

FC

Test Report

Product Name	Portable Navigation Device
Model No.	PD-17
FCC ID.	OW3PD-17

Applicant	Nokia Gmbh
Address	Rensingstrasse 15 Bochum D-44807 Germany

Date of Receipt	2007/09/26
Issued Date	2007/10/02
Report No.	079194R-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: 2007/10/02

Report No.: 079194R-RFUSP06V01



Product Name	Portable Navigation Device
Applicant	Nokia Gmbh
Address	Rensingstrasse 15 Bochum D-44807 Germany
Manufacturer	Nokia Gmbh
Model No.	PD-17
FCC ID.	OW3PD-17
EUT Voltage	DC 5V
Rated Voltage	Input: DC 12V-24V Output: DC 5V
Trade Name	Nokia
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



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Tested By : Dino Chen
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Approved By : Vincent Lin
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TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	7
1.3. Tested System Details.....	8
2.1. Configuration of Tested System	8
2.2. EUT Exercise Software	8
2.3. Test Facility	9
3. CONDUCTED EMISSION	10
3.1. Test Equipment.....	10
3.2. Test Setup	10
3.3. Limits.....	11
3.4. Test Procedure	11
3.5. Uncertainty	11
3.6. Test Result of Conducted Emission	12
4. PEAK POWER OUTPUT	14
4.1. Test Equipment.....	14
4.2. Test Setup	14
4.3. Limit	14
4.4. Test Procedure	14
4.5. Uncertainty	14
4.6. Test Result of Peak Power Output	15
5. RADIATED EMISSION	16
5.1. Test Equipment.....	16
5.2. Test Setup	17
5.3. Limits.....	17
5.4. Test Procedure	18
5.5. Uncertainty	18
5.6. Test Result of Radiated Emission	19
6. BAND EDGE	23
6.1. Test Equipment.....	23
6.2. Test Setup	23
6.3. Limit	24
6.4. Test Procedure	24
6.5. Uncertainty	24
6.6. Test Result of Band Edge	25
7. CHANNEL NUMBER.....	29

7.1.	Test Equipment	29
7.2.	Test Setup	29
7.3.	Limit	29
7.4.	Test Procedure	29
7.5.	Uncertainty	29
7.6.	Test Result of Channel Number.....	30
8.	CHANNEL SEPARATION.....	32
8.1.	Test Equipment	32
8.2.	Test Setup	32
8.3.	Limit	32
8.4.	Test Procedure	32
8.5.	Uncertainty	32
8.6.	Test Result of Channel Separation.....	33
9.	DWELL TIME.....	34
9.1.	Test Equipment	34
9.2.	Test Setup	34
9.3.	Limit	34
9.4.	Test Procedure	34
9.5.	Uncertainty	34
9.6.	Test Result of Dwell Time.....	35
10.	OCCUPIED BANDWIDTH	37
10.1.	Test Equipment	37
10.2.	Test Setup	37
10.3.	Limits.....	37
10.4.	Test Procedure	37
10.5.	Uncertainty	37
10.6.	Test Result of Occupied Bandwidth	38
11.	EMI REDUCTION METHOD DURING COMPLIANCE TESTING	41
12.	SECOND SOURCE LIST.....	42
ATTACHMENT 1: EUT TEST SETUP PHOTOGRAPHS.....		43
ATTACHMENT 2 : EUT DETAILED PHOTOGRAPHS.....		46

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Portable Navigation Device
Trade Name	Nokia
Model No.	PD-17
FCC ID.	OW3PD-17
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS
Antenna type	Chip
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

Component	
HW version	DVT2.2
SW version	1.0.32

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	LITE-ON	KYBNA100030040AD-R	0.32dBi 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 Portable Navigation Device 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 Portable Navigation Device 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 Chip-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-DH5
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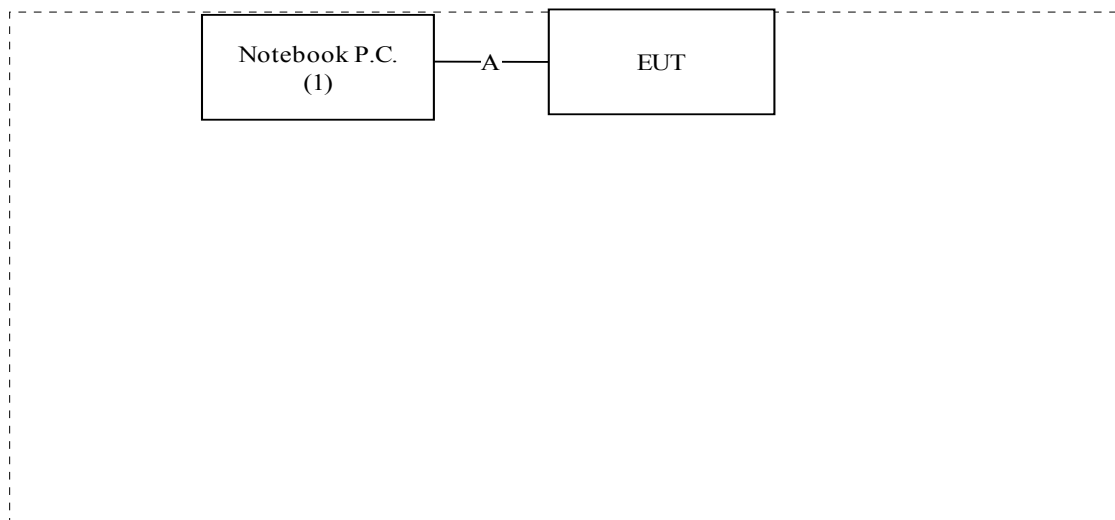
1.3. Tested System Details

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	PP04X	2D2ZM1S	Non-Shielded, 0.8m

	Signal Cable Type	Signal cable Description
2.	RS-232 Cable	Shielded, 1.5m

2.1. Configuration of Tested System



2.2. EUT Exercise Software

1	EUT shall be placed on the center of the testing table.
2	Starting Notebook pc and EUT after the power on.
3	Execute Bluetest.exe on the Notebook pc.
4	Configure the test channel and the packet type as follow: CH00, CH39, CH78
5	Press "OK" to start the continuous transmission/receiving.
6	After the set-up, starting the test and data shall be recorded in the test report.

2.3. 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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Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
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FCC Accreditation Number: TW1014

3. Conducted Emission

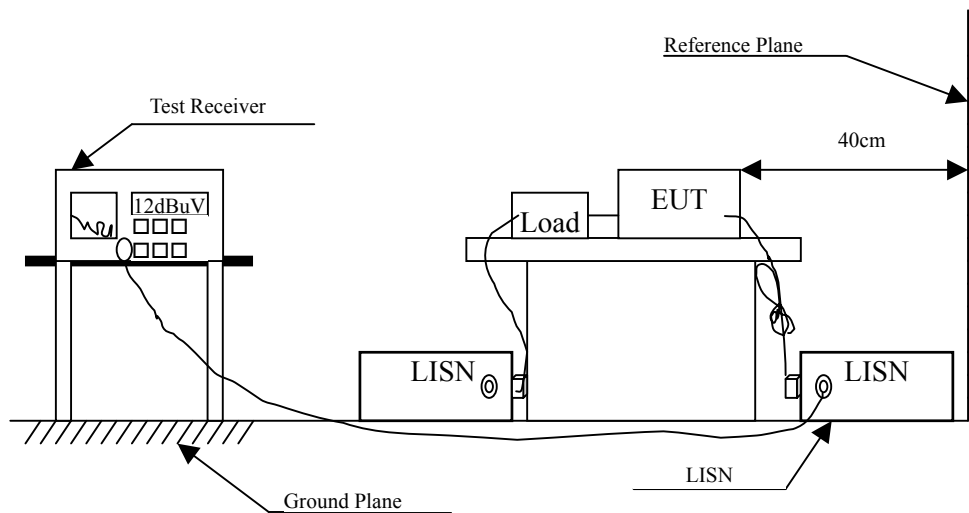
3.1. Test Equipment

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.

3.2. Test Setup



3.3. 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.

3.4. 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.

3.5. Uncertainty

± 2.26 dB

3.6. Test Result of Conducted Emission

Product : Portable Navigation Device
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter-DH5

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.271	0.300	38.680	38.980	-23.563	62.543
0.365	0.300	39.860	40.160	-19.697	59.857
0.459	0.300	35.480	35.780	-21.391	57.171
0.634	0.302	28.970	29.272	-26.728	56.000
1.193	0.320	31.640	31.960	-24.040	56.000
3.857	0.392	23.490	23.882	-32.118	56.000
Average					
0.271	0.300	30.700	31.000	-21.543	52.543
0.365	0.300	32.320	32.620	-17.237	49.857
0.459	0.300	27.590	27.890	-19.281	47.171
0.634	0.302	21.590	21.892	-24.108	46.000
1.193	0.320	21.640	21.960	-24.040	46.000
3.857	0.392	6.740	7.132	-38.868	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 : Portable Navigation Device
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmitter-DH5

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.193	0.300	42.950	43.250	-21.521	64.771
0.279	0.300	37.320	37.620	-24.694	62.314
0.365	0.310	35.840	36.150	-23.707	59.857
0.701	0.310	35.800	36.110	-19.890	56.000
0.912	0.320	27.830	28.150	-27.850	56.000
1.369	0.330	27.250	27.580	-28.420	56.000
Average					
0.193	0.300	37.690	37.990	-16.781	54.771
0.279	0.300	25.750	26.050	-26.264	52.314
0.365	0.310	25.830	26.140	-23.717	49.857
0.701	0.310	26.590	26.900	-19.100	46.000
0.912	0.320	19.920	20.240	-25.760	46.000
1.369	0.330	14.960	15.290	-30.710	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

4. Peak Power Output

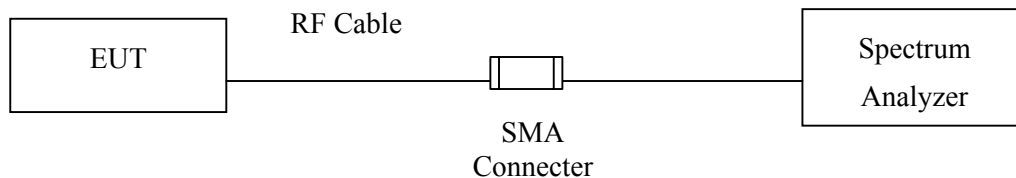
4.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power sensor	Anritsu	MA2491A/034457	June,2007
X	Peak power meter	Anritsu	ML2495A/6K00003357	June,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. Limit

The maximum peak power shall be less 1Watt.

4.4. Test Procedure

This test procedure is found in FCC PUBLIC NOTICE DA 00-705.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

4.5. Uncertainty

± 1.27 dB

4.6. Test Result of Peak Power Output

Product : Portable Navigation Device
Test Item : Peak Power Output
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter-DH5

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 00	2402.00	-0.93dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.00	-0.82dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.00	-0.51dBm	1 Watt= 30 dBm	Pass

5. Radiated Emission

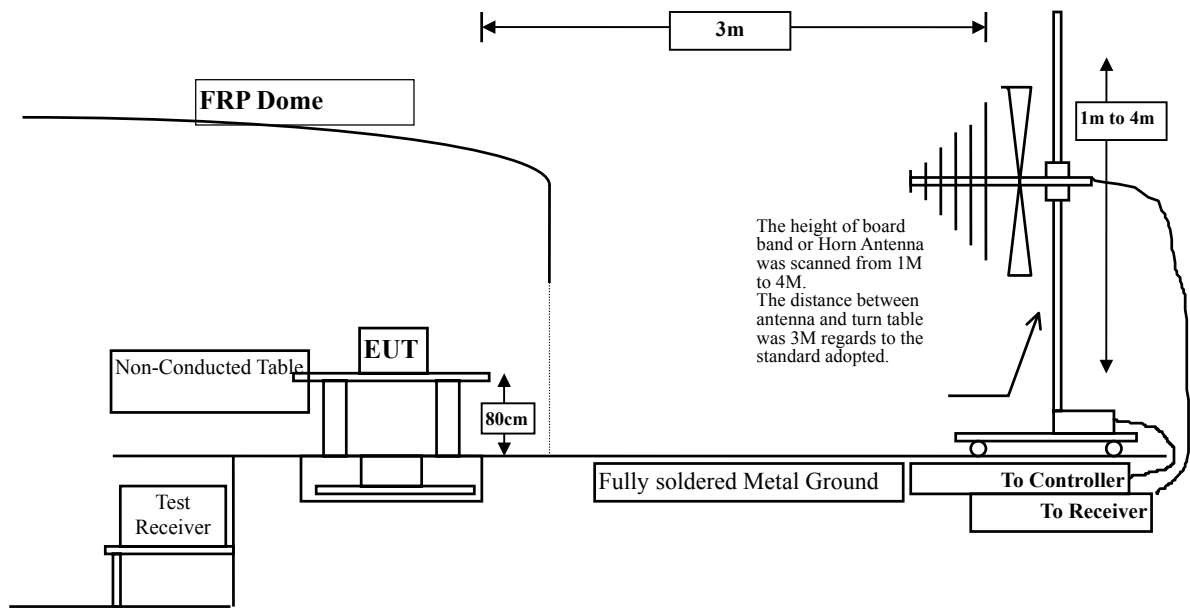
5.1. Test Equipment

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.

5.2. Test Setup



5.3. 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.

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 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.

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

5.6. Test Result of Radiated Emission

Product : Portable Navigation Device
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2402MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	2.888	42.314	45.202	-28.798	74.000
7206.000	9.442	40.146	49.587	-24.413	74.000
9608.000	10.484	38.831	49.315	-24.685	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4804.000	2.888	46.396	49.283	-24.717	74.000
7206.000	9.442	40.494	49.935	-24.065	74.000
9608.000	10.484	40.040	50.524	-23.476	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 : Portable Navigation Device
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (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	41.582	44.638	-29.362	74.000
7323.000	9.570	40.320	49.889	-24.111	74.000
9764.000	10.614	39.045	49.659	-24.341	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4882.000	3.056	44.207	47.263	-26.737	74.000
7323.000	9.570	40.471	50.040	-23.960	74.000
9764.000	10.614	38.790	49.404	-24.596	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 : Portable Navigation Device
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (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	42.405	45.642	-28.358	74.000
7440.000	9.689	39.241	48.929	-25.071	74.000
9920.000	10.742	38.950	49.691	-24.309	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4960.000	3.237	46.437	49.674	-24.326	74.000
7440.000	9.689	41.295	50.983	-23.017	74.000
9920.000	10.742	39.008	49.749	-24.251	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 : Portable Navigation Device
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
143.975	11.109	23.458	34.566	-8.934	43.500
228.850	9.982	28.640	38.622	-7.378	46.000
335.550	13.281	23.615	36.896	-9.104	46.000
401.025	15.491	19.606	35.097	-10.903	46.000
531.975	17.402	14.314	31.716	-14.284	46.000
876.325	20.286	12.565	32.851	-13.149	46.000
Vertical					
265.225	13.404	22.445	35.849	-10.151	46.000
304.025	12.665	20.706	33.371	-12.629	46.000
391.325	16.183	15.878	32.061	-13.939	46.000
534.400	18.189	14.421	32.610	-13.390	46.000
876.325	20.935	11.374	32.310	-13.690	46.000
966.050	21.146	13.335	34.481	-19.519	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.

6. Band Edge

6.1. Test Equipment

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

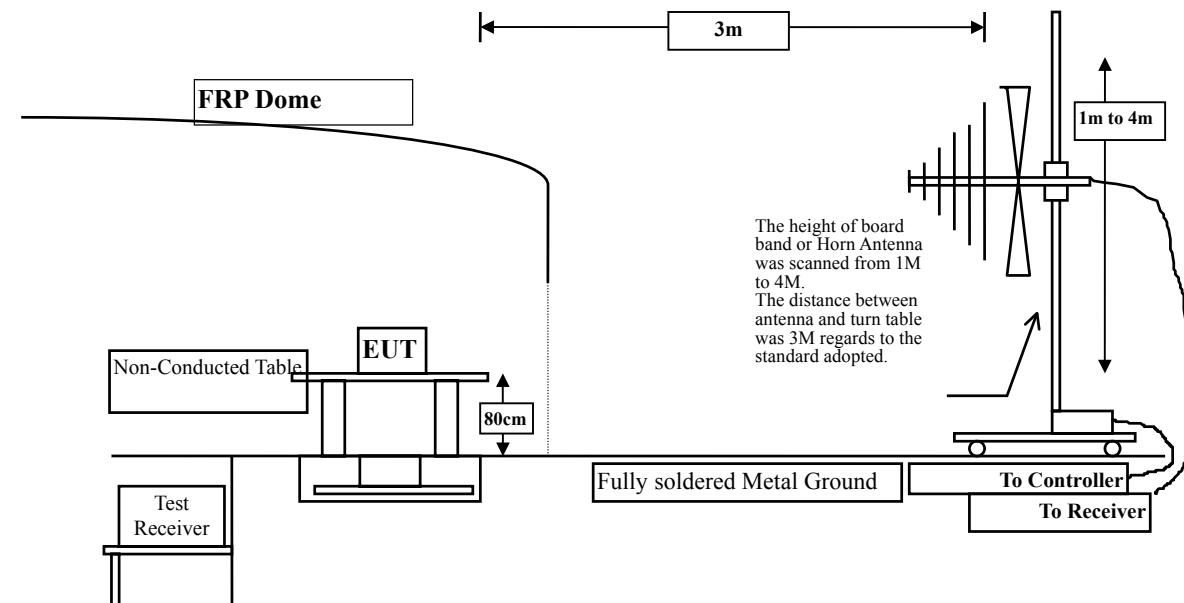
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
X	Spectrum Analyzer	HP	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170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

6.2. Test Setup

RF Radiated Measurement:



6.3. 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)).

6.4. 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.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Portable Navigation Device
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2402MHz)

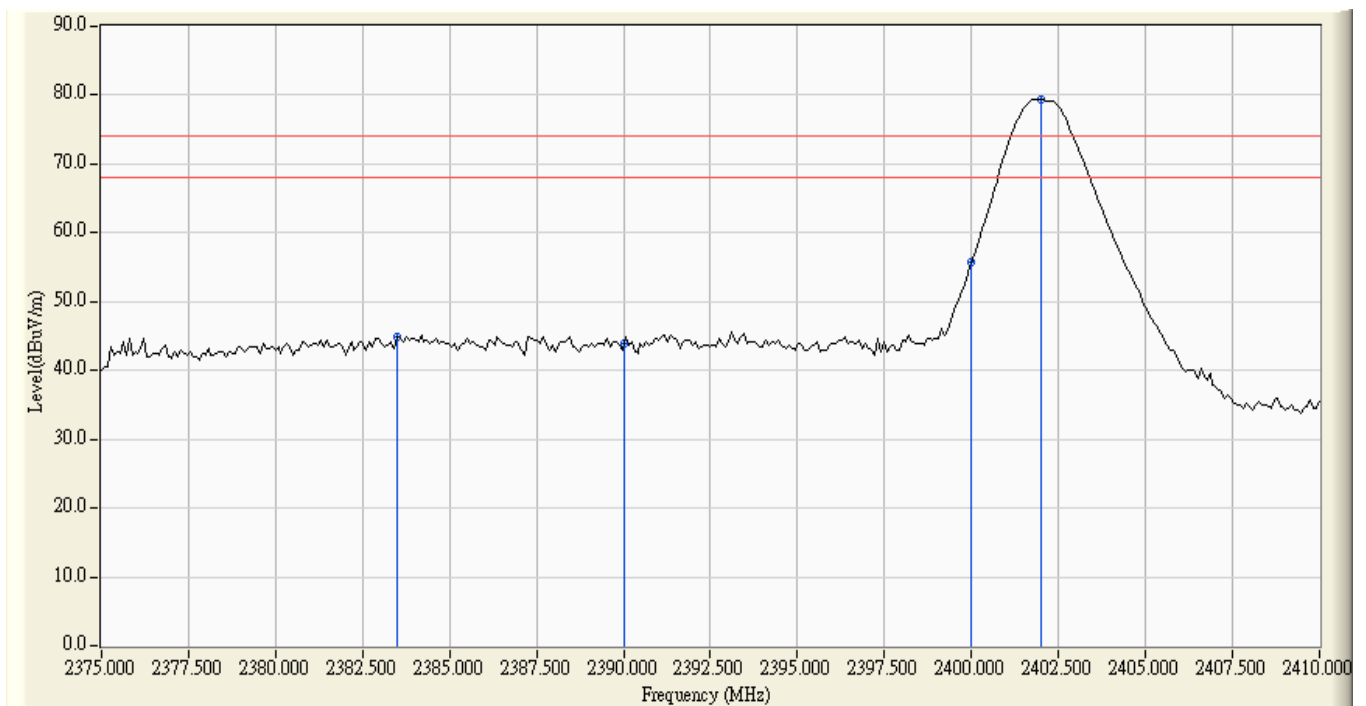
RF Radiated Measurement:

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

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)	2383.488	-2.408	47.398	44.989	74.000	54.00	Pass
00 (Peak)	2390.000	-2.378	46.177	43.800	74.000	54.00	Pass
00 (Peak)	2400.000	-2.328	58.113	55.785	74.000	54.00	Pass
00 (Peak)	2402.000	-2.318	81.594	79.276	74.000	54.00	Pass

Figure Channel 00: (Horizontal) (Peak)



Note:

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

Product : Portable Navigation Device
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2402MHz)

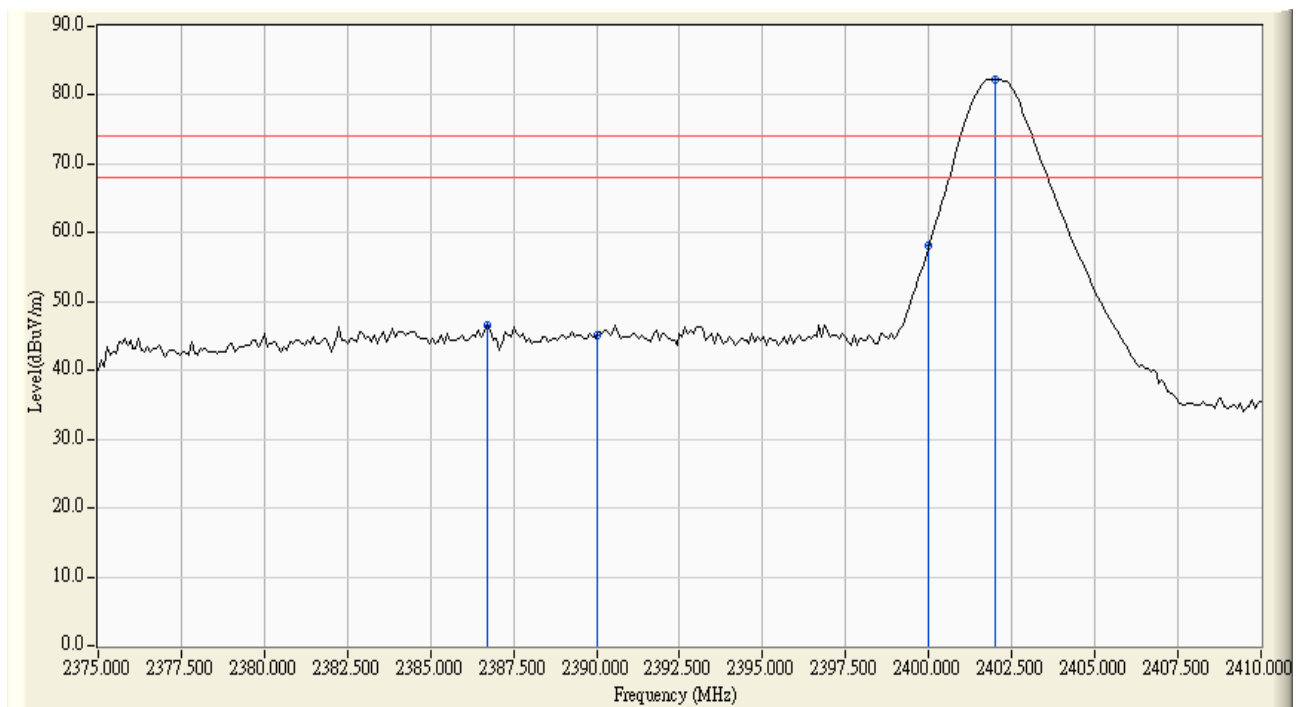
RF Radiated Measurement:

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

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)	2386.725	-2.394	48.893	46.500	74.00	54.00	Pass
00 (Peak)	2390.000	-2.378	47.382	45.005	74.00	54.00	Pass
00 (Peak)	2400.000	-2.328	60.455	58.127	74.00	54.00	Pass
00 (Peak)	2402.000	-2.318	84.530	82.212	74.00	54.00	Pass

Figure Channel 00: (Vertical) (Peak)



Note:

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

Product : Portable Navigation Device
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2480MHz)

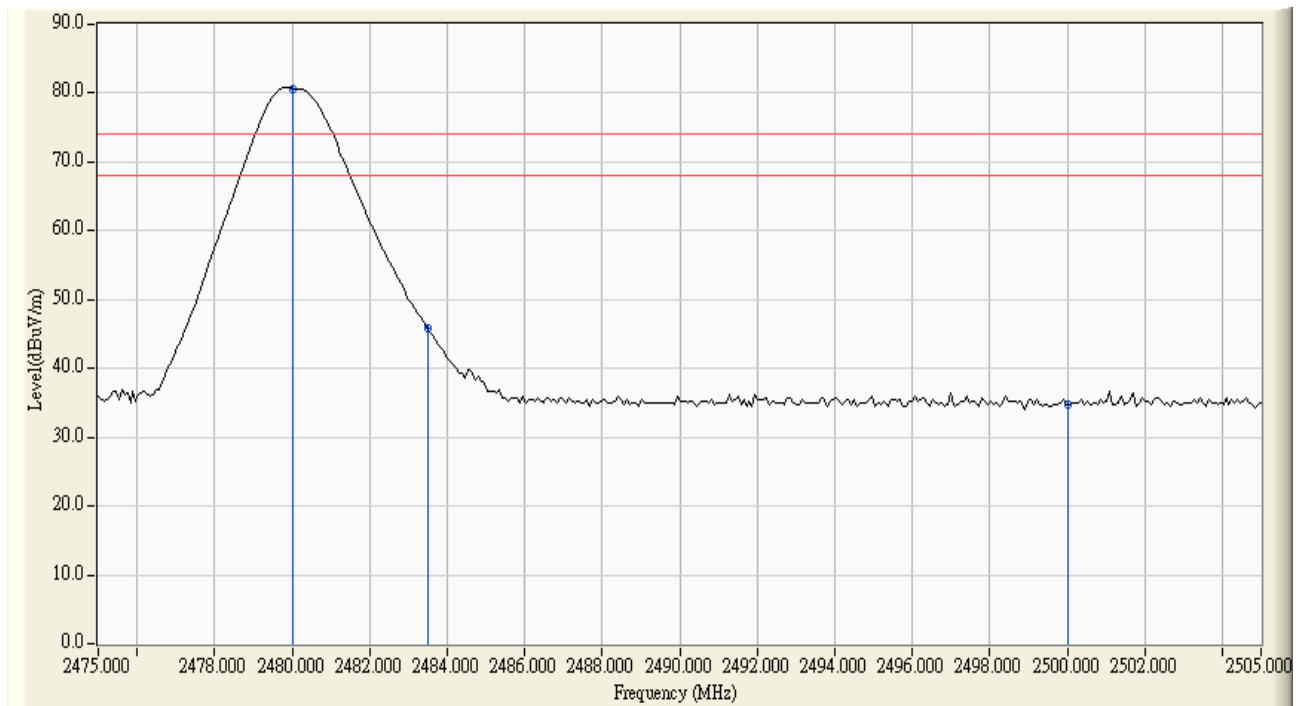
RF Radiated Measurement:

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

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)	2480.000	-1.952	82.642	80.691	74.00	54.00	Pass
78(Peak)	2483.500	-1.937	47.727	45.790	74.00	54.00	Pass
78(Peak)	2500.000	-1.886	36.674	34.788	74.00	54.00	Pass

Figure Channel 78: (Horizontal) (Peak)



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

Product : Portable Navigation Device
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2480MHz)

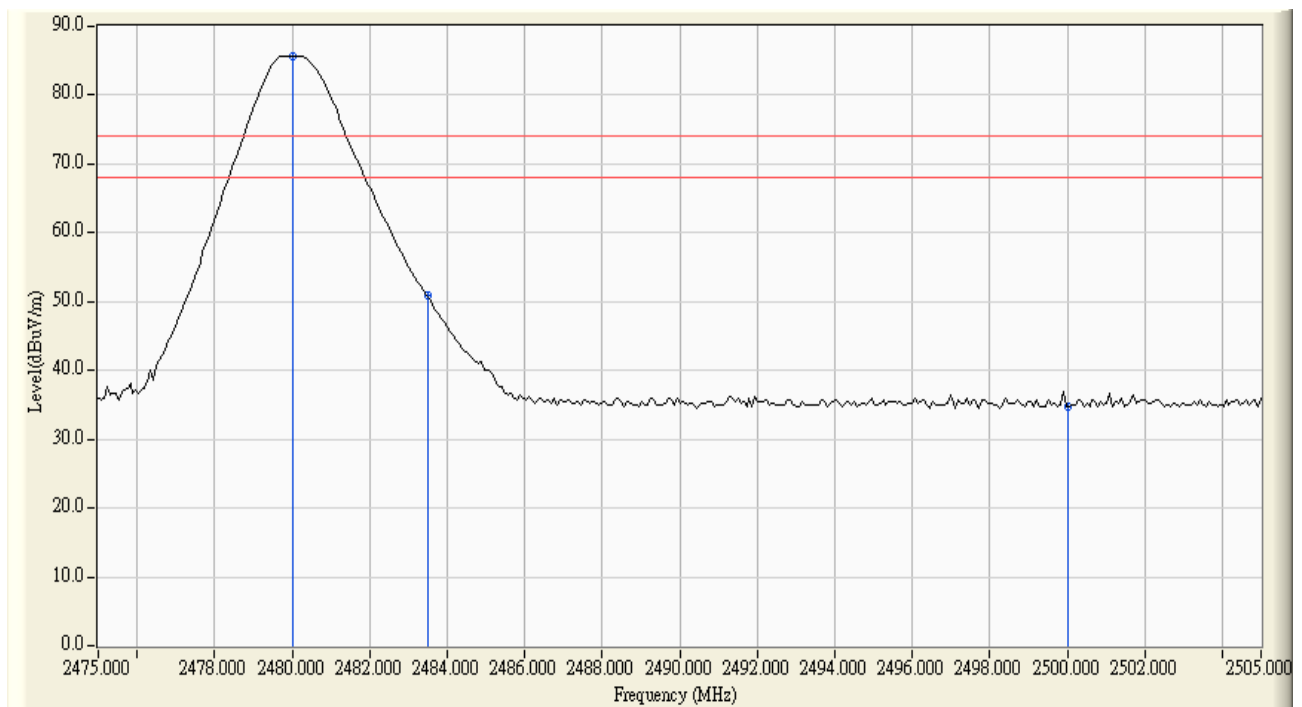
RF Radiated Measurement:

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

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)	2480.000	-1.952	87.587	85.636	74.00	54.00	Pass
78(Peak)	2483.500	-1.937	52.738	50.801	74.00	54.00	Pass
78(Peak)	2500.000	-1.886	36.674	34.788	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.

7. Channel Number

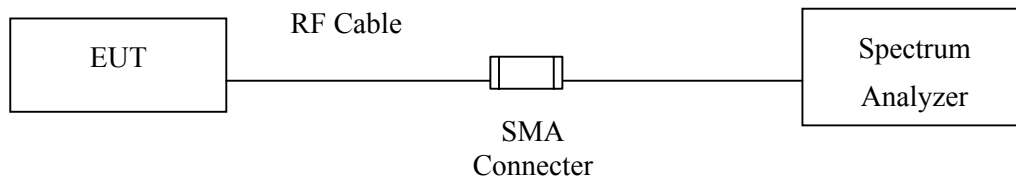
7.1. Test Equipment

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

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

7.2. Test Setup



7.3. Limit

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

7.4. Test Procedure

This test procedure is found in FCC PUBLIC NOTICE [DA 00-705](#).

Use the following spectrum analyzer settings:

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

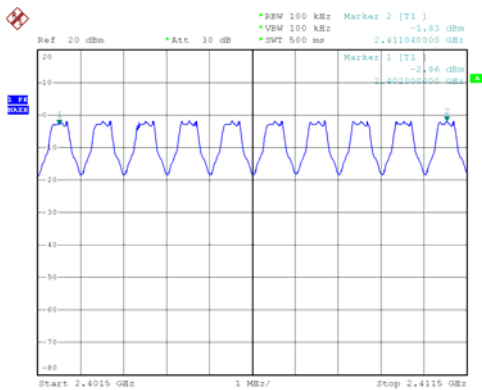
N/A

7.6. Test Result of Channel Number

Product : Portable Navigation Device
 Test Item : Channel Number
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5

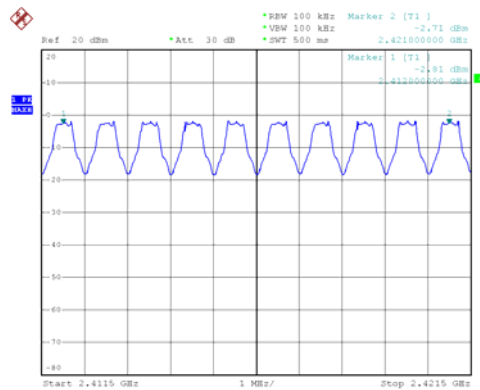
Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

2402-2411MHz



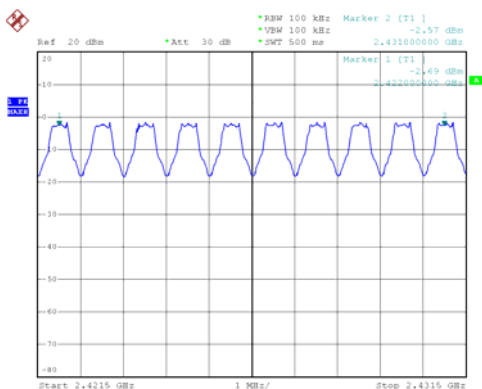
FN1
 Date: 28.AUG.2007 19:41:03

2412-2421MHz



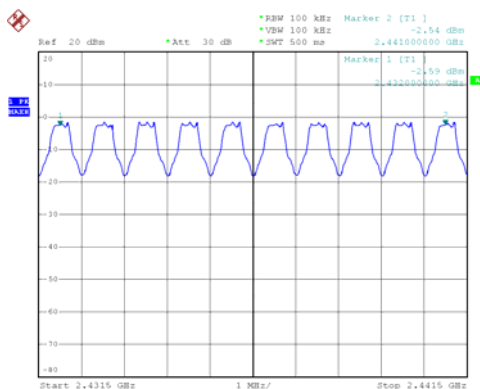
FN1
 Date: 28.AUG.2007 19:43:38

2422-2431MHz



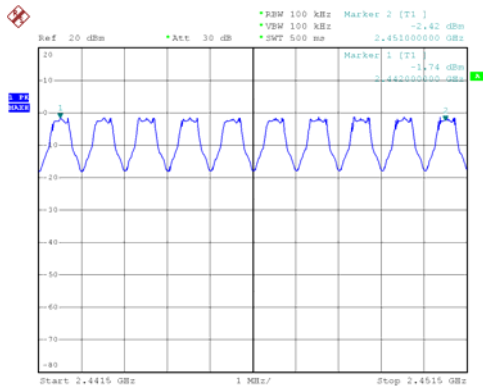
FN1
 Date: 28.AUG.2007 19:46:06

2432-2441MHz



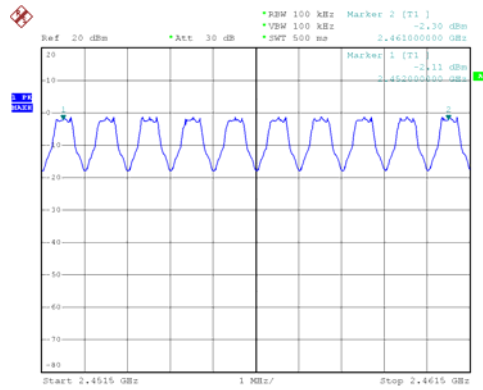
FN1
 Date: 28.AUG.2007 19:50:17

2442-2451MHz



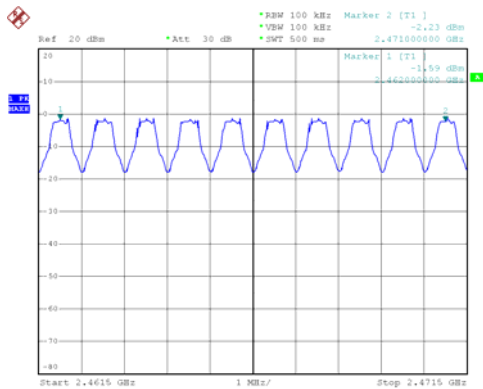
FN1
Date: 28.AUG.2007 19:53:21

2452-2461MHz



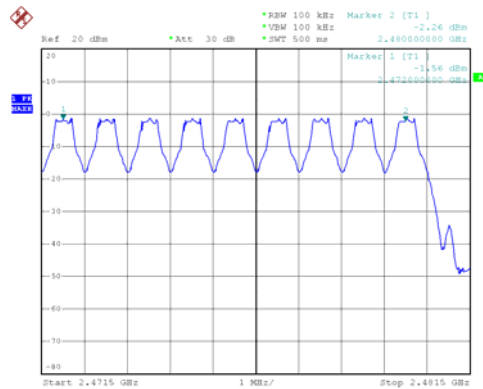
FN1
Date: 28.AUG.2007 19:57:33

2462-2471MHz



FN1
Date: 28.AUG.2007 19:59:56

2472-2480MHz



FN1
Date: 28.AUG.2007 20:06:53

8. Channel Separation

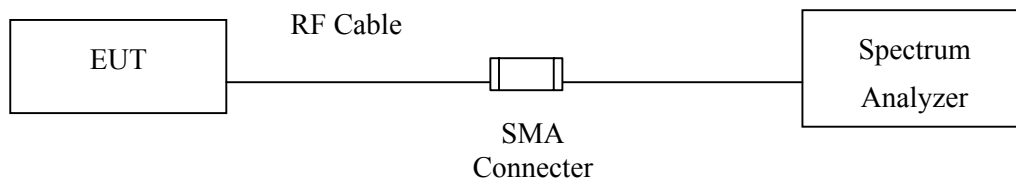
8.1. Test Equipment

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

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

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 Procedure

This test procedure is found in FCC PUBLIC NOTICE [DA 00-705](#).

Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

8.5. Uncertainty

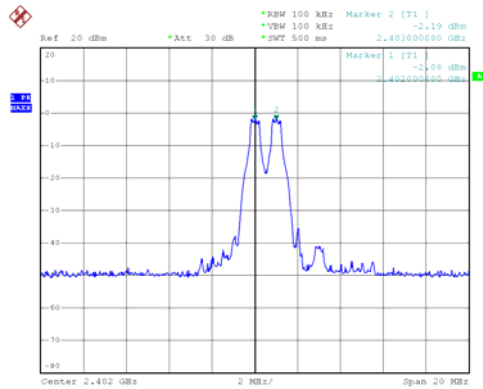
$\pm 150\text{Hz}$

8.6. Test Result of Channel Separation

Product : Portable Navigation Device
 Test Item : Channel Separation
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5

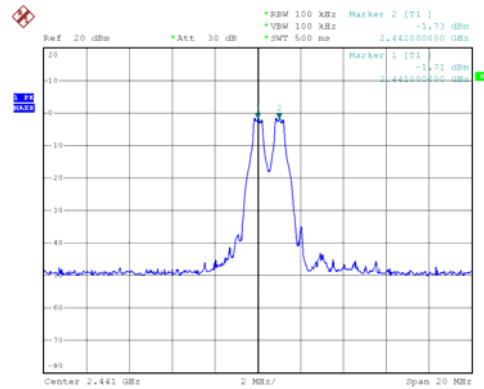
Frequency (MHz)	Measurement Level (MHz)	Required Limit	Result
2402	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2441	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2480	1.00	>25 kHz or 2/3 * 20 dB BW	Pass

Channel 00 2402MHz



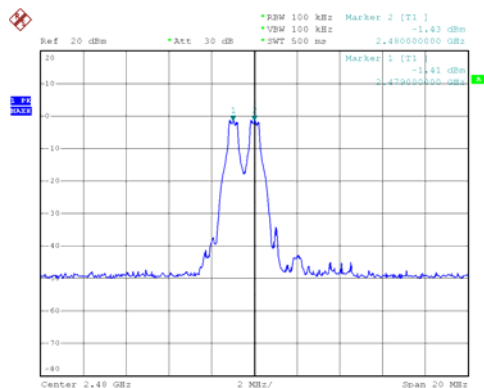
FN1
 Date: 28.AUG.2007 18:41:39

Channel 39 2441MHz



FN1
 Date: 28.AUG.2007 18:40:49

Channel 78 2480 MHz



FN1
 Date: 28.AUG.2007 18:39:25

9. Dwell Time

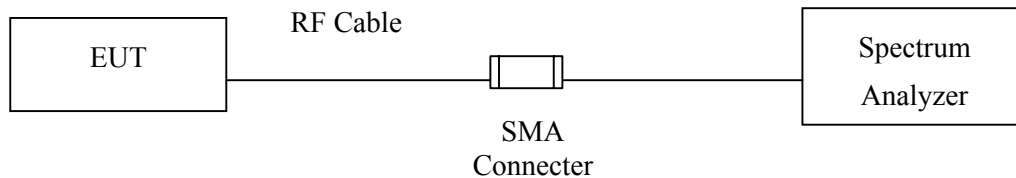
9.1. Test Equipment

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

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

9.4. Test Procedure

This test procedure is found in FCC PUBLIC NOTICE [DA 00-705](#).

Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

9.5. Uncertainty

$\pm$ 25msec

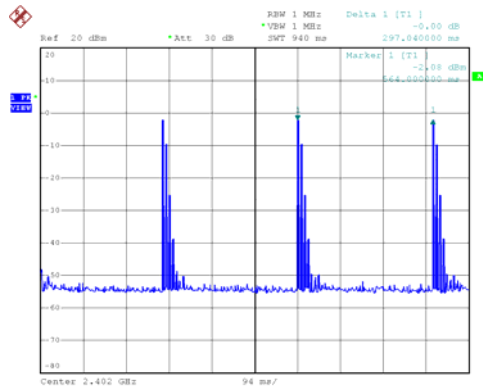
9.6. Test Result of Dwell Time

Product : Portable Navigation Device
 Test Item : Dwell Time
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (Channel 00,39,78)

Channel No.	Frequency (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
00	2402	297.04	3094	329.1489362	400	Pass
39	2441	297.04	3068	326.3829787	400	Pass
78	2480	298.92	3120	329.8273786	400	Pass

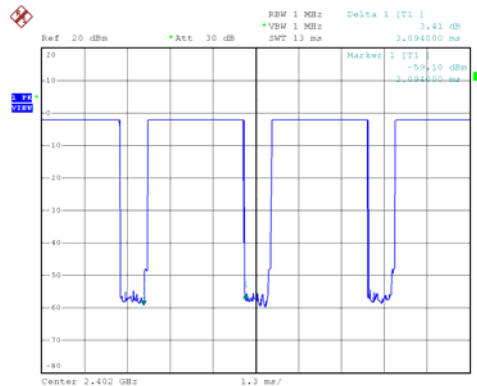
Note: Dwell Time = $79 * 400 / \text{Time Interval Between Hops} * \text{Transmission Time} / 1000$

CH 2402MHz Time Interval between hops



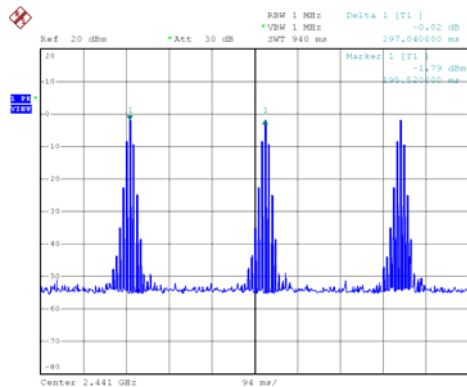
FN1
 Date: 28.AUG.2007 19:34:53

Transmission Time



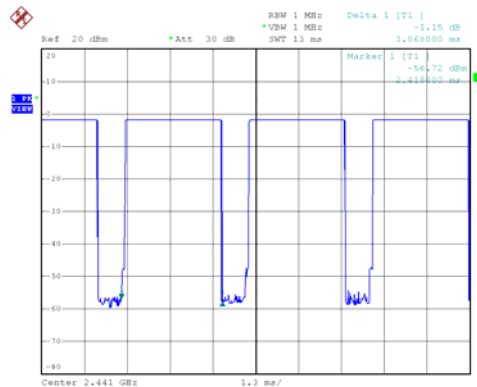
FN1
 Date: 28.AUG.2007 18:49:30

CH 2441MHz Time Interval between hops



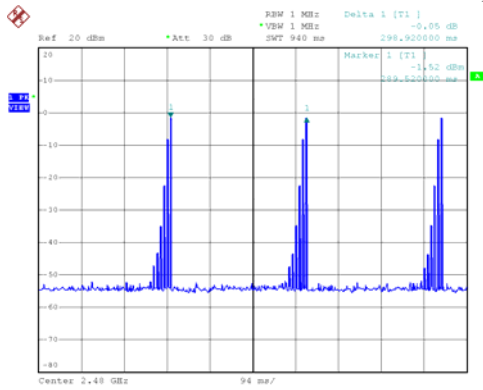
FN1
 Date: 28.AUG.2007 19:32:50

Transmission Time



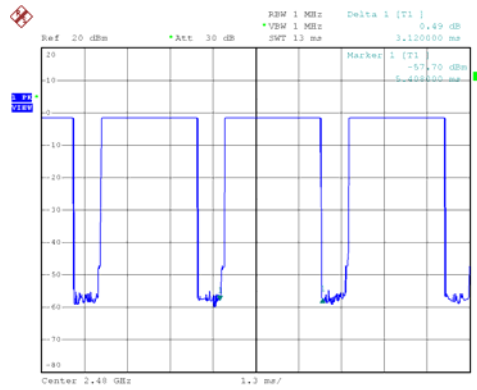
FN1
 Date: 28.AUG.2007 18:59:22

CH 2480MHz Time Interval between hops



FN1
 Date: 28.AUG.2007 19:33:46

Transmission Time



FN1
 Date: 28.AUG.2007 19:00:13

Note:

The dwell times of the packet type DH5 are tested.

10. Occupied Bandwidth

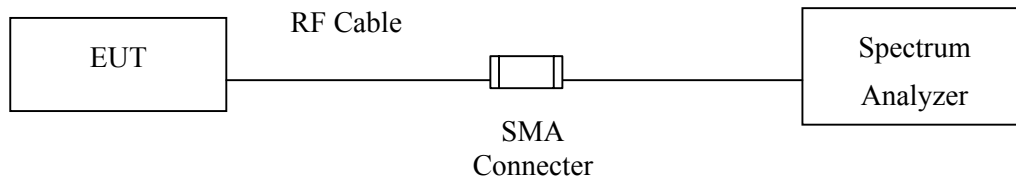
10.1. Test Equipment

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

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

10.2. Test Setup



10.3. Limits

N/A

10.4. Test Procedure

This test procedure is found in FCC PUBLIC NOTICE [DA 00-705](#).

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

10.5. Uncertainty

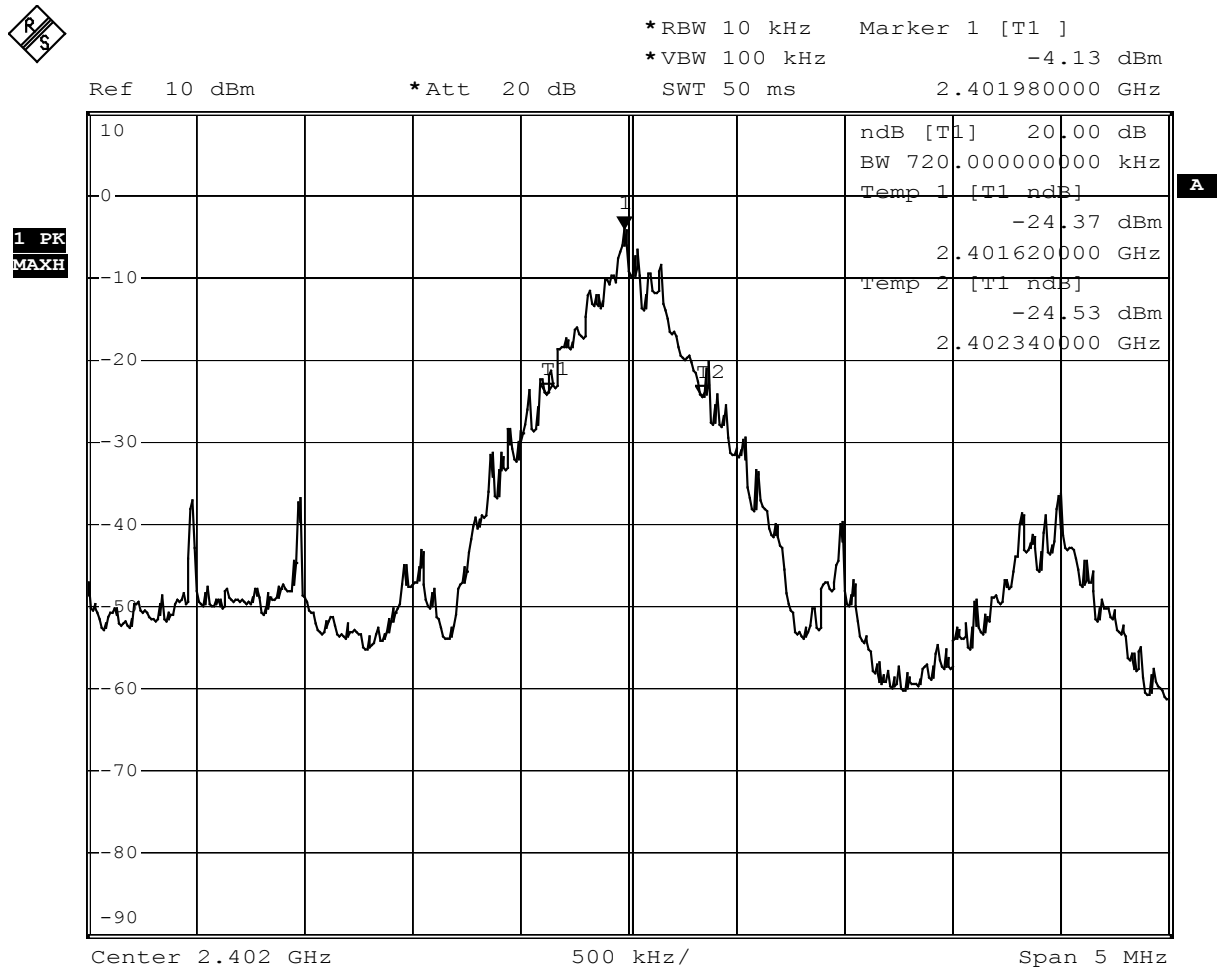
$\pm$ 150Hz

10.6. Test Result of Occupied Bandwidth

Product : Portable Navigation Device
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	720	--	NA

Figure Channel 00:

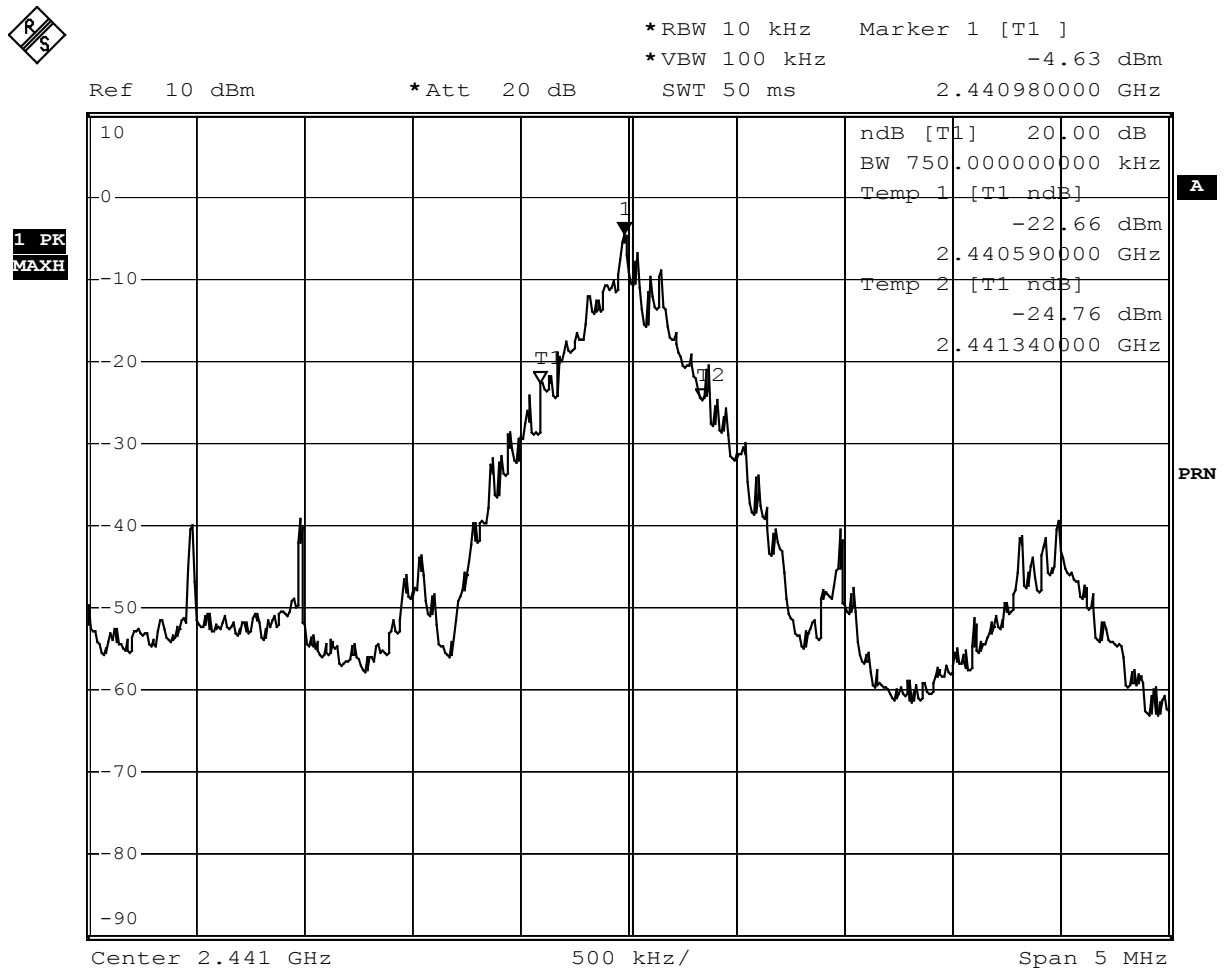


Date: 23.OCT.2007 16:26:41

Product : Portable Navigation Device
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	750	--	NA

Figure Channel 39:

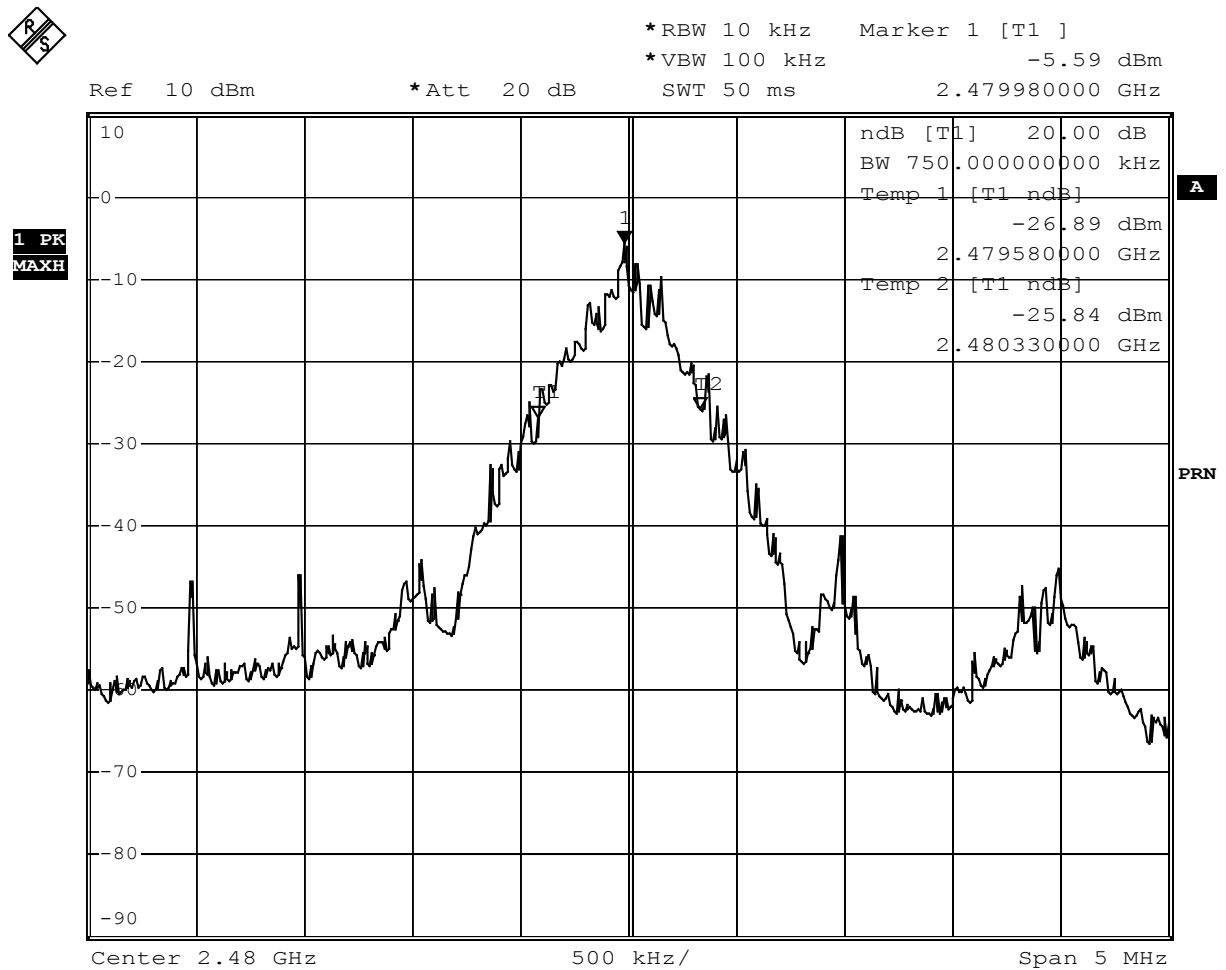


Date: 23.OCT.2007 16:30:23

Product : Portable Navigation Device
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter-DH5 (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	750	--	NA

Figure Channel 78:



Date: 23.OCT.2007 16:31:32

11. EMI Reduction Method During Compliance Testing

No modification was made during testing.

12. SECOND SOURCE LIST

PCBA BOM SECOND SOURCE		
Item	Specification	Brand
1	Flash ROM,K9F1208U0C-PCB0, 64M*8,42ns,48p,TSOP1,SAMSUNG,RoHS	Samsung
2	Flash ROM,K9F1208U0C-PCB0, 64M*8,42ns,48p,TSOP1,SAMSUNG,RoHS	Samsung
3	Flash ROM,SST39VF800A-70-4C-B3KE	SST
4	REG,S-1111B18MC-NYD-TFG, 1.8V,150mA,SOT23-5,Pb/F,RoHS	Seiko
5	SDRAM,HYB25L256160AF-7.5, 16M*16,7.5ns,54p,TFBGA,RoHS	Infineon (Qimonda)
6	Fuse,1.5A,50V, FCC32,152,1206, KAMAYA, RoHS	KAMAYA
ENGINE BOM SECOND SOURCE		
1	MIC+RUB,2.2K,1~10V,-42+-3dB, BLK,D6*2.7,TSOF6027L0423ZGF,NESSIE,RoHS	Nessie
2	Speaker,1W,8ohm,90+-3Db, 52.5*27.6*8.4, FYX2952A-01-C1-E1,BANG-TEC,RoHS	BANG-TEC