830	34.333	-25.667	60.000
13.884	0.600	19.370	19.970	-40.030	60.000
21.224	0.600	19.440	20.040	-39.960	60.000
Average					
0.158	0.400	53.420	53.820	-1.951	55.771
4.556	0.310	21.460	21.770	-24.230	46.000
9.509	0.390	11.190	11.580	-38.420	50.000
12.287	0.503	33.820	34.323	-15.677	50.000
13.884	0.600	12.950	13.550	-36.450	50.000
21.224	0.600	13.730	14.330	-35.670	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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 3: Transmitter(USB Link PC) (2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.150	0.300	47.660	47.960	-18.040	66.000
0.580	0.300	38.860	39.160	-16.840	56.000
0.845	0.310	36.980	37.290	-18.710	56.000
1.857	0.340	41.240	41.580	-14.420	56.000
3.826	0.390	47.540	47.930	-8.070	56.000
10.127	0.600	35.640	36.240	-23.760	60.000
Average					
0.150	0.300	34.850	35.150	-20.850	56.000
0.580	0.300	27.710	28.010	-17.990	46.000
0.845	0.310	25.750	26.060	-19.940	46.000
1.857	0.340	32.590	32.930	-13.070	46.000
3.826	0.390	33.390	33.780	-12.220	46.000
10.127	0.600	29.970	30.570	-19.430	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 DATA LOGGER & RECEIVER
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 3: Transmitter(USB Link PC) (2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.177	0.300	42.500	42.800	-22.429	65.229
0.392	0.310	36.590	36.900	-22.186	59.086
0.861	0.320	37.970	38.290	-17.710	56.000
1.912	0.350	36.310	36.660	-19.340	56.000
3.771	0.390	42.400	42.790	-13.210	56.000
19.728	0.900	33.240	34.140	-25.860	60.000
Average					
0.177	0.300	27.470	27.770	-27.459	55.229
0.392	0.310	33.890	34.200	-14.886	49.086
0.861	0.320	12.090	12.410	-33.590	46.000
1.912	0.350	30.420	30.770	-15.230	46.000
3.771	0.390	28.850	29.240	-16.760	46.000
19.728	0.900	32.610	33.510	-16.490	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

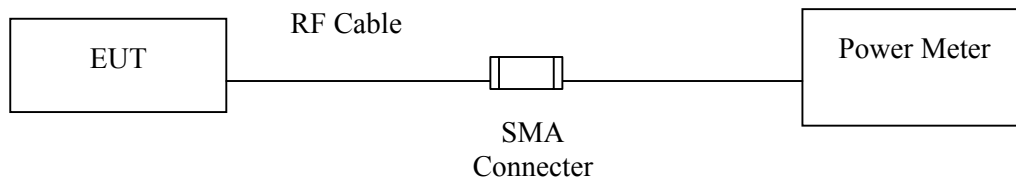
3.1. Test Equipment

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 every one year.
2. The test instruments marked by “X” 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

± 1.27 dB

3.5. Test Result of Peak Power Output

Product : BLUETOOTH DATA LOGGER & RECEIVER
Test Item : Peak Power Output
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter(Car Charge)

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 00	2402.00	-6.40 dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.00	-6.70 dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.00	-6.80 dBm	1 Watt= 30 dBm	Pass

4. Radiated Emission

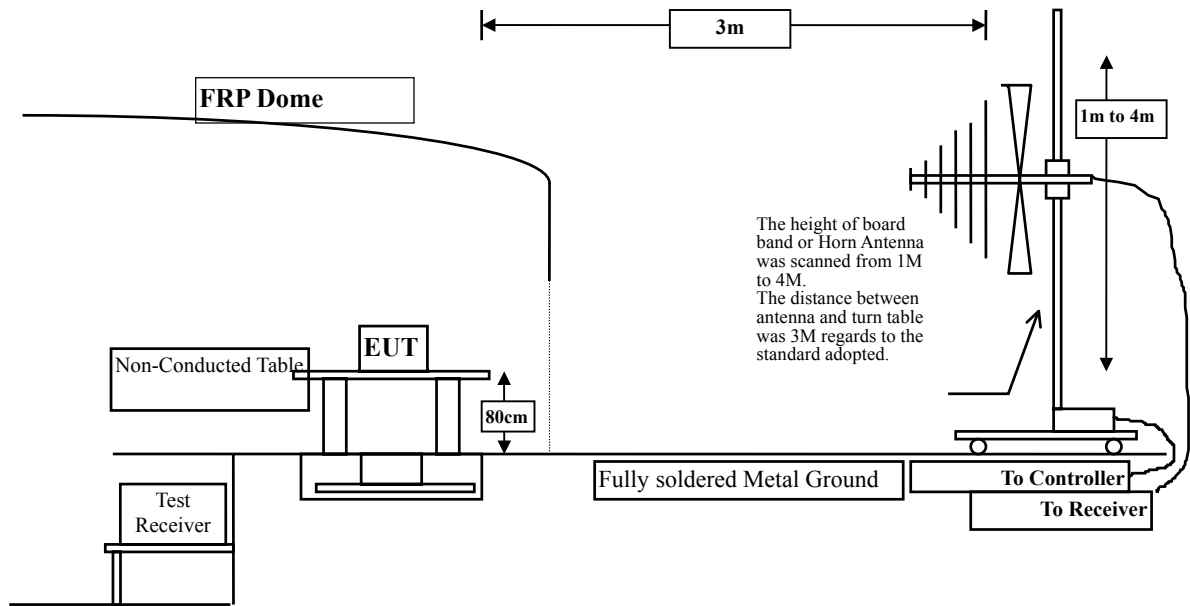
4.1. Test Equipment

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

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐ 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
☐ 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
☒ 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 every one year.
2. The test instruments marked by "X" 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 is 120 kHz, above 1GHz are 1 MHz.

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 DATA LOGGER & RECEIVER
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2402MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	2.888	43.840	46.727	-27.273	74.000
7206.000	9.442	41.729	51.170	-22.830	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4804.000	2.888	47.721	50.608	-23.392	74.000
7206.000	9.442	41.463	50.904	-23.096	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:3KHz; 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 DATA LOGGER & RECEIVER
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter(Car Charge)(2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4882.000	3.056	43.702	46.758	-27.242	74.000
7323.000	9.570	41.076	50.645	-23.355	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4882.000	3.056	48.098	51.154	-22.846	74.000
7323.000	9.570	40.967	50.536	-23.464	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:3KHz; 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 DATA LOGGER & RECEIVER
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2480MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	3.237	38.772	42.009	-31.991	74.000
7440.000	9.689	41.276	50.964	-23.036	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4960.000	3.237	45.572	48.809	-25.191	74.000
7440.000	9.689	41.276	50.964	-23.036	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:3KHz; 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 DATA LOGGER & RECEIVER
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (AC adapter)(2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
112.450	13.038	10.359	23.397	-20.103	43.500
192.475	9.304	14.036	23.340	-20.160	43.500
299.175	14.130	9.552	23.682	-22.318	46.000
473.355	18.675	8.944	27.619	-18.381	46.000
658.070	20.821	2.575	23.396	-22.604	46.000
839.500	21.979	8.440	30.418	-15.582	46.000
Vertical					
192.475	9.382	13.888	23.270	-20.230	43.500
257.950	14.277	8.147	22.424	-23.576	46.000
398.600	17.966	12.220	30.186	-15.814	46.000
565.925	21.227	5.358	26.585	-19.415	46.000
730.825	22.912	0.713	23.625	-22.375	46.000
810.850	21.702	8.713	30.415	-15.585	46.000

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 DATA LOGGER & RECEIVER
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 2: Transmitter(Car Charge) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
111.200	13.094	17.106	30.200	-13.300	43.500
214.300	9.334	24.514	33.848	-9.652	43.500
354.900	15.224	16.876	32.100	-13.900	46.000
658.000	20.821	13.144	33.965	-12.035	46.000
839.500	21.979	11.680	33.658	-12.342	46.000
929.120	23.025	10.620	33.645	-12.355	46.000
Vertical					
175.200	9.772	23.493	33.265	-10.235	43.500
352.300	15.373	18.176	33.548	-12.452	46.000
473.775	18.378	14.220	32.598	-13.402	46.000
595.369	21.808	13.311	35.120	-10.880	46.000
665.360	19.974	13.974	33.948	-12.052	46.000
925.000	24.099	9.555	33.654	-12.346	46.000

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 DATA LOGGER & RECEIVER
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 3: Transmitter(USB Link PC) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
192.475	9.304	13.367	22.671	-20.829	43.500
299.175	14.130	11.152	25.282	-20.718	46.000
473.200	18.689	0.680	19.369	-26.631	46.000
602.650	20.187	4.173	24.360	-21.640	46.000
730.285	21.309	-3.711	17.598	-28.402	46.000
922.000	23.038	3.837	26.875	-19.125	46.000
Vertical					
207.025	10.040	18.668	28.708	-14.792	43.500
398.600	17.966	7.048	25.015	-20.985	46.000
500.454	18.354	6.006	24.360	-21.640	46.000
619.275	21.591	4.960	26.551	-19.449	46.000
810.850	21.702	3.227	24.929	-21.071	46.000
929.675	24.177	0.192	24.369	-21.631	46.000

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. Band Edge

5.1. Test Equipment

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

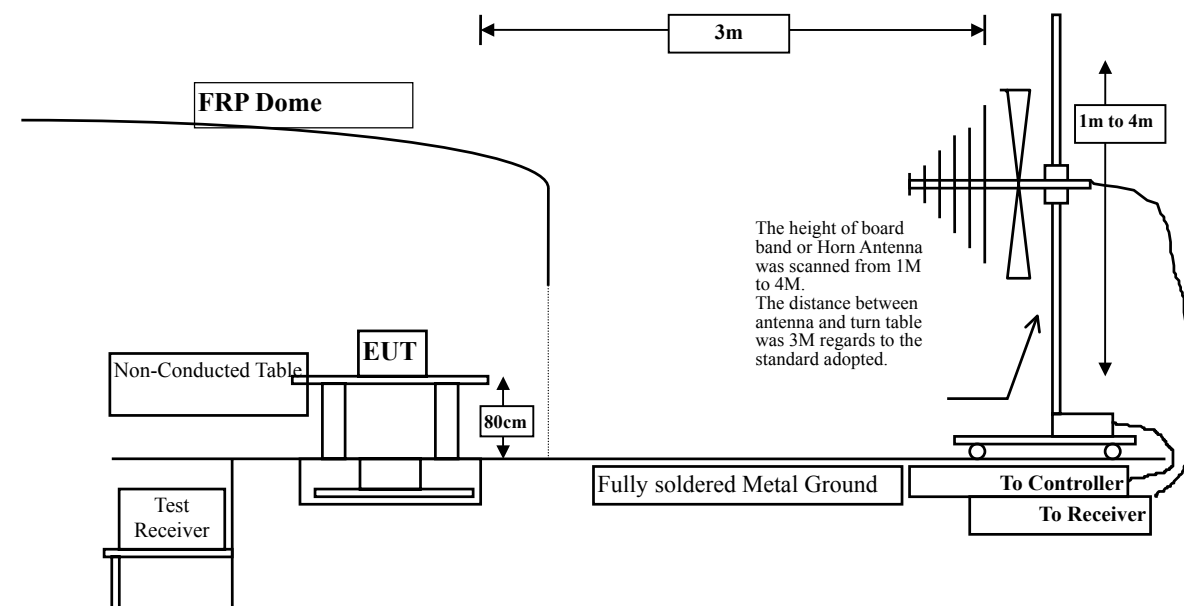
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
X	Spectrum Analyzer	HP	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170 / 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	HP	8449B / 3008A01123	July, 2007

Test Site Site 3

- Note:
1. All equipments are calibrated every one year.
 2. The test instruments marked by "X" 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 is 120 kHz, above 1GHz are 1 MHz.

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

5.6. Test Result of Band Edge

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2402MHz)

RF Radiated Measurement:

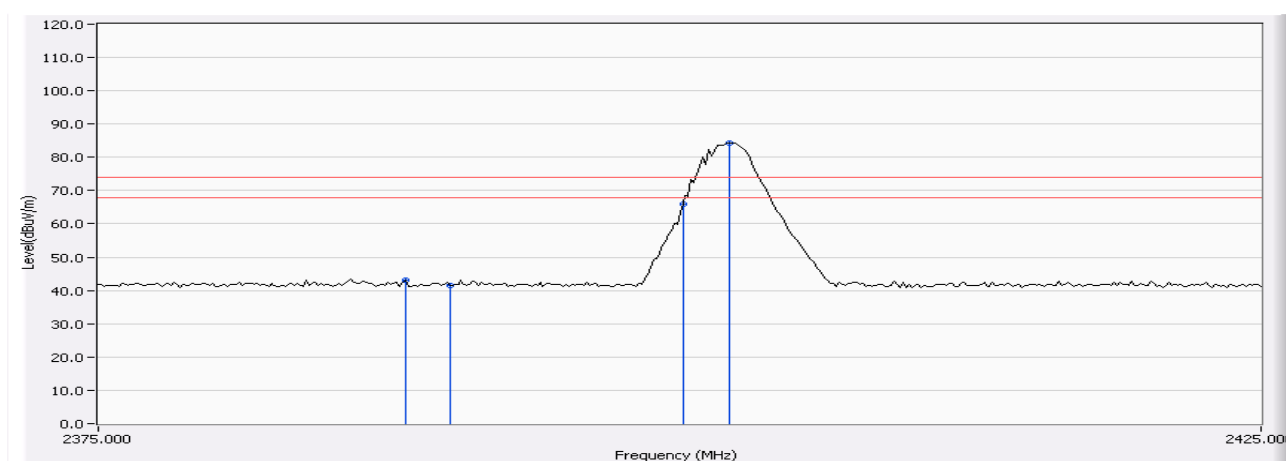
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2388.125	-1.413	44.508	43.095	74.00	54.00	Pass
00(Peak)	2390.000	-1.407	42.887	41.480	74.00	54.00	Pass
00(Peak)	2400.000	-1.363	67.198	65.835	74.00	54.00	Pass
00(Peak)	2402.000	-1.357	85.690	85.933	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

Figure Channel 00:

Horizontal (Peak)



Note:

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

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2402MHz)

RF Radiated Measurement:

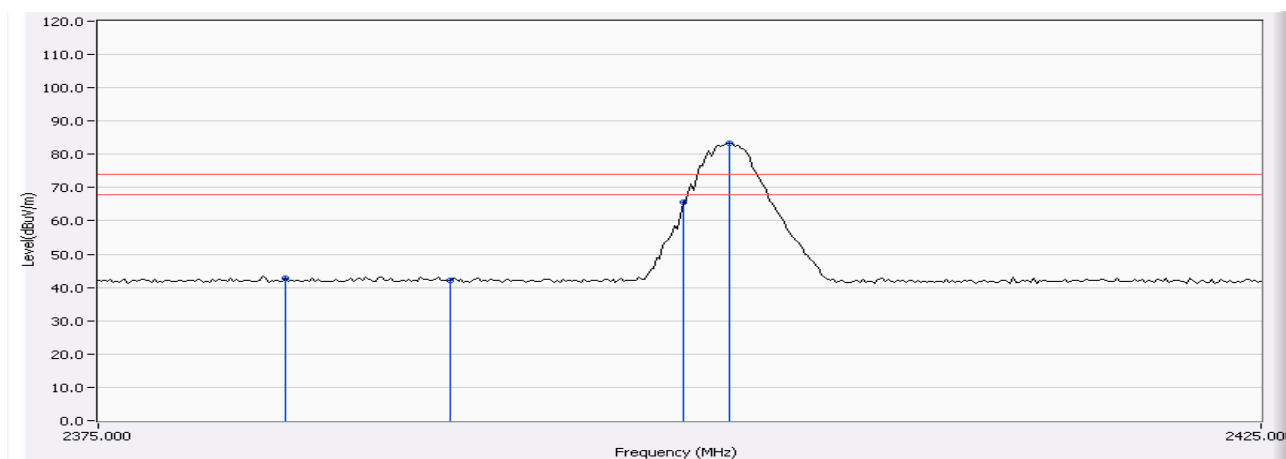
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2383.000	-1.428	44.367	42.939	74.00	54.00	Pass
00(Peak)	2390.000	-1.407	43.625	42.218	74.00	54.00	Pass
00(Peak)	2400.000	-1.363	66.891	65.528	74.00	54.00	Pass
00(Peak)	2402.000	-1.357	84.764	85.607	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

Figure Channel 00:

Vertical (Peak)



Note:

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

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2480MHz)

RF Radiated Measurement:

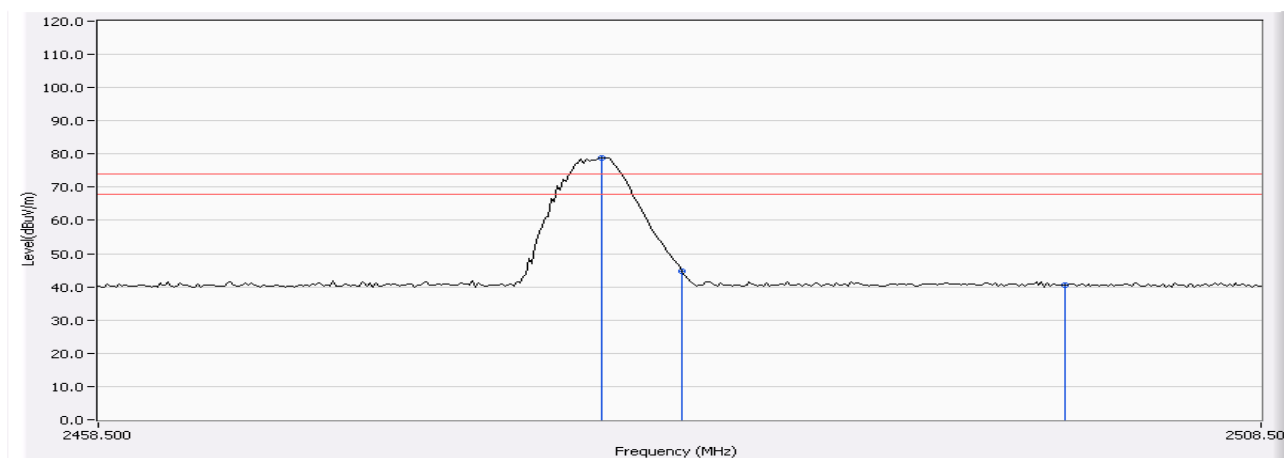
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78	>2483.5	>20	Pass

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	-1.048	79.804	78.756	74.00	54.00	Pass
78 (Peak)	2483.500	-1.037	45.665	44.628	74.00	54.00	Pass
78 (Peak)	2500.000	-0.988	41.499	40.511	74.00	54.00	Pass
78 (Avg)	--	--	--	--	74.00	54.00	Pass

Figure Channel 78:

Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2480MHz)

RF Radiated Measurement:

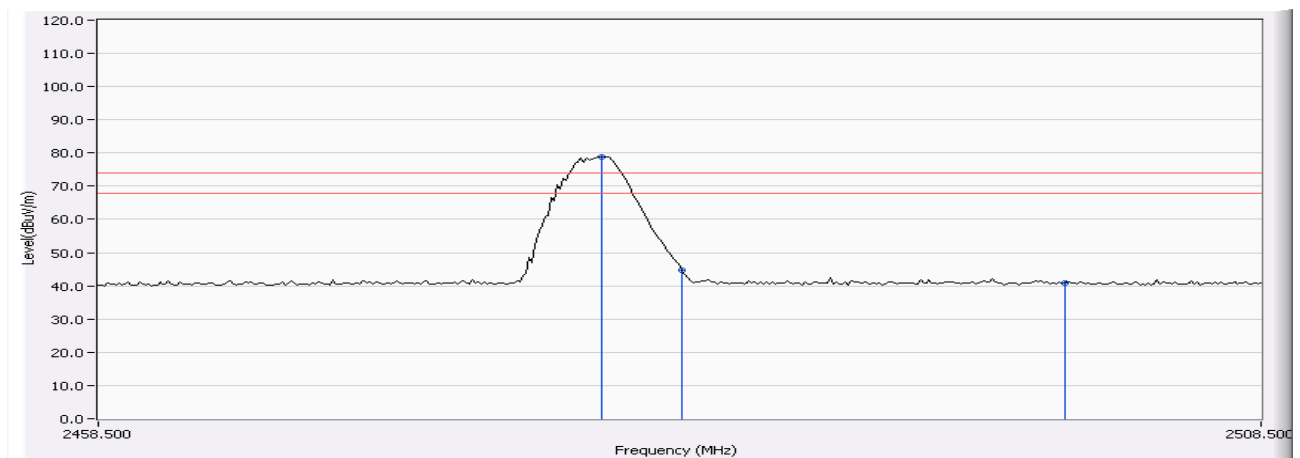
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78	>2483.5	>20	Pass

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78 (Peak)	2480.000	-1.048	79.804	78.756	74.00	54.00	Pass
78 (Peak)	2483.500	-1.037	45.665	44.628	74.00	54.00	Pass
78 (Peak)	2500.000	-0.988	41.972	40.984	74.00	54.00	Pass
78 (Avg)	--	--	--	--	74.00	54.00	Pass

Figure Channel 78:

Vertical (Peak)



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

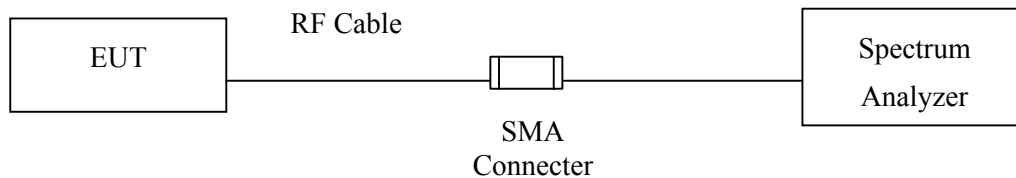
6.1. Test Equipment

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

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

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” 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

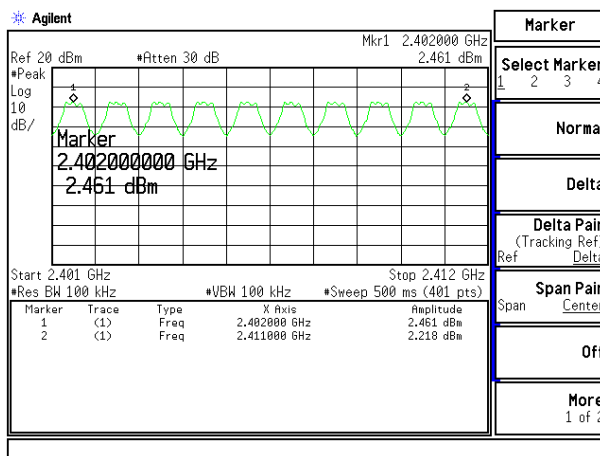
N/A

6.5. Test Result of Channel Number

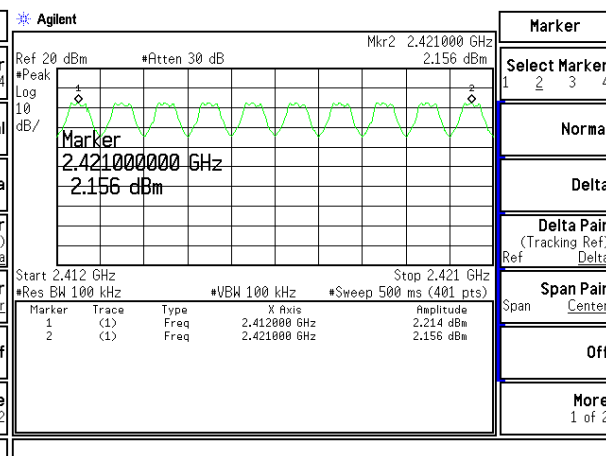
Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)

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

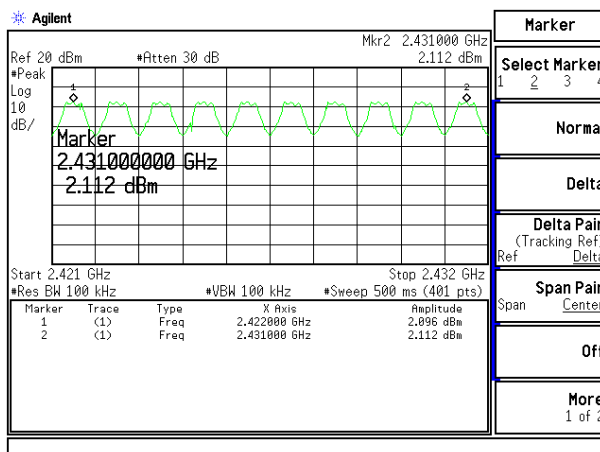
2402-2411MHz



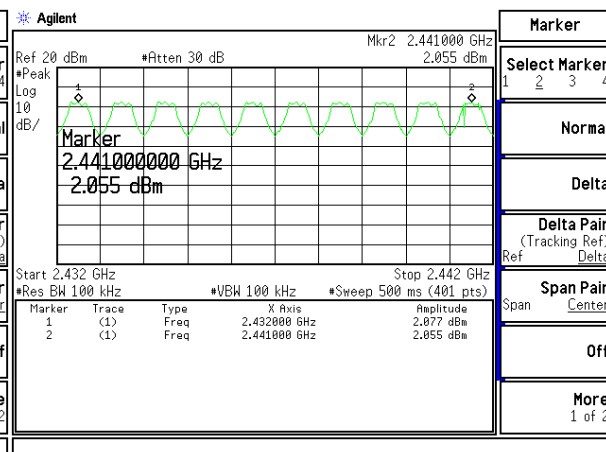
2412-2421MHz



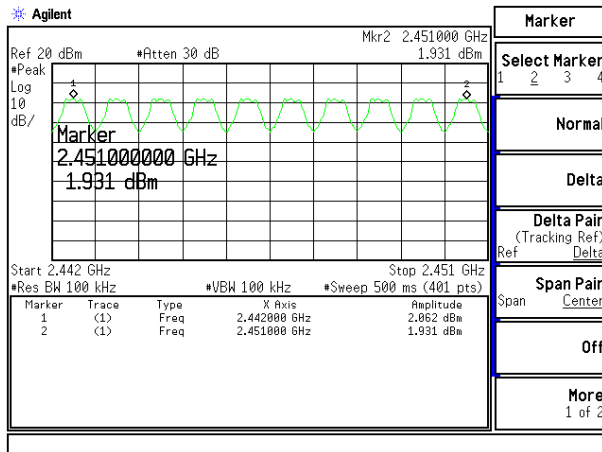
2422-2431MHz



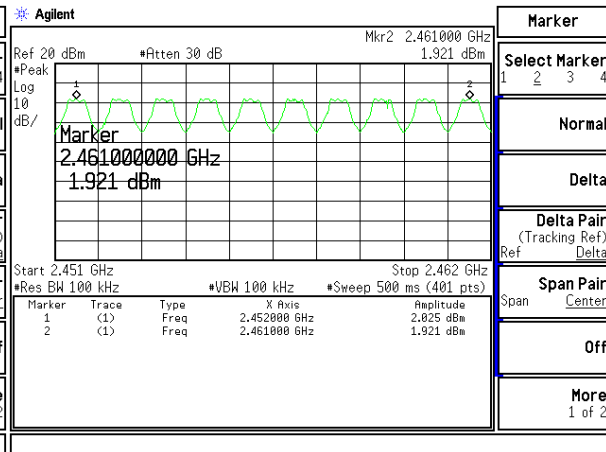
2432-2441MHz



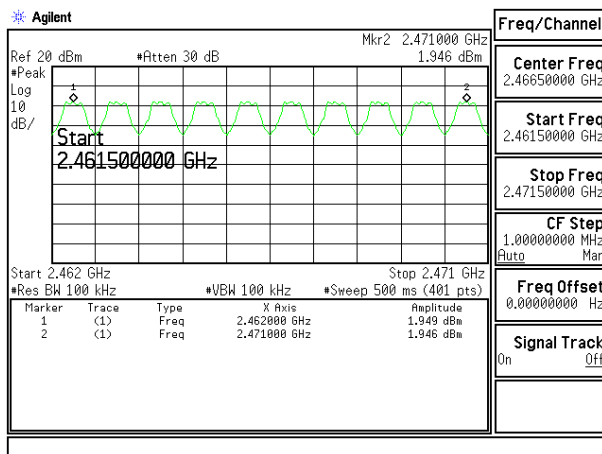
2442-2451MHz



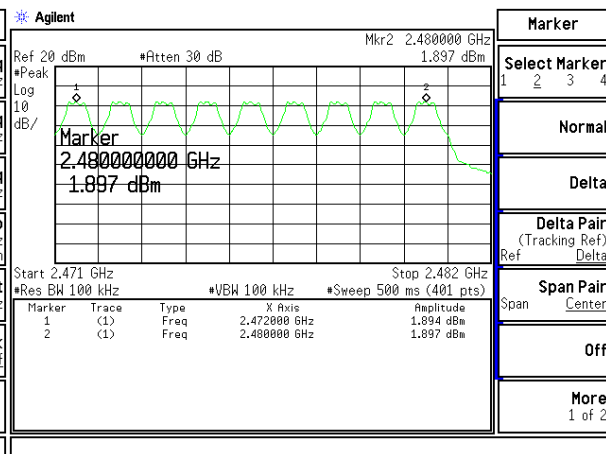
2452-2461MHz



2462-2471MHz



2472-2480MHz



7. Channel Separation

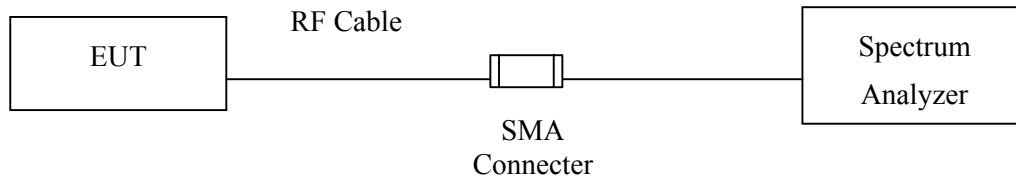
7.1. Test Equipment

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

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

Note: 1. All equipments are calibrated every one year.
2. The test instruments mark by “X” 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

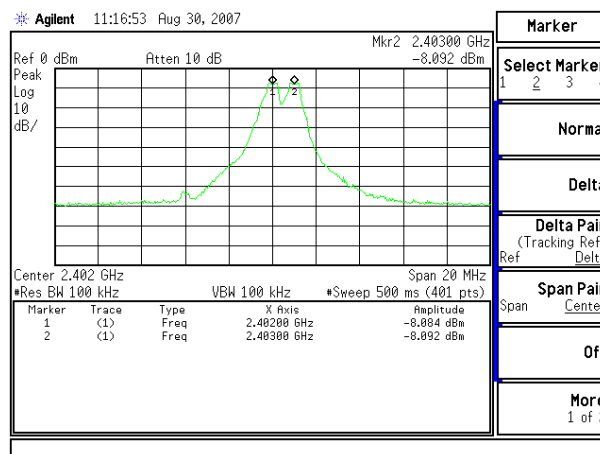
$\pm 150\text{Hz}$

7.5. Test Result of Channel Separation

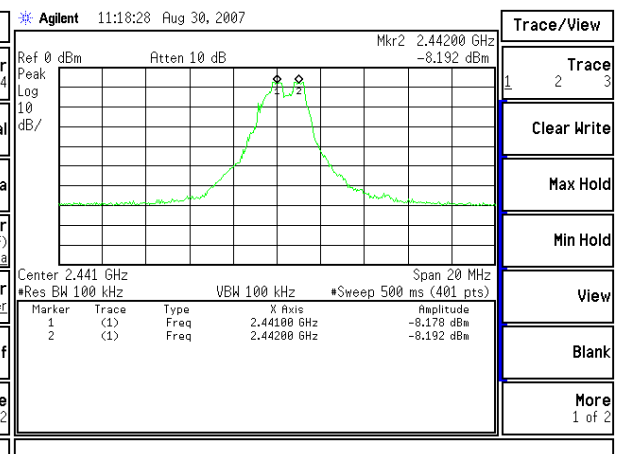
Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)

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

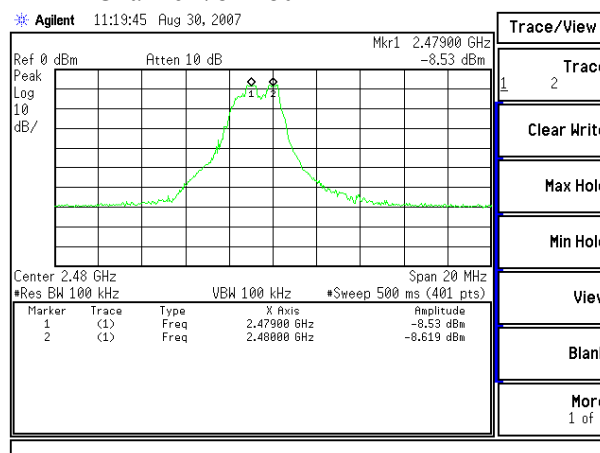
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz



8. Dwell Time

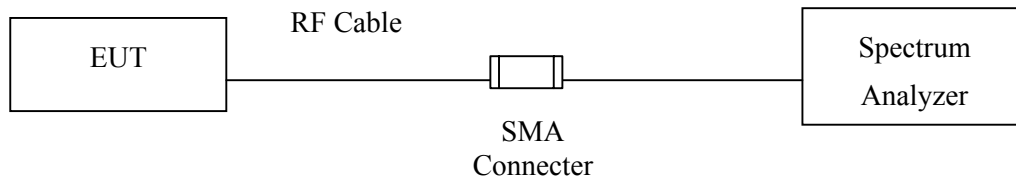
8.1. Test Equipment

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

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

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” 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

± 25msec

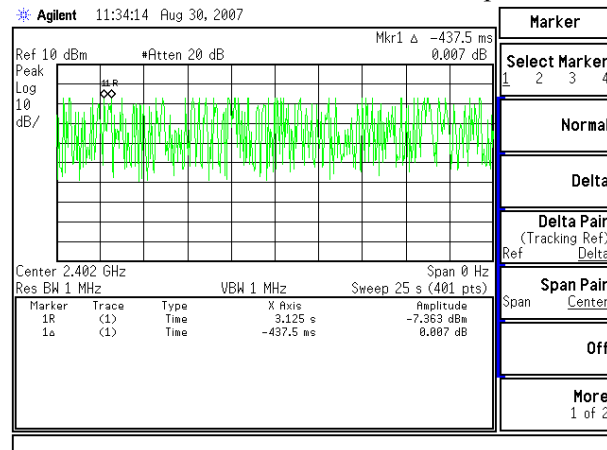
8.5. Test Result of Dwell Time

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(Channel 00,39,78 –DH5)

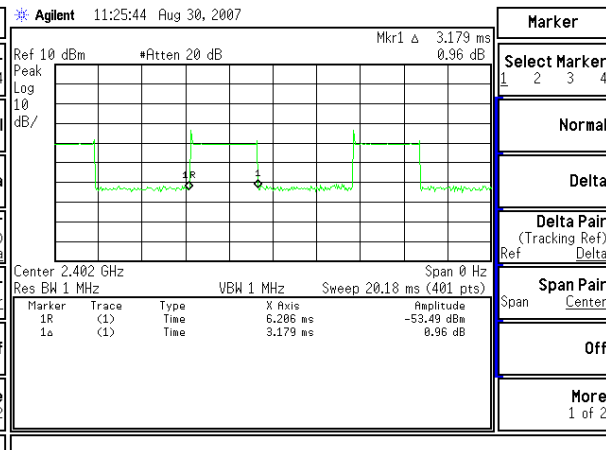
Channel No.	Frequency (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
00	2402	437.5	3179	229.6146	400	Pass
39	2441	375	3330	280.6080	400	Pass
78	2480	375	3179	267.8837	400	Pass

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

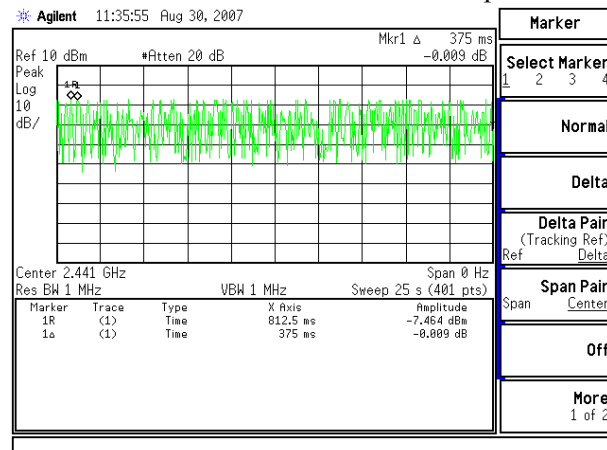
CH 2402MHz Time Interval between hops



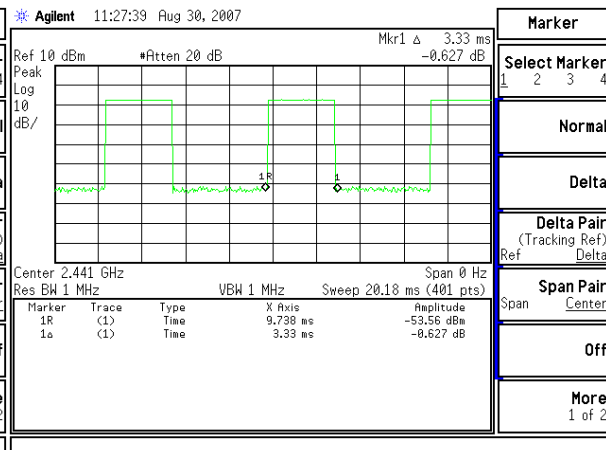
Transmission Time



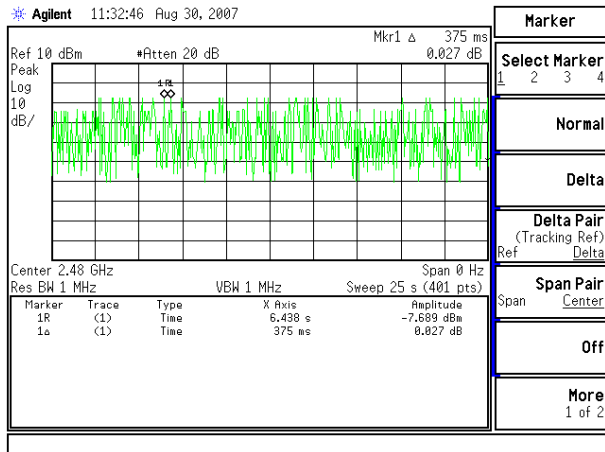
CH 2441MHz Time Interval between hops



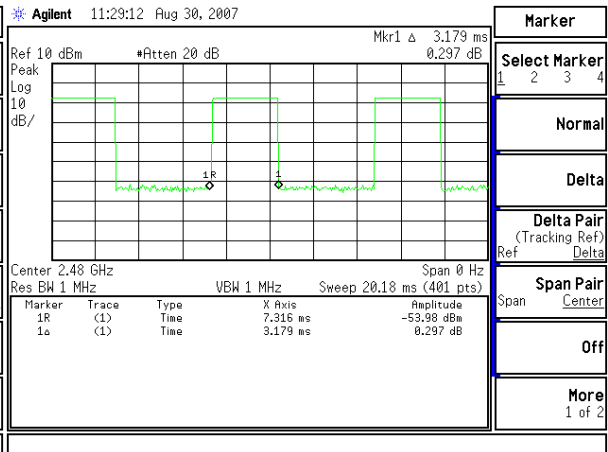
Transmission Time



CH 2480MHz Time Interval between hops



Transmission Time



Note:

The dwell times of the packet type DH5 are tested.

9. Occupied Bandwidth

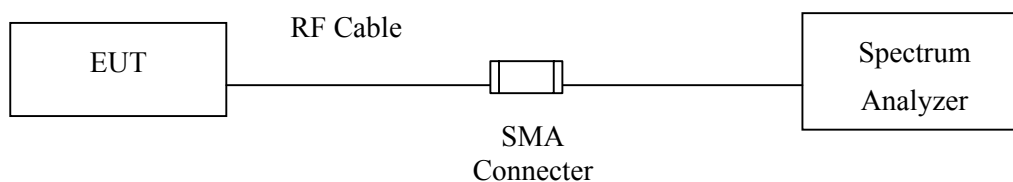
9.1. Test Equipment

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

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

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

9.2. Test Setup



9.3. Limits

N/A

9.4. Uncertainty

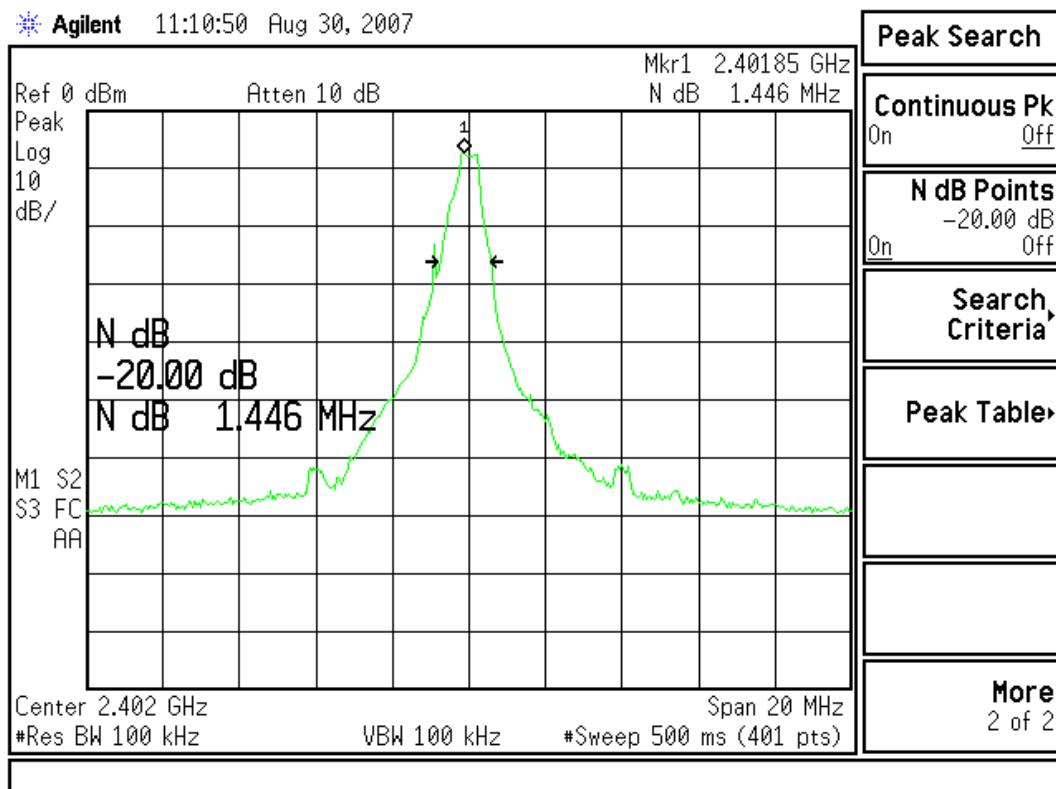
± 150Hz

9.5. Test Result of Occupied Bandwidth

Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1446	--	NA

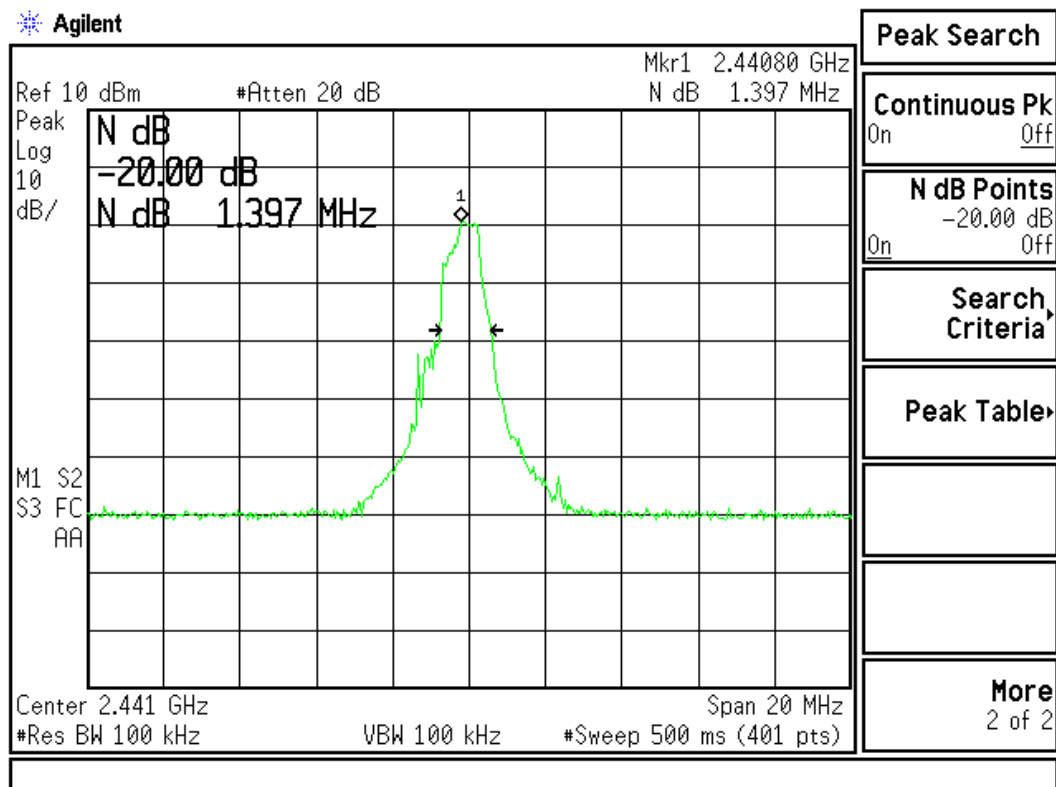
Figure Channel 00:



Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1397	--	NA

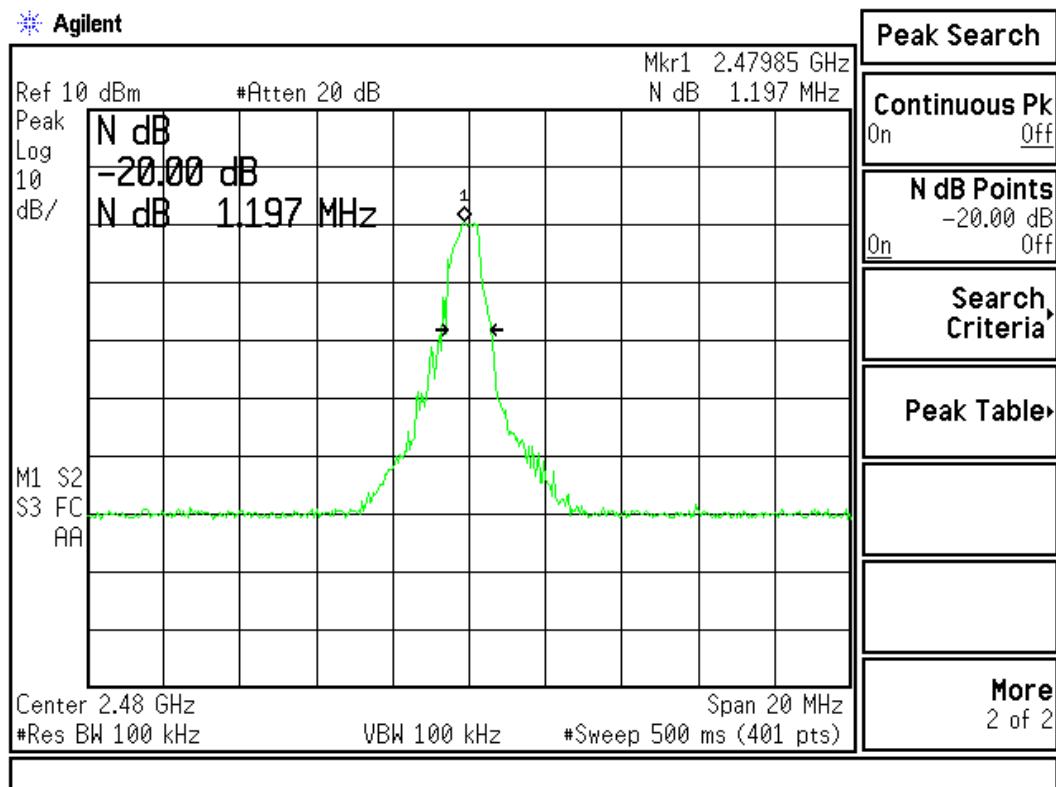
Figure Channel 39:



Product : BLUETOOTH DATA LOGGER & RECEIVER
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter(Car Charge)(2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1197	--	NA

Figure Channel 78:



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

Front View of Conducted Test (AC adapter)



Back View of Conducted Test (AC adapter)



Front View of Conducted Test (Car Charge)



Back View of Conducted Test (Car Charge)



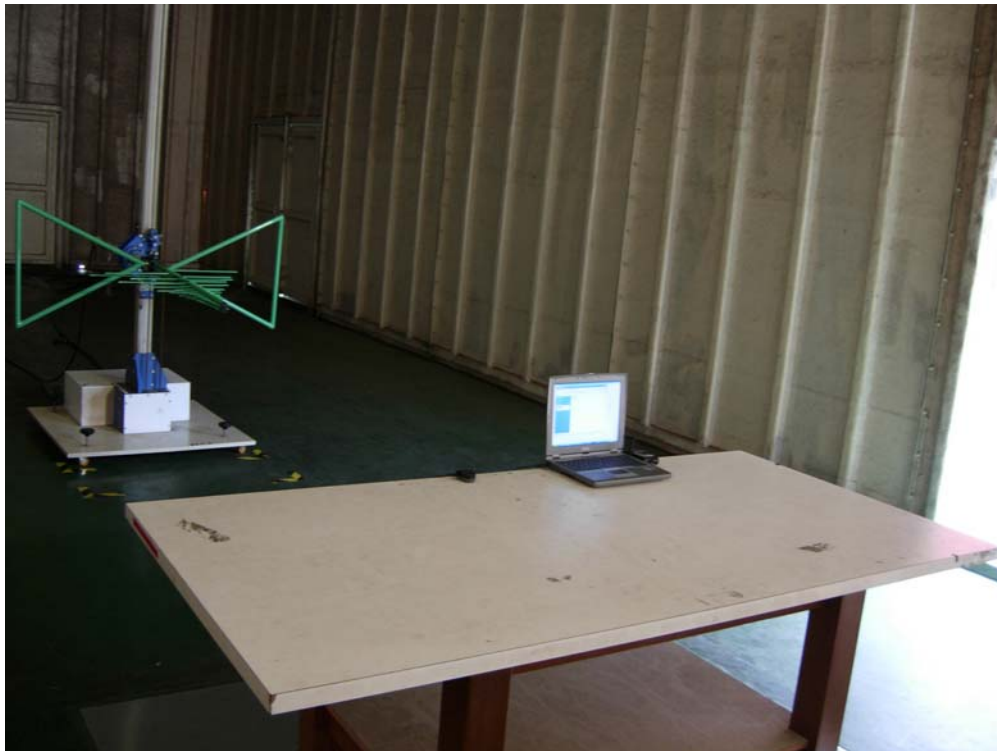
Front View of Conducted Test (USB Link PC)



Back View of Conducted Test (USB Link PC)



Front View of Radiated Test (AC adapter)



Back View of Radiated Test (AC adapter)



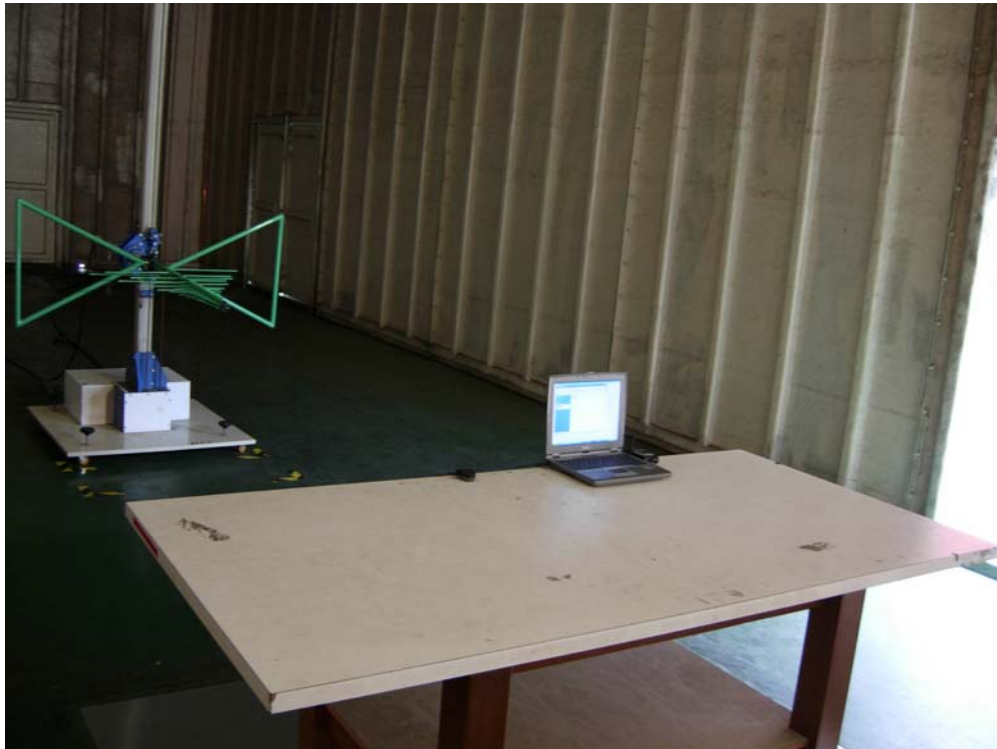
Front View of Radiated Test (Car Charge)



Back View of Radiated Test (Car Charge)



Front View of Radiated Test (USB Link PC)



Back View of Radiated Test (USB Link PC)



Front View of Radiated Test (Horn) (Car Charge)



Back View of Radiated Test (Horn) (Car Charge)



Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

(1) EUT Photo



(2) EUT Photo



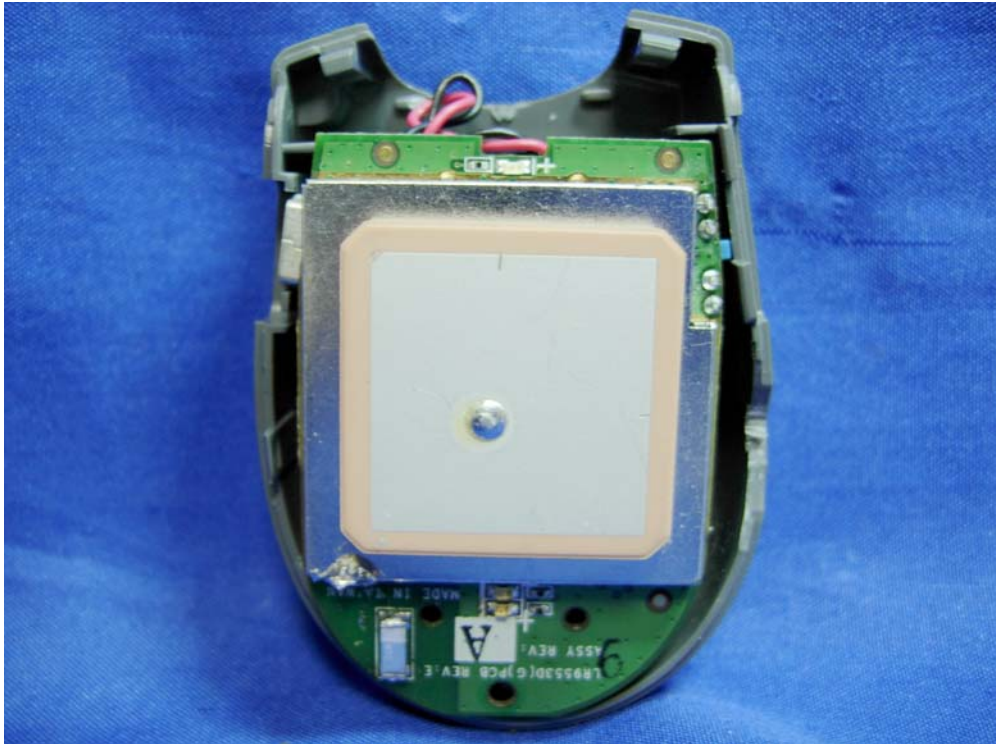
(3) EUT Photo



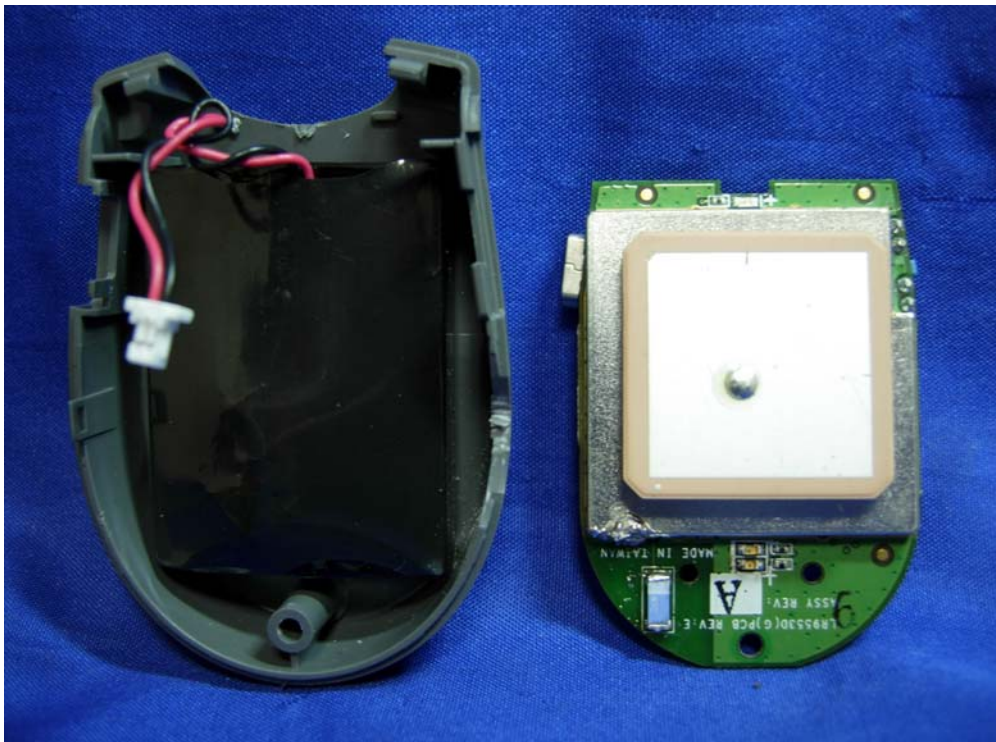
(4) EUT Photo



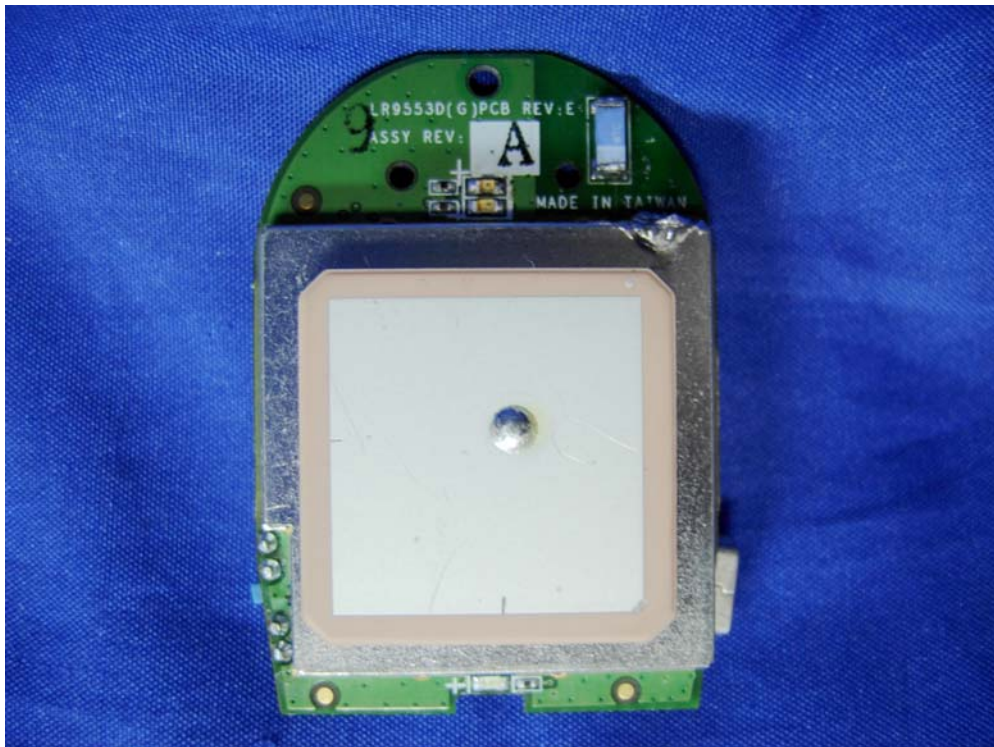
(5) EUT Photo



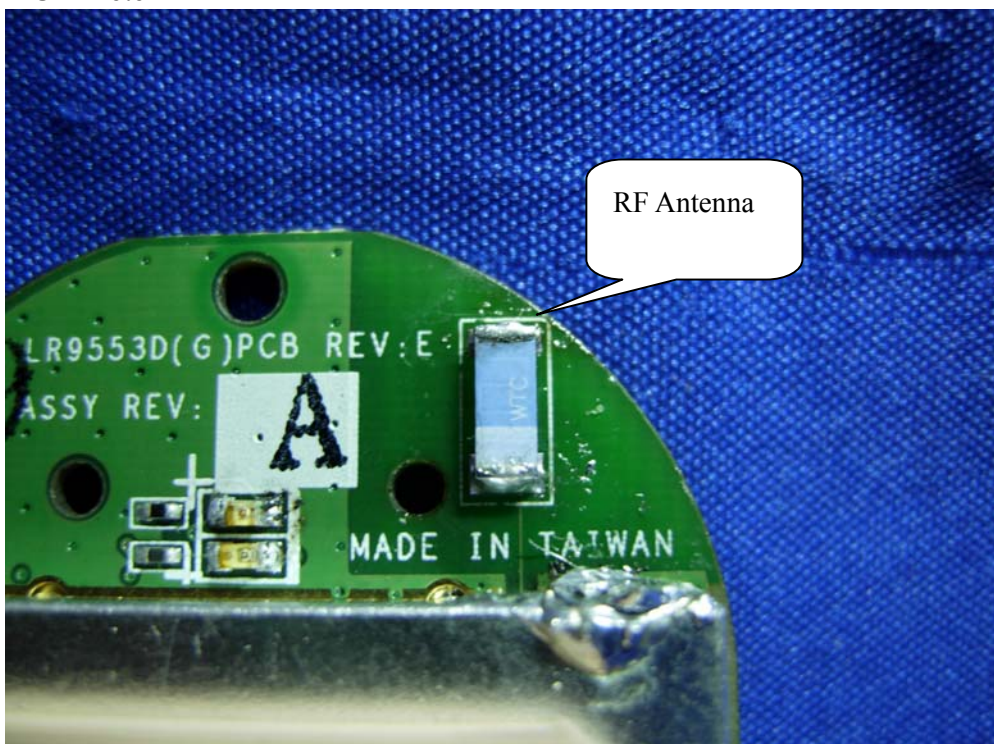
(6) EUT Photo



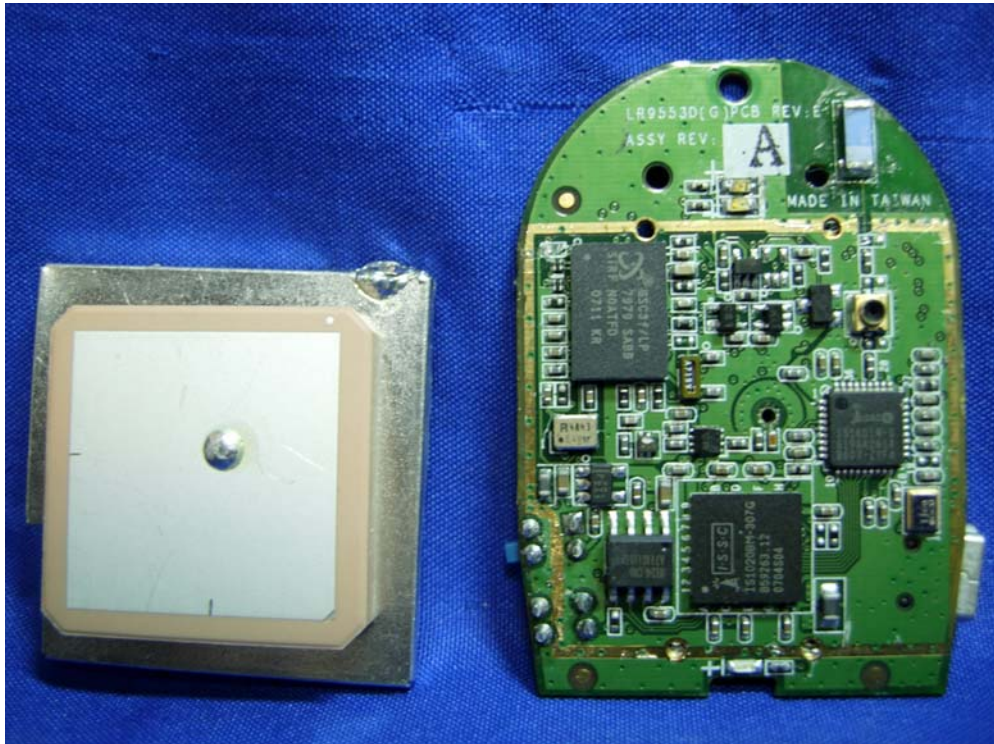
(7) EUT Photo



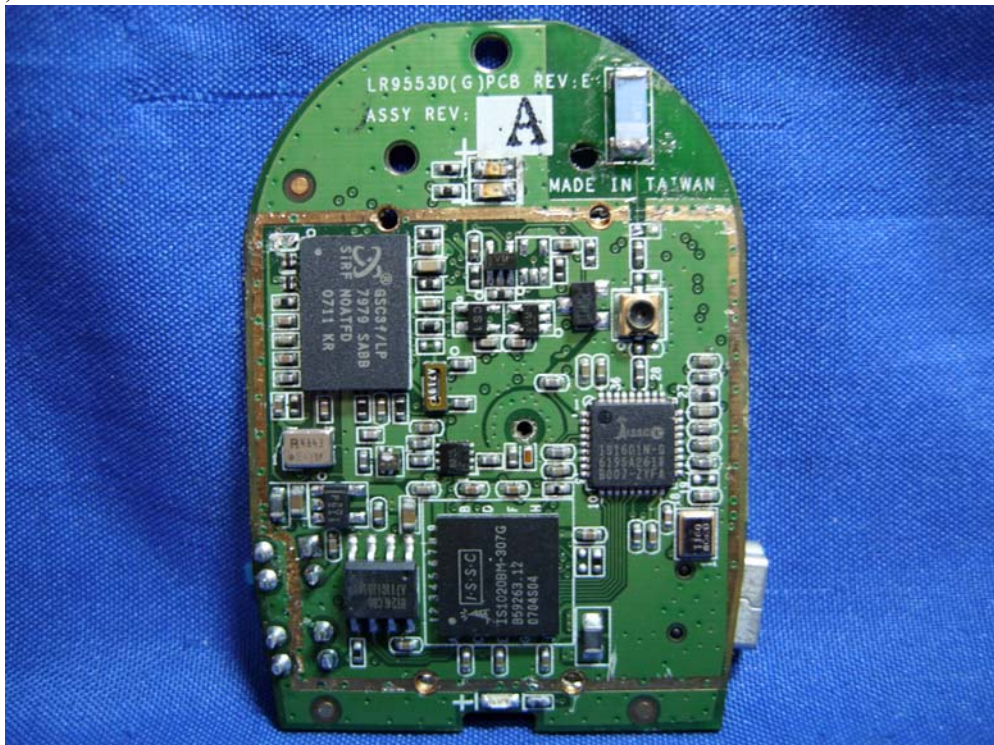
(8) EUT Photo



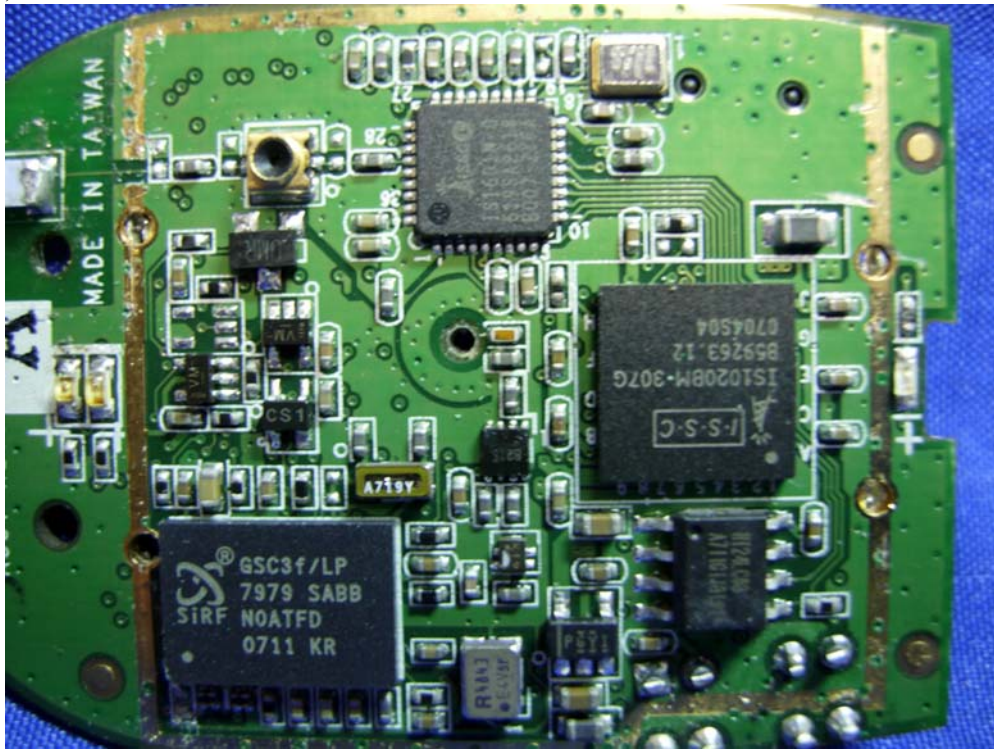
(9) EUT Photo



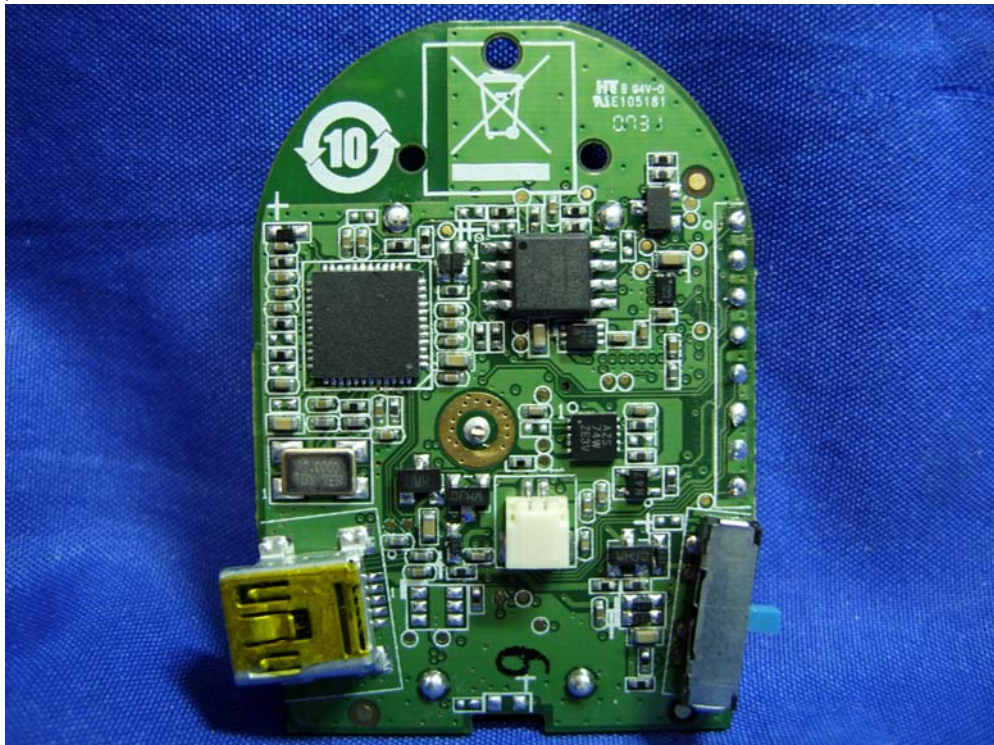
(10) EUT Photo



(11) EUT Photo



(12) EUT Photo



(13) EUT Photo



(14) EUT Photo



(15) EUT Photo



(16) EUT Photo



(17) EUT Photo



(18) EUT Photo



(19) EUT Photo



(20) EUT Photo



(21) EUT Photo

