



Test Report

Product Name	Industrial PDA
Model No.	DOLPHIN 7600
FCC ID	HD5760002

Applicant	Hand Held Products, Inc.
Address	700 Visions Drive P.O. Box 208 Skaneateles Falls, NY, 13153-0208 USA

Date of Receipt	April 03, 2006
Issued Date	Sep. 27, 2006
Report No.	064L048-RF-US-P05V01

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. 27, 2006

Report No.: 064L048-RF-US-P05V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name	Industrial PDA
Applicant	Hand Held Products, Inc.
Address	700 Visions Drive P.O. Box 208 Skaneateles Falls, NY, 13153-0208 USA
Manufacturer	E-TEN Information Systems Co., Ltd.
Model No.	DOLPHIN 7600
Rated Voltage	AC 120V/60Hz
Working Voltage	AC 120V/60Hz
Trade Name	HHP
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2005 ANSI C63.4: 2003
Test Result	Complied



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0914

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	6
1.3. Tested System Details.....	7
1.4. Configuration of Test System	7
1.5. EUT Exercise Software	8
1.6. Test Facility	9
2. Conducted Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	10
2.3. Limits	10
2.4. Test Procedure	11
2.5. Uncertainty	11
2.6. Test Result of Conducted Emission.....	12
3. Peak Power Output	16
3.1. Test Equipment.....	16
3.2. Test Setup	16
3.3. Limits	16
3.4. Uncertainty	16
3.5. Test Result of Peak Power Output.....	17
4. Radiated Emission.....	19
4.1. Test Equipment.....	19
4.2. Test Setup	20
4.3. Limits	20
4.4. Test Procedure	21
4.5. Uncertainty	21
4.6. Test Result of Radiated Emission.....	22
5. Band Edge	30

5.1.	Test Equipment.....	30
5.2.	Test Setup	30
5.3.	Limits	31
5.4.	Test Procedure	31
5.5.	Uncertainty	31
5.6.	Test Result of Band Edge	32
6.	Occupied Bandwidth.....	48
6.1.	Test Equipment.....	48
6.2.	Test Setup	48
6.3.	Limits	48
6.4.	Uncertainty	48
6.5.	Test Result of Occupied Bandwidth	49
7.	Power Density	55
7.1.	Test Equipment.....	55
7.2.	Test Setup	55
7.3.	Limits	55
7.4.	Uncertainty	55
7.5.	Test Result of Power Density	56
8.	EMI Reduction Method During Compliance Testing	62

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Industrial PDA
Trade Name	HHP
Model No.	DOLPHIN 7600
FCC ID	HD5760002
Frequency Range	2412 – 2462MHz
Channel Number	11
Data Speed	IEEE 802.11b – 1, 2, 5.5, 11Mbps IEEE 802.11g – 6, 9, 12, 18, 24, 36 48, 54Mbps
Type of Modulation	DSSS/ OFDM
Antenna Type	Connector
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: PHIHONG M/N: PSA15R-050P Cable out: Non-Shielded, 1.8m with one ferrite core bonded.
Infinion	HYB25L256160A
Samsung	K4M561633G-R(B)N/G/L/F

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	E-TEN	Wlan Antenna, Brass / C2680R-H	0.218 dBi in 2.4 GHz

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2412 MHz	Channel 5:	2432 MHz	Channel 9:	2452 MHz
Channel 2:	2417 MHz	Channel 6:	2437 MHz	Channel 10:	2457 MHz
Channel 3:	2422 MHz	Channel 7:	2442 MHz	Channel 11:	2462 MHz
Channel 4:	2427 MHz	Channel 8:	2447 MHz		

Note:

1. The EUT is an Industrial PDA with a built-in 2.4GHz WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 11Mbps and 802.11g is 54Mbps)
4. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
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 a Industrial PDA with 11 channels. This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The device of RF carrier is DBPSK, DQPSK and CCK (IEEE 802.11b) or eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps. The device of RF carrier is OFDM (IEEE 802.11g).

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function.

This Industrial PDA, compliant with IEEE 802.11b and IEEE 802.11g, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direst Sequence Spread Spectrum (DSSS) radio transmission, the Industrial PDA Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11g network.

Test Mode	Mode 1: Transmitter 802.11b
	Mode 2: Transmitter 802.11g

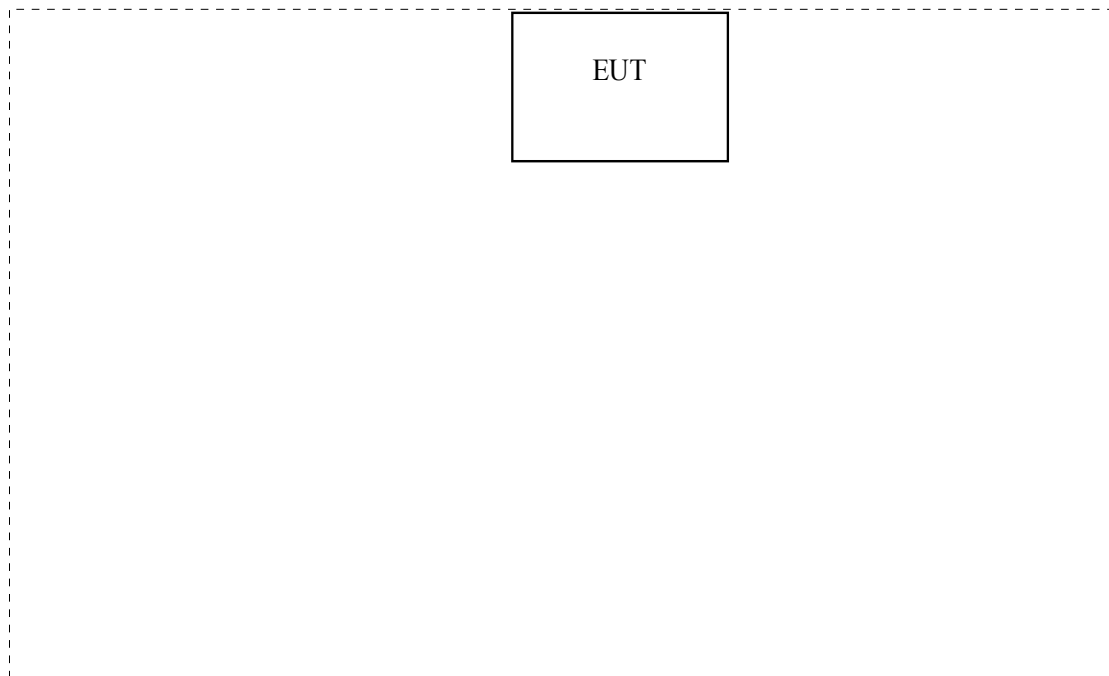
1.3. Tested System Details

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

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A

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

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4
- (2) Power on the EUT.
- (3) Click the icon in the tool bar and select “Activate (TestMode)”.
- (4) Double-click the icon “My Device” on the desktop.
- (5) Double-click the file folder “IPSM”.
- (6) Execute SEMRFTool_24XX_CE.
- (7) Configure the test channel and the data rate.
- (8) Click on “Start” to transmit continuously.
- (9) 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	50-65
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



Site Name: Quietek Corporation

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E-Mail : service@quietek.com



2. Conducted Emission

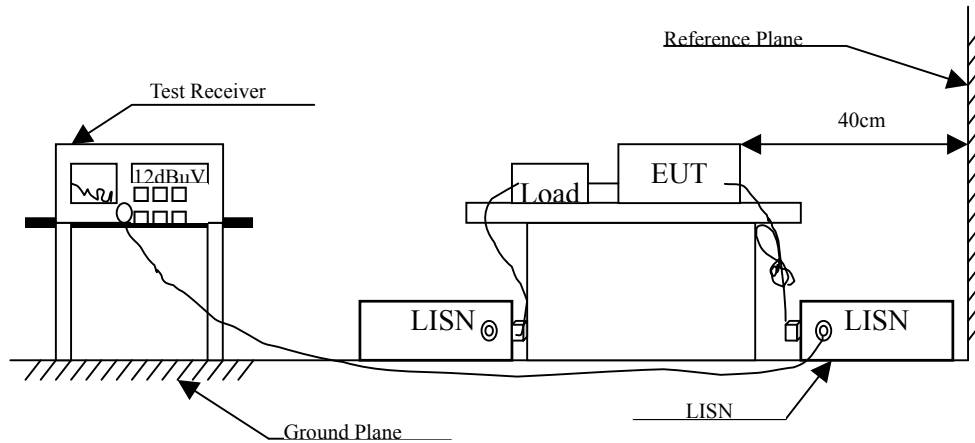
2.1. Test Equipment

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, 2006	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2006	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2006	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2006	
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	
	uV	dBuV
0.15 - 0.50	66-56 _(註)	56-46 _(註)
0.50-5.0	56	46
5.0 - 30	60	50

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 : Industrial PDA
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.197	0.669	50.470	51.139	-13.518	64.657
0.259	0.324	35.740	36.064	-26.821	62.886
0.720	0.310	39.400	39.710	-16.290	56.000
1.677	0.330	34.160	34.490	-21.510	56.000
3.091	0.370	38.450	38.820	-17.180	56.000
7.986	0.530	35.720	36.250	-23.750	60.000
Average					
0.197	0.669	42.890	43.559	-11.098	54.657
0.259	0.324	29.970	30.294	-22.591	52.886
0.720	0.310	27.680	27.990	-18.010	46.000
1.677	0.330	30.620	30.950	-15.050	46.000
3.091	0.370	33.490	33.860	-12.140	46.000
7.986	0.530	33.500	34.030	-15.970	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 : Industrial PDA
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.193	0.300	52.900	53.200	-11.571	64.771
0.709	0.310	37.830	38.140	-17.860	56.000
1.478	0.330	34.010	34.340	-21.660	56.000
2.963	0.370	37.020	37.390	-18.610	56.000
8.115	0.470	31.450	31.920	-28.080	60.000
19.377	0.900	29.950	30.850	-29.150	60.000
Average					
0.193	0.300	45.890	46.190	-8.581	54.771
0.709	0.310	30.490	30.800	-15.200	46.000
1.478	0.330	25.920	26.250	-19.750	46.000
2.963	0.370	32.900	33.270	-12.730	46.000
8.115	0.470	27.060	27.530	-22.470	50.000
19.377	0.900	26.730	27.630	-22.370	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 : Industrial PDA
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.162	0.202	47.890	48.092	-17.565	65.657
0.220	0.202	42.690	42.892	-21.108	64.000
0.271	0.210	39.390	39.600	-22.943	62.543
0.321	0.214	32.790	33.004	-28.110	61.114
0.381	0.215	21.710	21.925	-37.475	59.400
1.232	0.246	21.190	21.436	-34.564	56.000
Average					
0.162	0.202	35.780	35.982	-19.675	55.657
0.220	0.202	34.940	35.142	-18.858	54.000
0.271	0.210	36.480	36.690	-15.853	52.543
0.321	0.214	30.390	30.604	-20.510	51.114
0.381	0.215	15.200	15.415	-33.985	49.400
1.232	0.246	14.800	15.046	-30.954	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 : Industrial PDA
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.158	0.202	46.830	47.032	-18.739	65.771
0.212	0.202	45.530	45.732	-18.497	64.229
0.267	0.203	39.450	39.653	-23.004	62.657
0.317	0.214	31.990	32.204	-29.025	61.229
0.377	0.215	22.430	22.645	-36.869	59.514
0.970	0.232	24.890	25.122	-30.878	56.000
Average					
0.158	0.202	34.180	34.382	-21.389	55.771
0.212	0.202	39.470	39.672	-14.557	54.229
0.267	0.203	36.810	37.013	-15.644	52.657
0.317	0.214	28.670	28.884	-22.345	51.229
0.377	0.215	16.960	17.175	-32.339	49.514
0.970	0.232	16.550	16.782	-29.218	46.000

Note:

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

3. Peak Power Output

3.1. Test Equipment

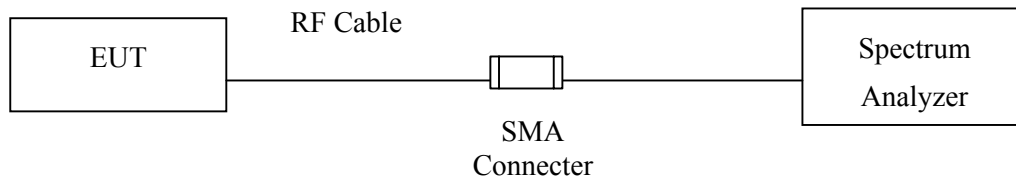
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

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

3.2. Test Setup

Conducted Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Uncertainty

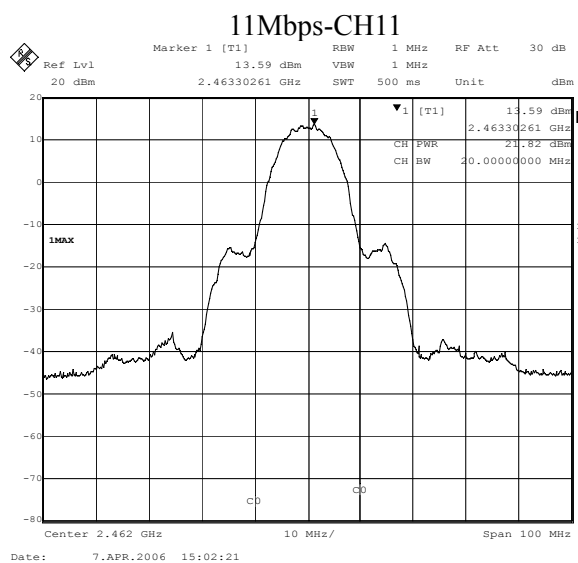
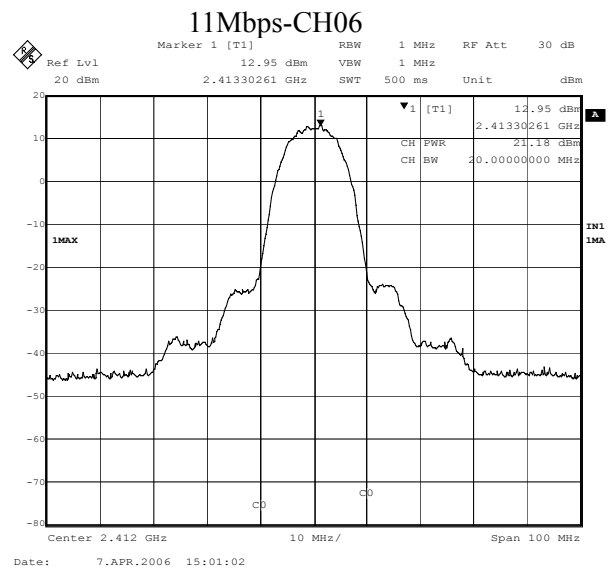
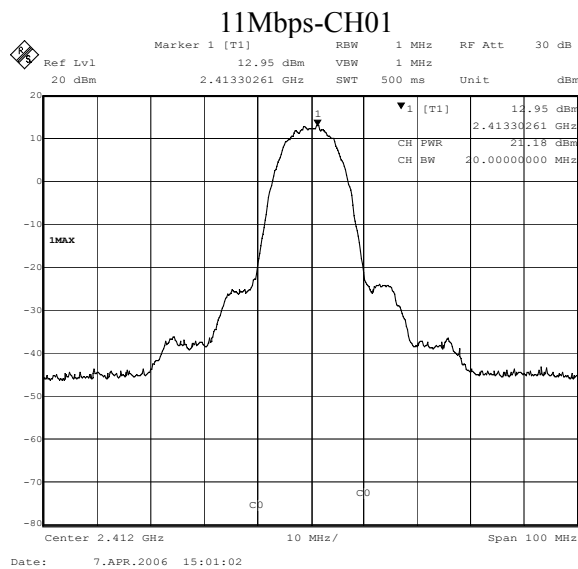
± 1.27 dB

3.5. Test Result of Peak Power Output

Product : Industrial PDA
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

Data Speed: 11Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	21.18dBm	1 Watt= 30 dBm	Pass
6	2437.00	21.80dBm	1 Watt= 30 dBm	Pass
11	2462.00	21.82dBm	1 Watt= 30 dBm	Pass

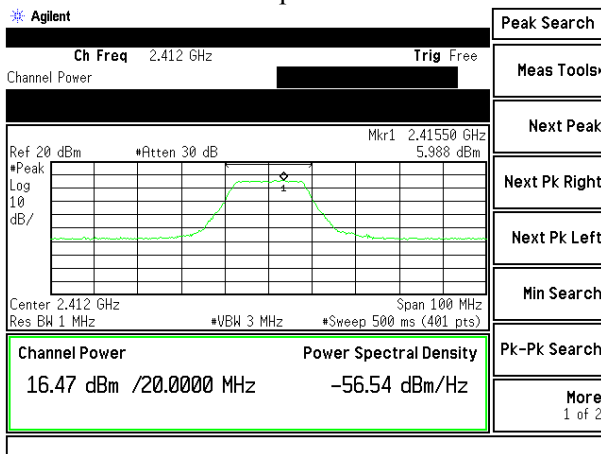


Product : Industrial PDA
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

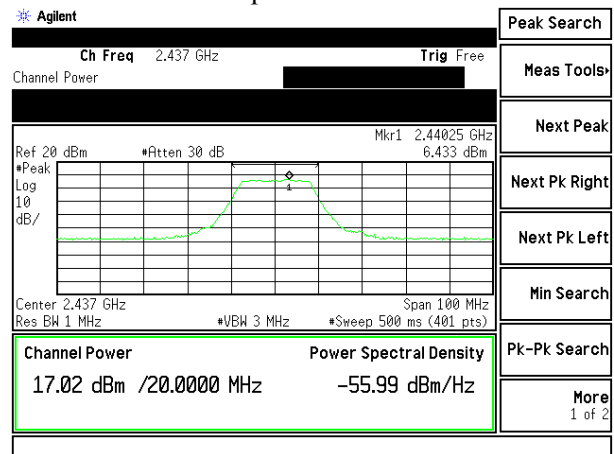
Data Speed: 54Mbps

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
1	2412.00	16.47dBm	1 Watt= 30 dBm	Pass
6	2437.00	17.02dBm	1 Watt= 30 dBm	Pass
11	2462.00	17.37dBm	1 Watt= 30 dBm	Pass

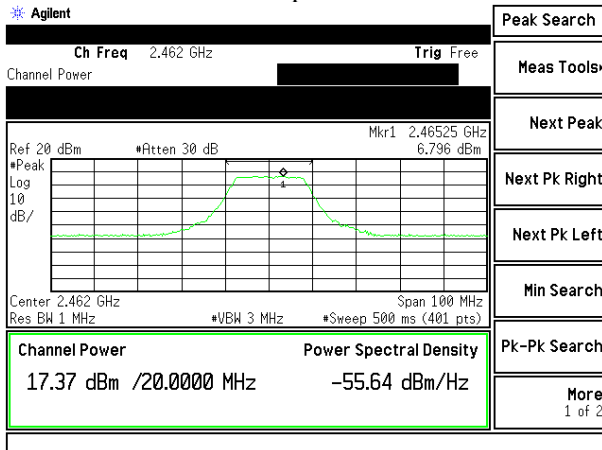
54Mbps-CH01



54Mbps-CH06



54Mbps-CH11



4. Radiated Emission

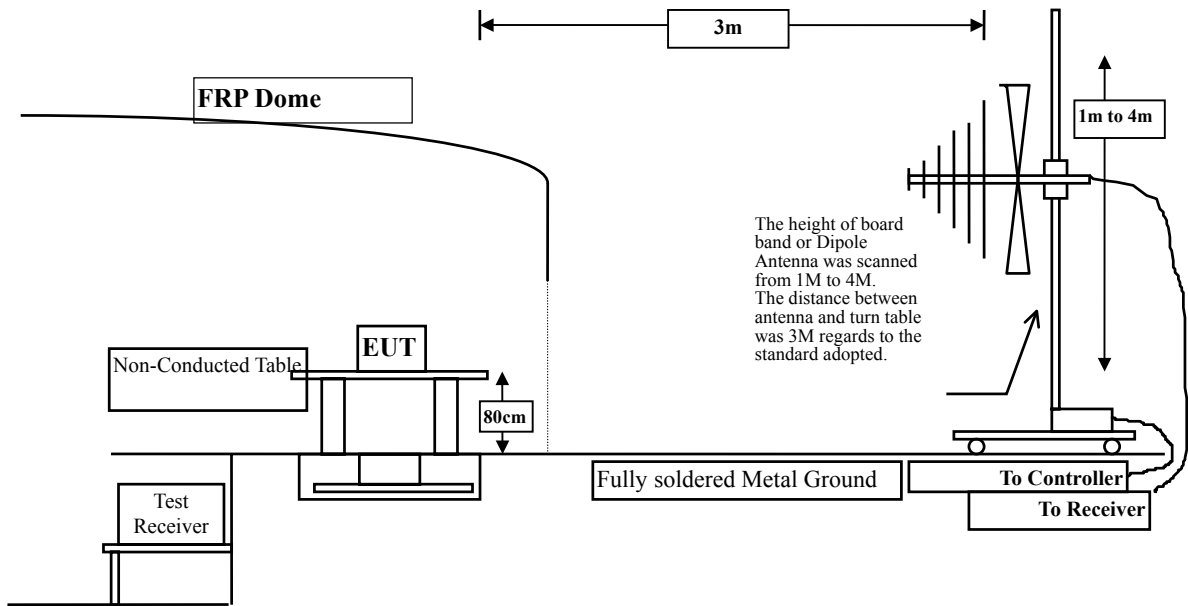
4.1. Test Equipment

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

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1		Test Receiver	R & S	ESCS 30 / 825442/14	May, 2006
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2006
		Pre-Amplifier	HP	8447D/3307A01812	May, 2006
		Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2006
		Horn Antenna	EM	EM6917 / 103325	May, 2006
Site # 2		Test Receiver	R & S	ESCS 30 / 825442/17	May, 2006
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2006
		Pre-Amplifier	HP	8447D/3307A01814	May, 2006
		Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2006
		Horn Antenna	EM	EM6917 / 103325	May, 2006
Site # 3	X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2006
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006

- Note:
1. All instruments 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(a) 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 : Industrial PDA
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4824.000	3.723	45.387	49.110	-24.890	74.000
7236.000	9.439	37.751	47.190	-26.810	74.000
9648.000	11.829	38.411	50.240	-23.760	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4824.000	3.723	43.097	46.820	-27.180	74.000
7236.000	9.439	38.081	47.520	-26.480	74.000
9648.000	11.829	38.591	50.420	-23.580	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 : Industrial PDA
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

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

Horizontal

Peak Detector:

4874.000	3.893	46.338	50.230	-23.770	74.000
7311.000	9.624	37.706	47.330	-26.670	74.000
9748.000	11.805	40.384	52.190	-21.810	74.000

Average

Detector:

--

Vertical

Peak Detector:

4874.000	3.893	44.418	48.310	-25.690	74.000
7311.000	9.624	37.906	47.530	-26.470	74.000
9748.000	11.805	39.934	51.740	-22.260	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 : Industrial PDA
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

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

Horizontal

Peak Detector:

4924.000	4.075	47.165	51.240	-22.760	74.000
7386.000	9.812	35.368	45.180	-28.820	74.000
9848.000	11.819	38.201	50.020	-23.980	74.000

Average

Detector:

--

Vertical

Peak Detector:

4924.000	4.075	44.255	48.330	-25.670	74.000
7386.000	9.812	36.458	46.270	-27.730	74.000
9848.000	11.819	38.421	50.240	-23.760	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 : Industrial PDA
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

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

Horizontal

Peak Detector:

4824.000	-0.281	36.542	36.261	-37.739	74.000
7236.000	9.409	36.564	45.973	-28.027	74.000
9648.000	14.882	35.480	50.362	-23.638	74.000

Average

Detector:

--

Vertical

Peak Detector:

4824.000	3.768	36.286	40.054	-33.946	74.000
7236.000	10.969	36.761	47.730	-26.270	74.000
9648.000	14.882	36.343	51.225	-22.775	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 : Industrial PDA
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

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

Horizontal

Peak Detector:

4874.000	0.913	36.123	37.036	-36.964	74.000
7311.000	10.547	36.365	46.912	-27.088	74.000
9748.000	14.260	36.297	50.557	-23.443	74.000

Average

Detector:

--

Vertical

Peak Detector:

4874.000	3.746	36.827	40.573	-33.427	74.000
7311.000	11.547	37.116	48.663	-25.337	74.000
9748.000	14.260	35.252	49.512	-24.488	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 : Industrial PDA
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4924.000	1.054	37.071	38.125	-35.875	74.000
7386.000	11.617	35.895	47.512	-26.488	74.000
9848.000	13.462	35.079	48.541	-25.459	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4924.000	4.054	37.669	41.723	-32.277	74.000
7386.000	11.873	36.121	47.995	-26.005	74.000
9848.000	13.462	35.334	48.796	-25.204	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 : Industrial PDA
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
105.175	12.655	25.701	38.356	-5.144	43.500
352.525	14.973	25.168	40.141	-5.859	46.000
461.650	18.642	23.003	41.645	-4.355	46.000
534.400	18.780	19.877	38.657	-7.343	46.000
587.750	20.061	17.721	37.782	-8.218	46.000
810.850	21.606	18.564	40.170	-5.830	46.000
Vertical					
97.900	10.460	28.898	39.358	-4.142	43.500
333.125	14.323	25.127	39.449	-6.551	46.000
352.525	15.427	25.849	41.276	-4.724	46.000
466.500	18.457	17.900	36.357	-9.643	46.000
512.575	18.762	17.129	35.891	-10.109	46.000
539.250	19.997	15.171	35.168	-10.832	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

Product : Industrial PDA
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
143.975	11.972	21.686	33.658	-9.842	43.500
243.400	12.282	21.147	33.429	-12.571	46.000
287.050	13.473	22.297	35.770	-10.230	46.000
427.700	17.887	14.342	32.229	-13.771	46.000
517.425	18.722	16.352	35.074	-10.926	46.000
619.275	21.041	10.797	31.838	-14.162	46.000
Vertical					
197.325	9.518	19.990	29.508	-13.992	43.500
236.125	11.806	18.099	29.905	-16.095	46.000
323.425	14.317	18.908	33.224	-12.776	46.000
444.675	19.048	12.484	31.532	-14.468	46.000
512.575	18.762	14.489	33.251	-12.749	46.000
607.150	21.816	9.624	31.440	-14.560	46.000

Note:

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

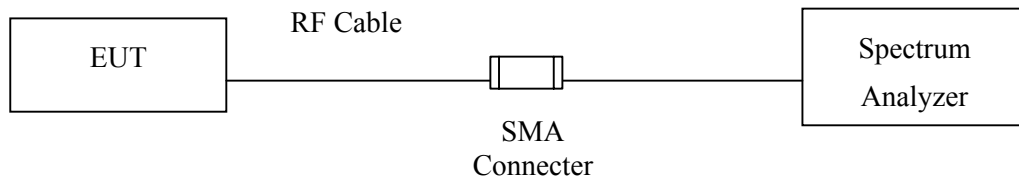
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2006
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006

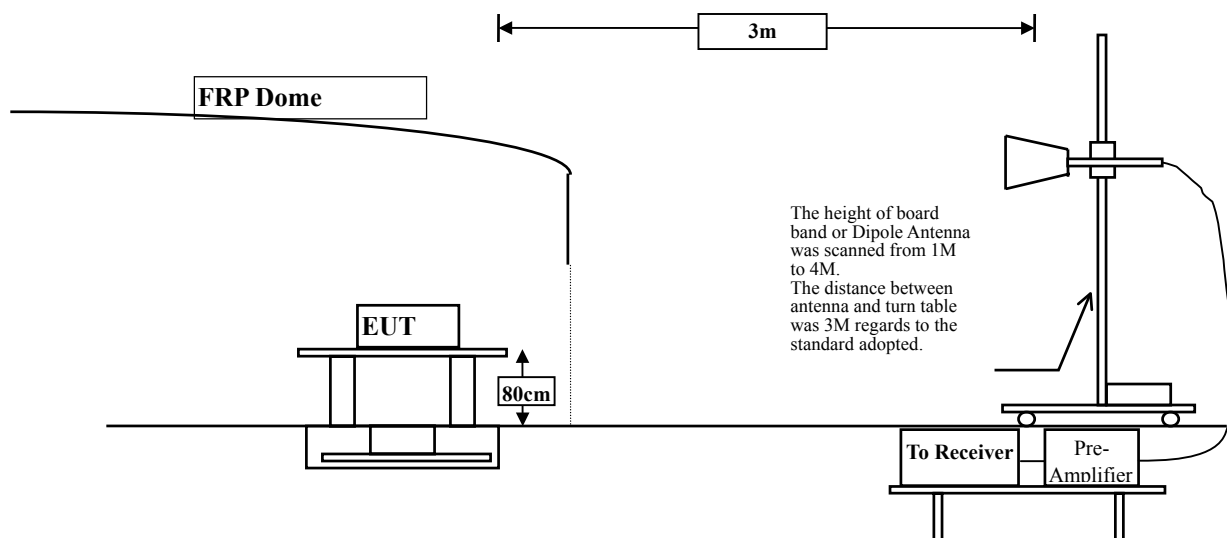
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

5.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

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

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

5.6. Test Result of Band Edge

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

RF Radiated Measurement:

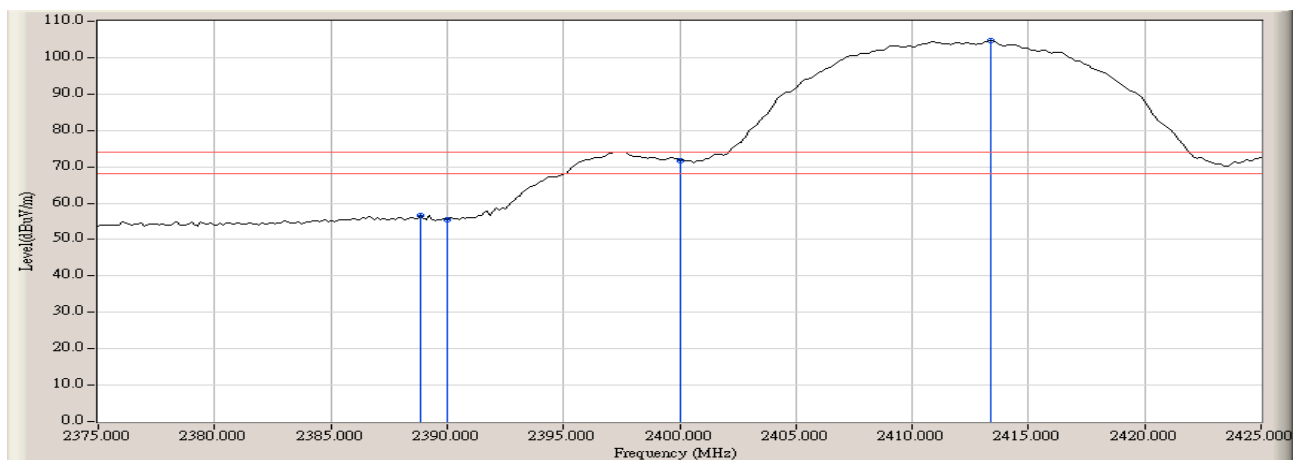
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Horizontal)	<2400	>20	Pass

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
1 (Peak)	2388.875	-2.890	59.558	56.668	74.00	54.00	Pass
1 (Average)	2388.875	-2.890	44.369	41.479	74.00	54.00	Pass

Figure Channel 1:

Horizontal (Peak)

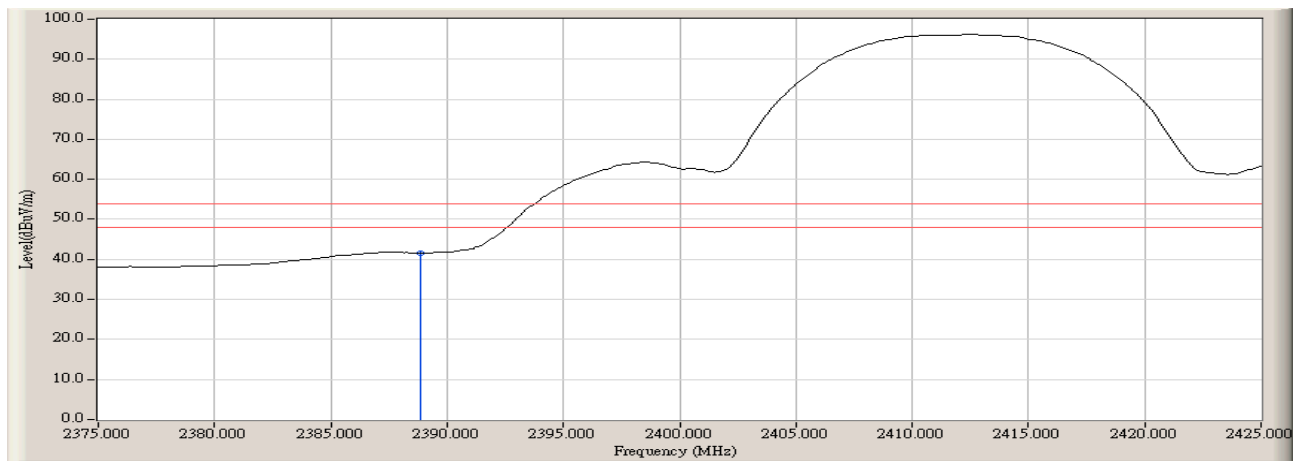


Note:

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

Figure Channel 1:

Horizontal (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

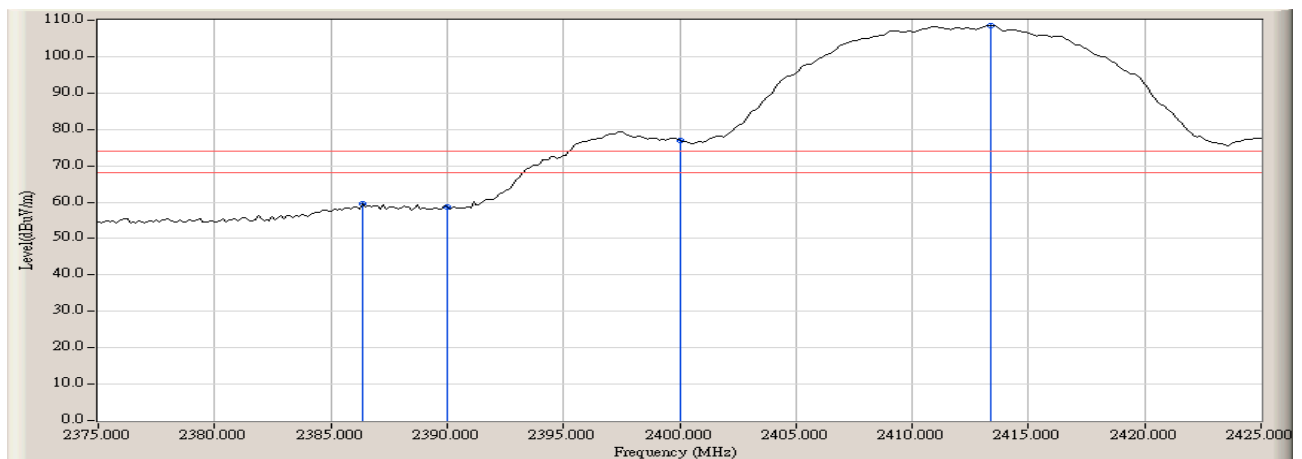
RF Radiated Measurement:

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

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2386.375	-2.901	62.466	59.565	74.00	54.00	Pass
1 (Average)	2386.375	-2.901	49.022	46.121	74.00	54.00	Pass

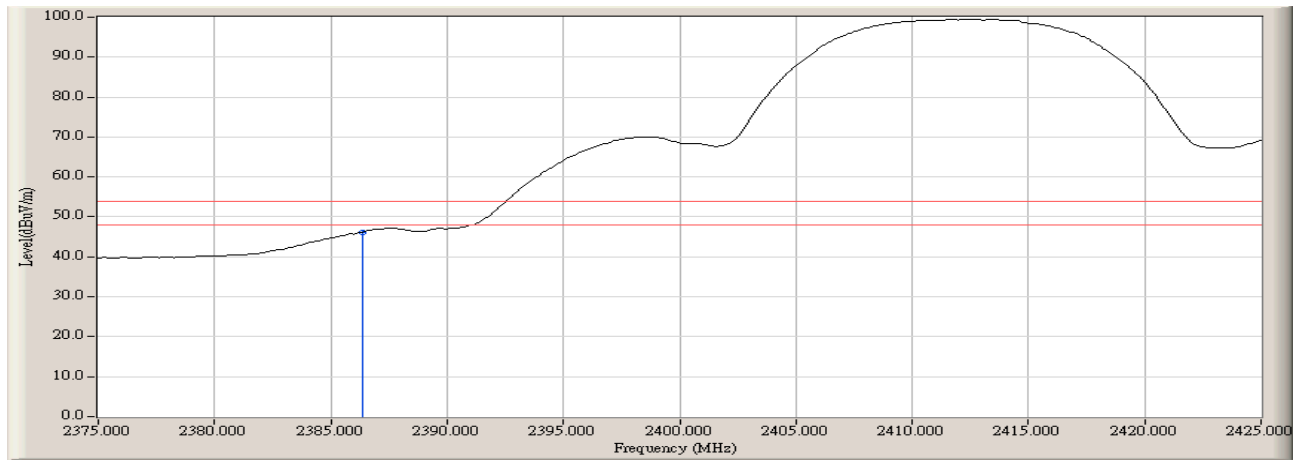
Figure Channel 1: Vertical (Peak)



Note:

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

Figure Channel 1: Vertical (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

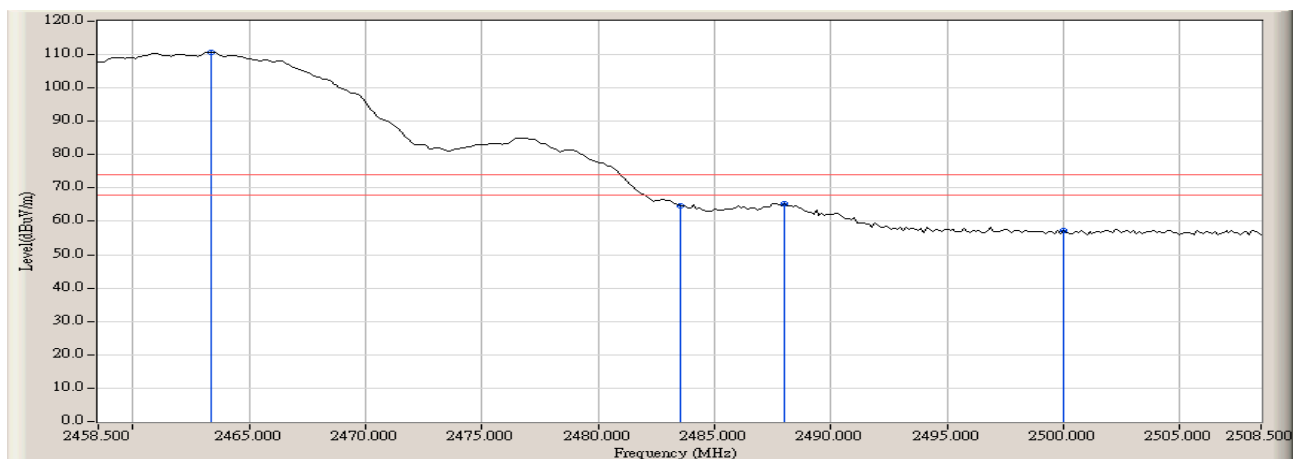
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>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
11(Peak)	2488.000	-2.422	67.812	65.389	74.00	54.00	Pass
11(Average)	2488.000	-2.422	51.119	48.696	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

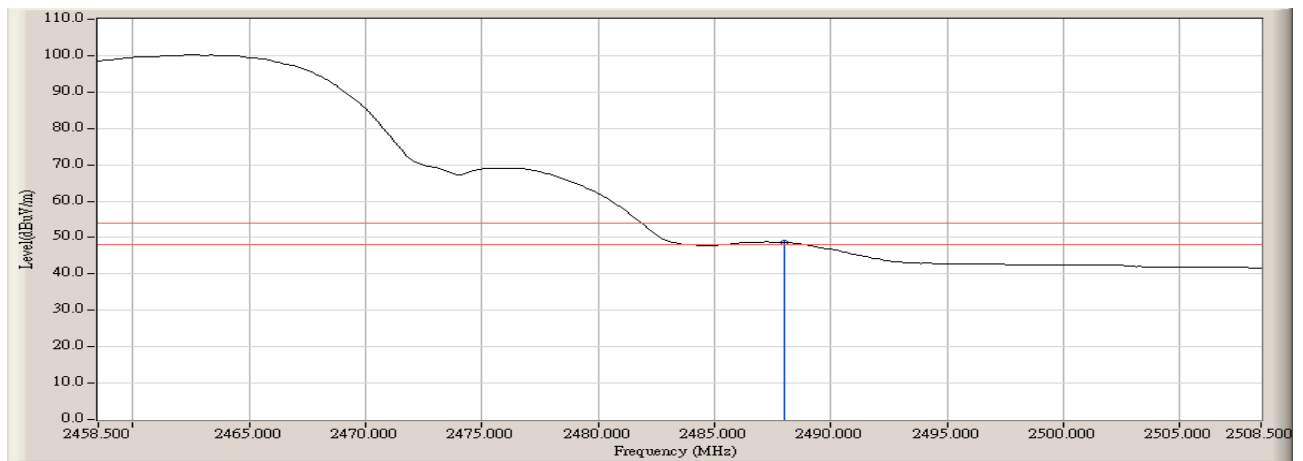


Note:

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

Figure Channel 11:

Horizontal (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b

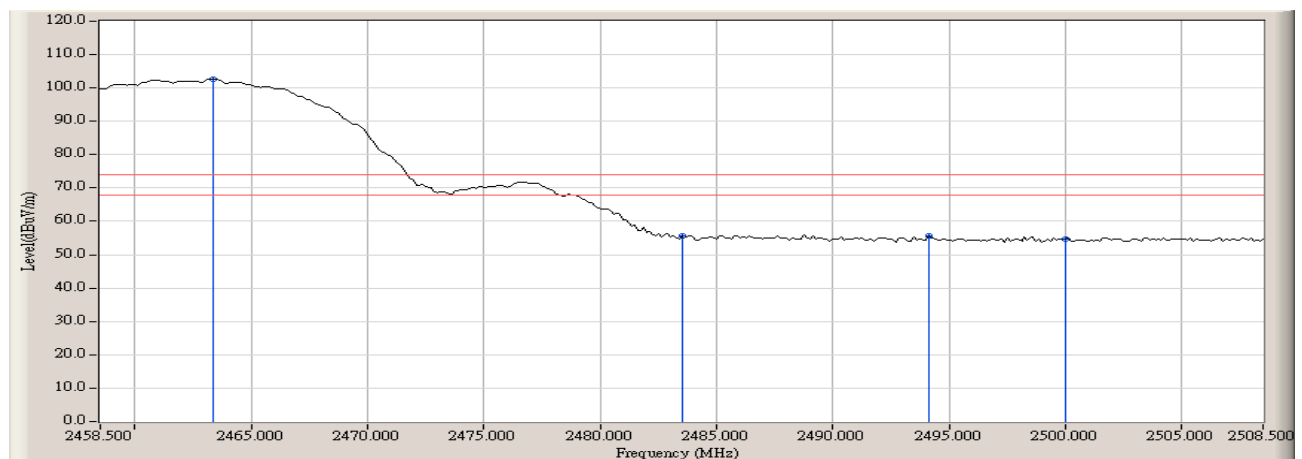
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>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
11(Peak)	2494.125	-2.397	57.978	55.581	74.00	54.00	Pass
11(Average)	2494.125	-2.397	43.272	40.875	74.00	54.00	Pass

Figure Channel 11: (Vertical) (Peak)

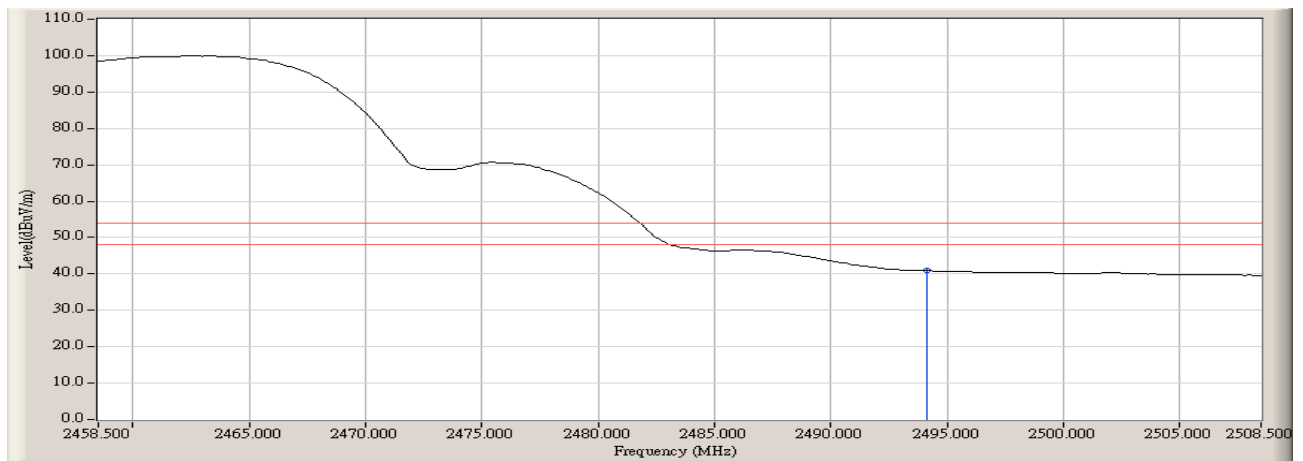


Note:

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

Figure Channel 11:

Vertical (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

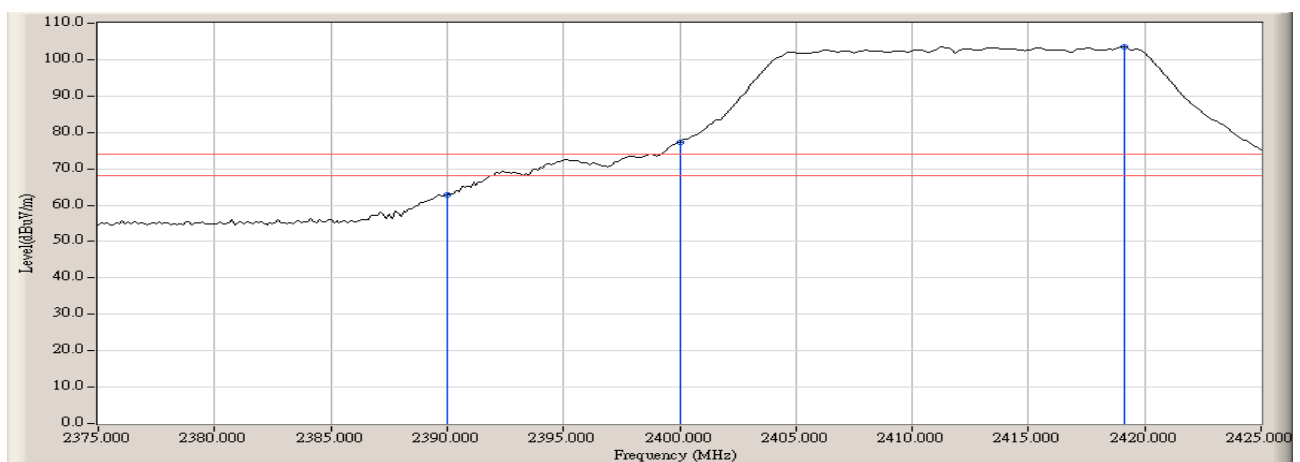
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
1 (Horizontal)	<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
1 (Peak)	2390.000	-2.257	65.051	62.794	74.00	54.00	Pass
1 (Average)	2390.000	-2.257	48.324	46.067	74.00	54.00	Pass

Figure Channel 1: Horizontal (Peak)

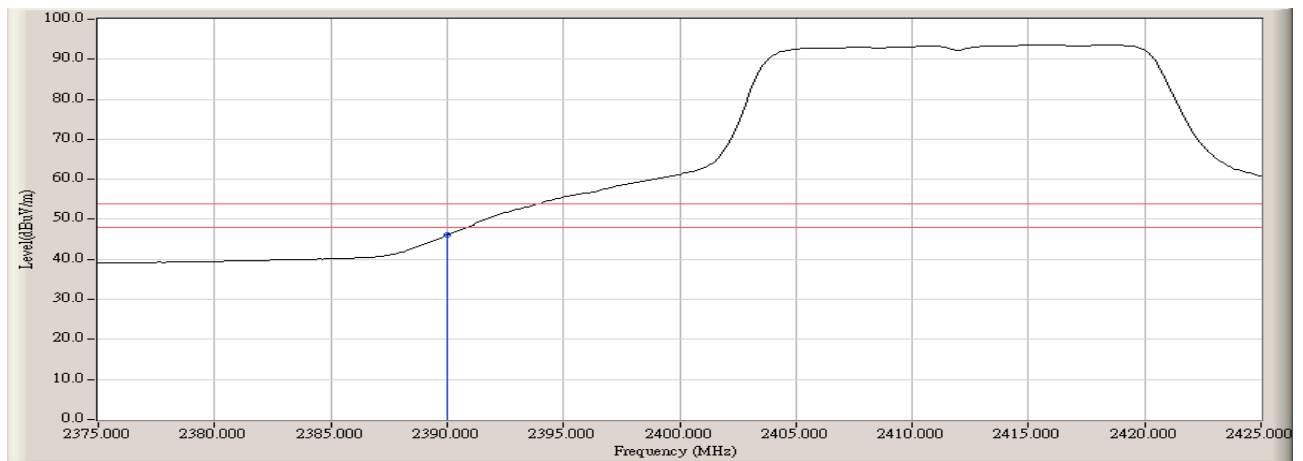


Note:

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

Figure Channel 1:

Horizontal (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

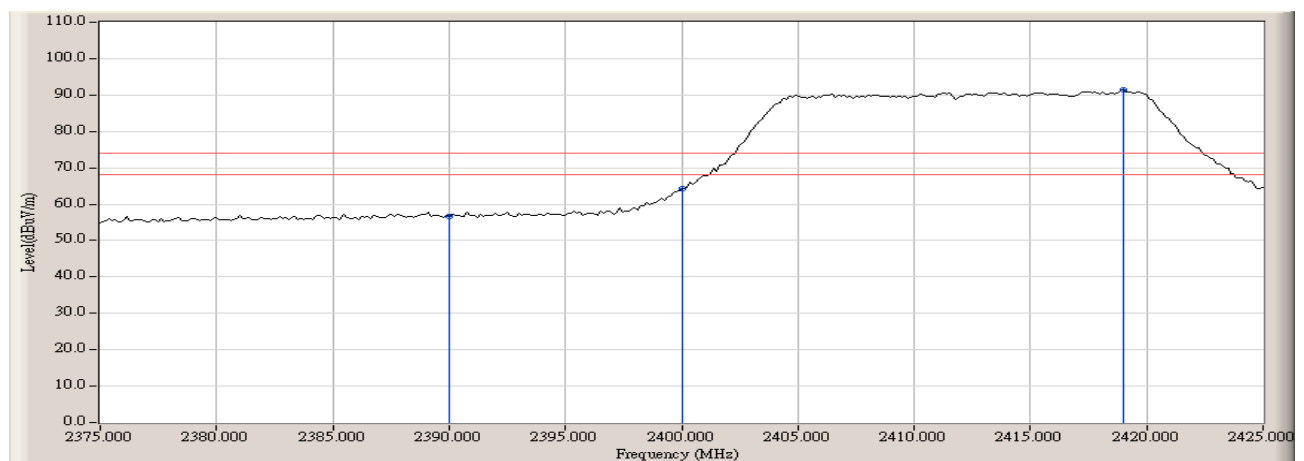
RF Radiated Measurement:

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

RF Radiated Measurement (Vertical):

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
1 (Peak)	2390.000	-2.257	56.192	53.935	74.00	54.00	Pass
1 (Average)	2390.000	-2.257	38.140	35.883	74.00	54.00	Pass

Figure Channel 1: Vertical (Peak)

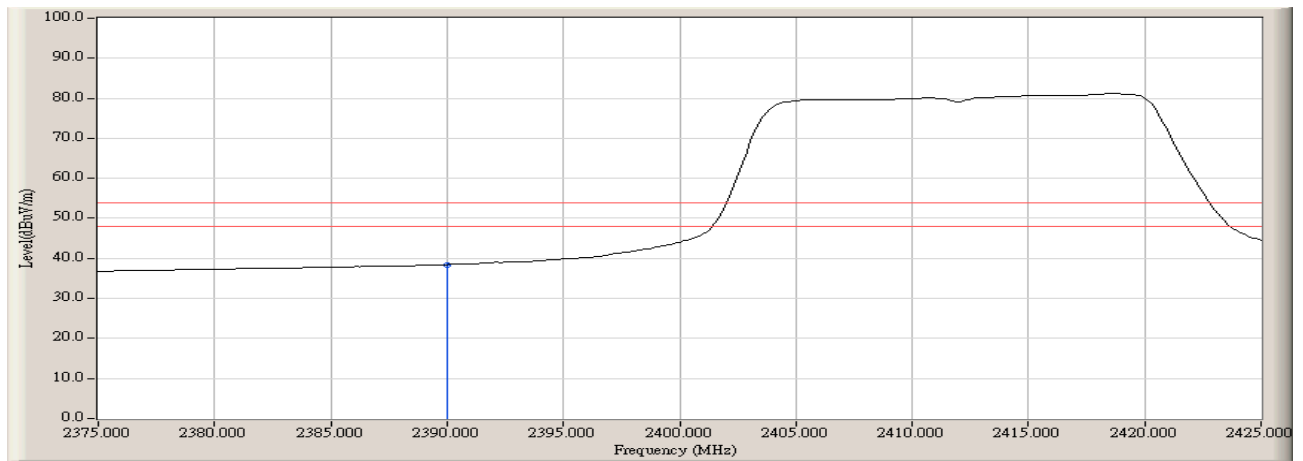


Note:

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

Figure Channel 1:

Vertical (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

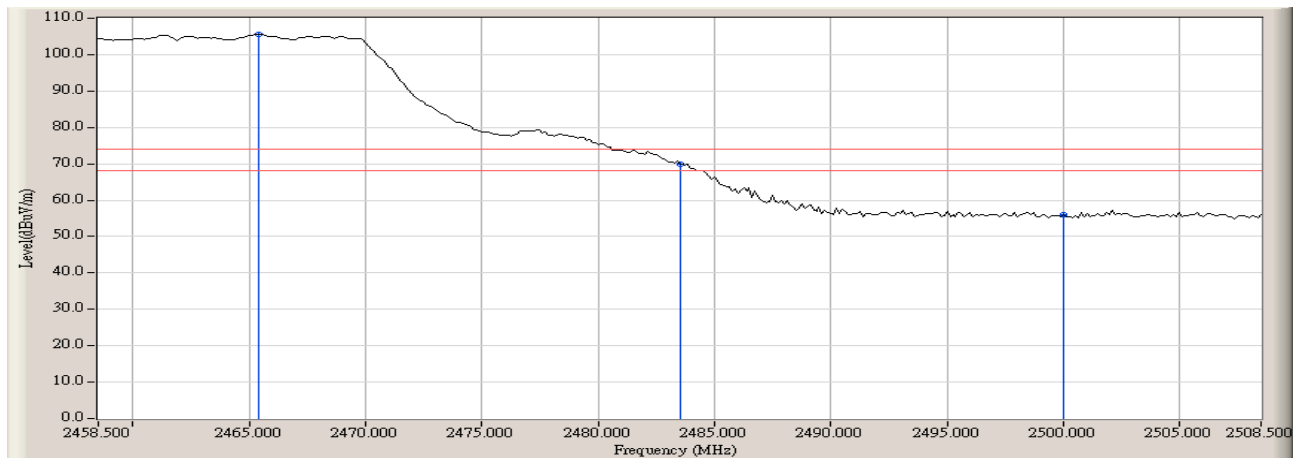
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Horizontal)	>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
11(Peak)	2483.500	-1.896	71.729	69.834	74.00	54.00	Pass
11(Average)	2483.500	-1.896	52.261	50.366	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

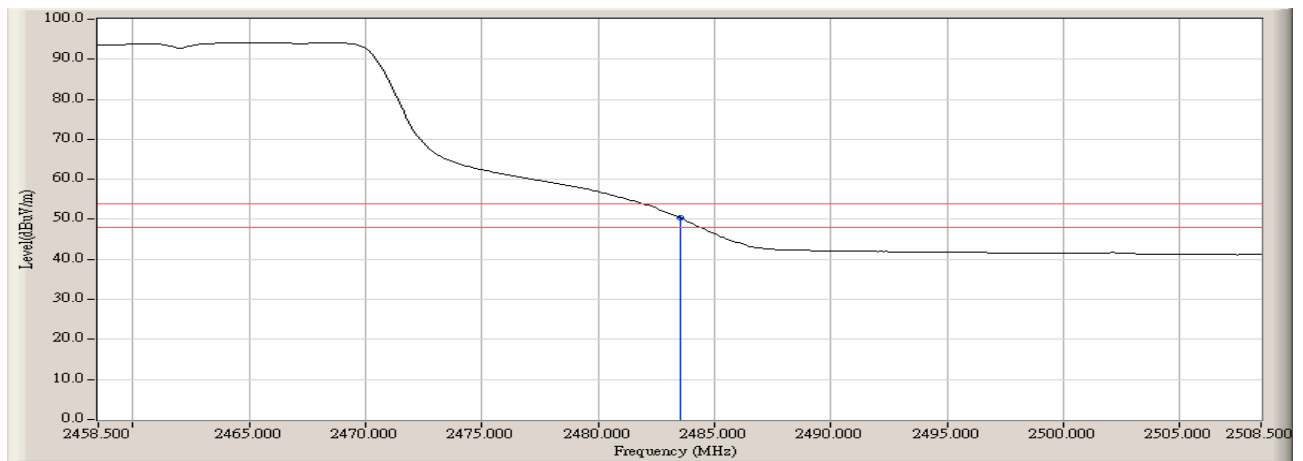


Note:

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

Figure Channel 11:

Horizontal (Average)



Note:

RBW=1MHz, VBW=300Hz, Sweep Time=500ms

Product : Industrial PDA
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g

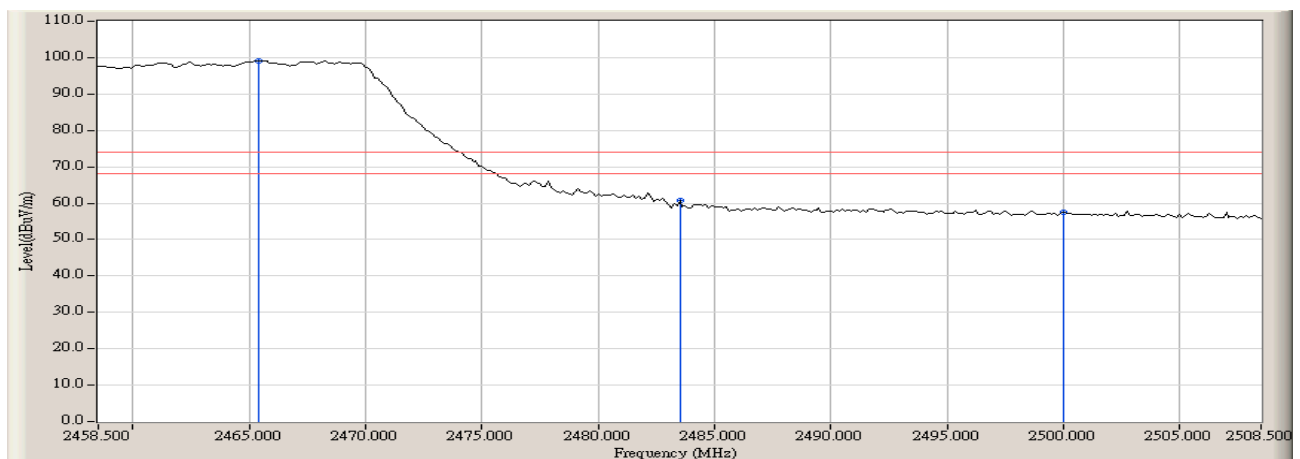
RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
11 (Vertical)	>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
11(Peak)	2483.500	-1.896	58.761	56.865	74.00	54.00	Pass
11(Average)	2483.500	-1.896	40.810	38.914	74.00	54.00	Pass

Figure Channel 11: (Vertical) (Peak)

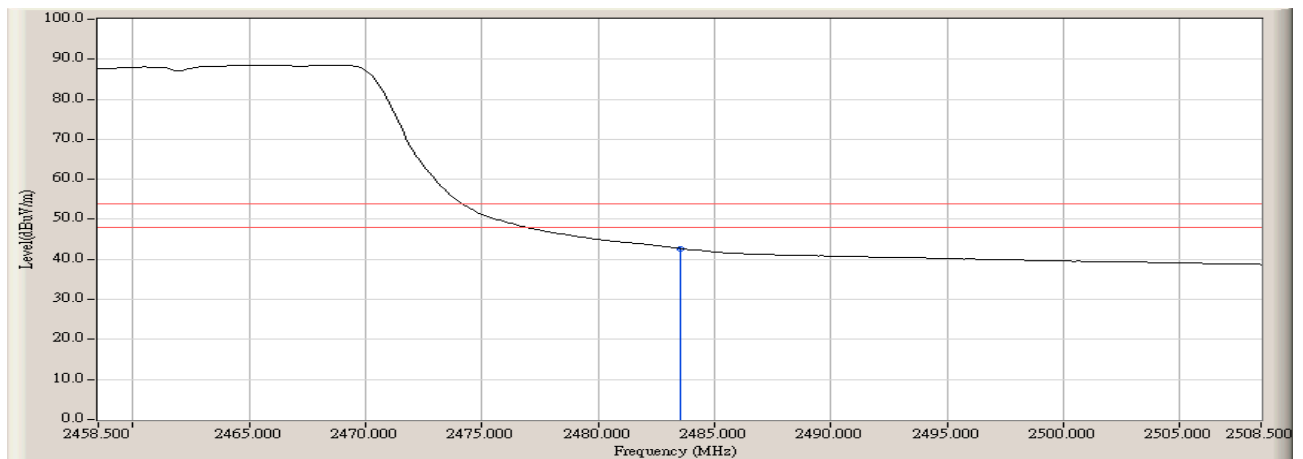


Note:

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

Figure Channel 11:

Vertical (Average)



Note:

RBW=1MHz, VBW=300Hz, 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. Occupied Bandwidth

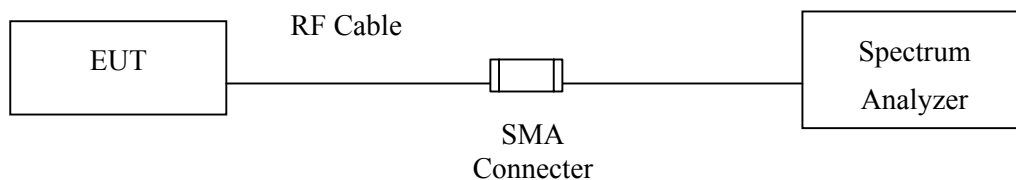
6.1. Test Equipment

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, 2006
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All instruments 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. Limits

The minimum bandwidth shall be at least 500kHz.

6.4. Uncertainty

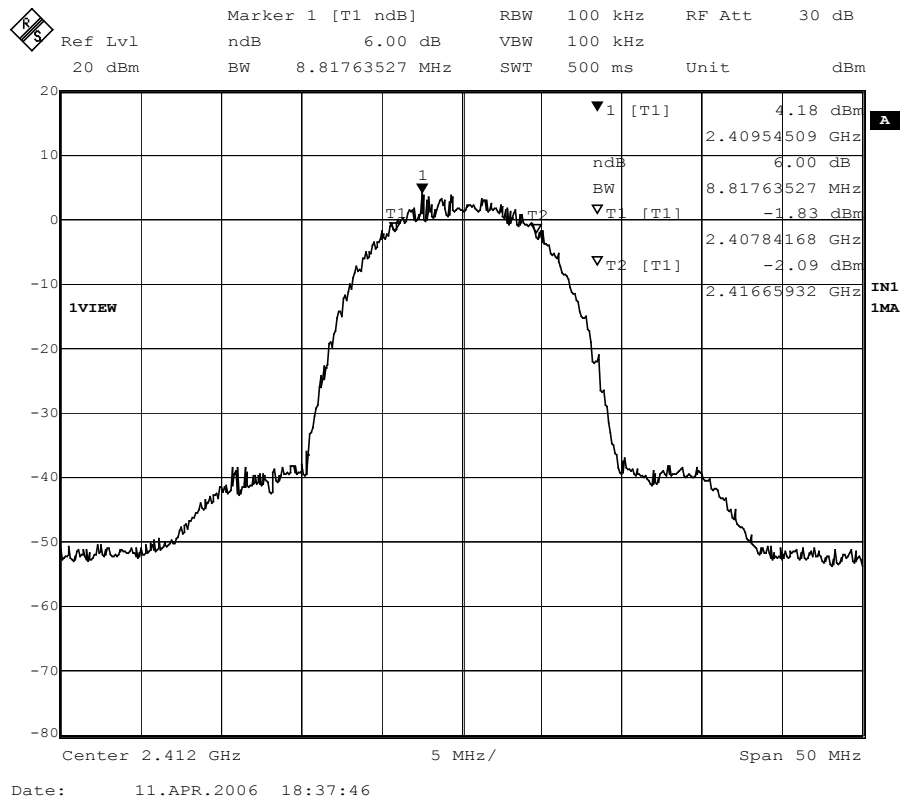
$\pm 150\text{Hz}$

6.5. Test Result of Occupied Bandwidth

Product : Industrial PDA
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (11Mbps)	2412.00	8817	>500	Pass

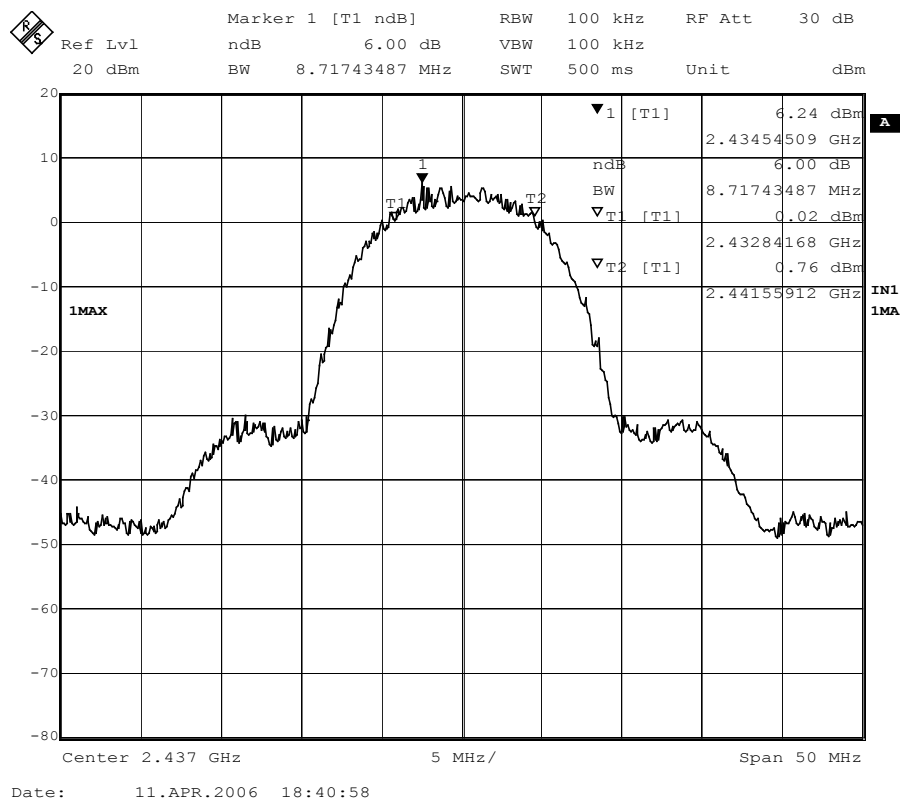
Figure Channel 1: 11Mbps



Product	:	Industrial PDA
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (11Mbps)	2437.00	8717	>500	Pass

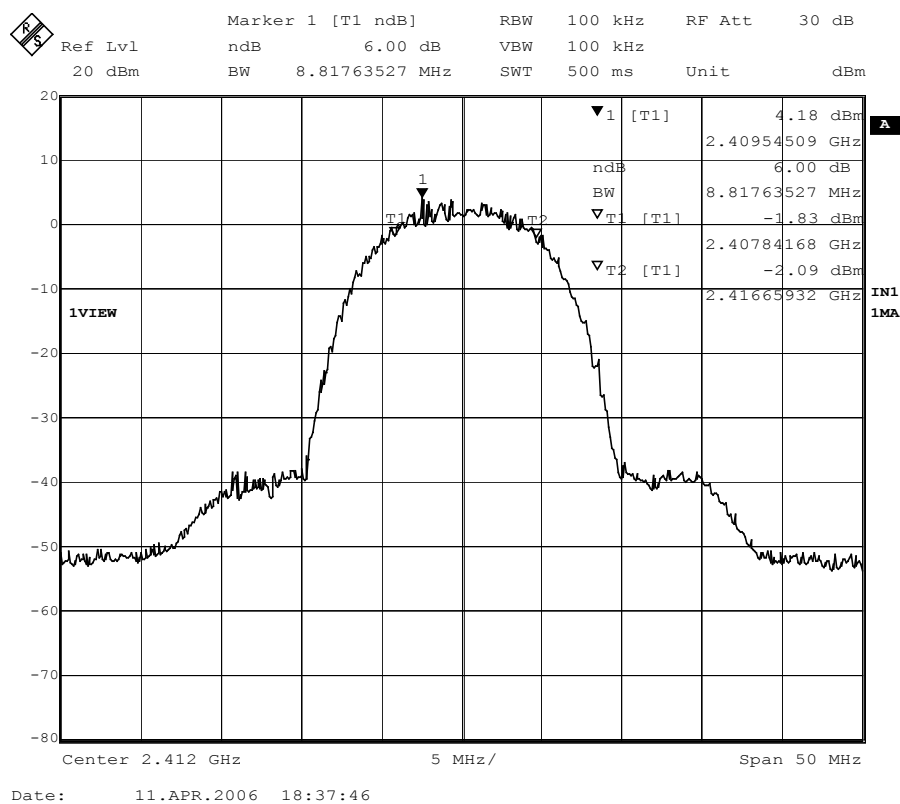
Figure Channel 6: 11Mbps



Product : Industrial PDA
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (11Mbps)	2462.00	9619	>500	Pass

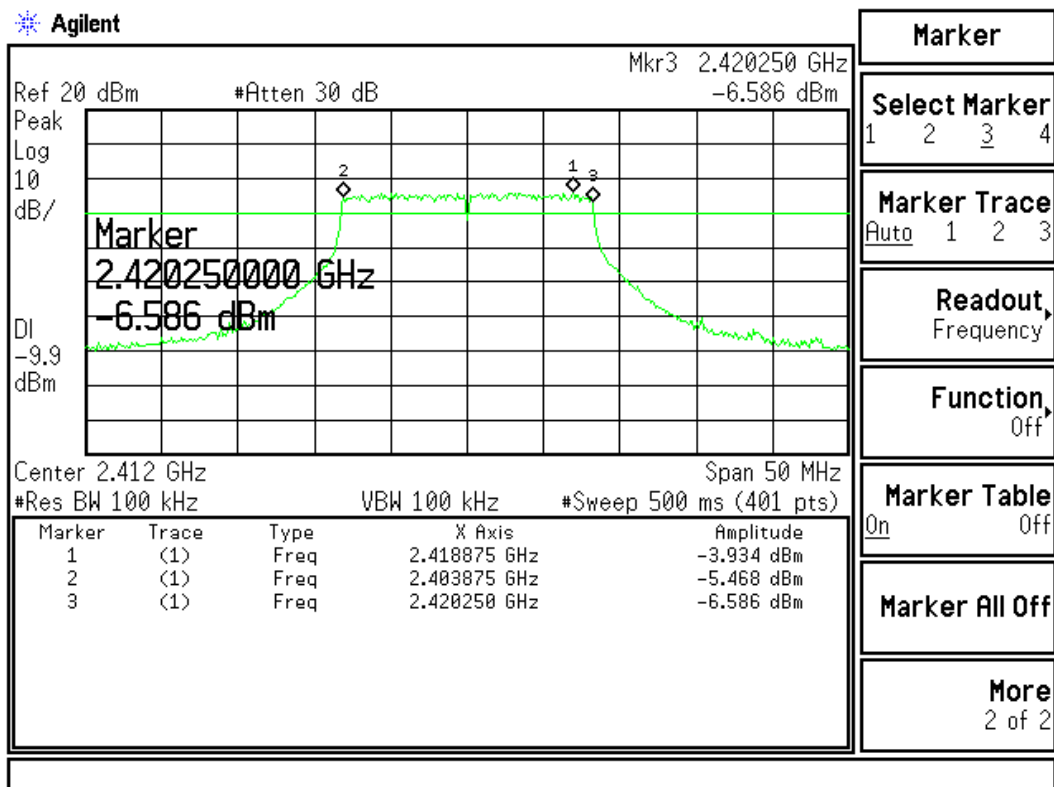
Figure Channel 11: 11Mbps



Product : Industrial PDA
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1 (54Mbps)	2412.00	16375	>500	Pass

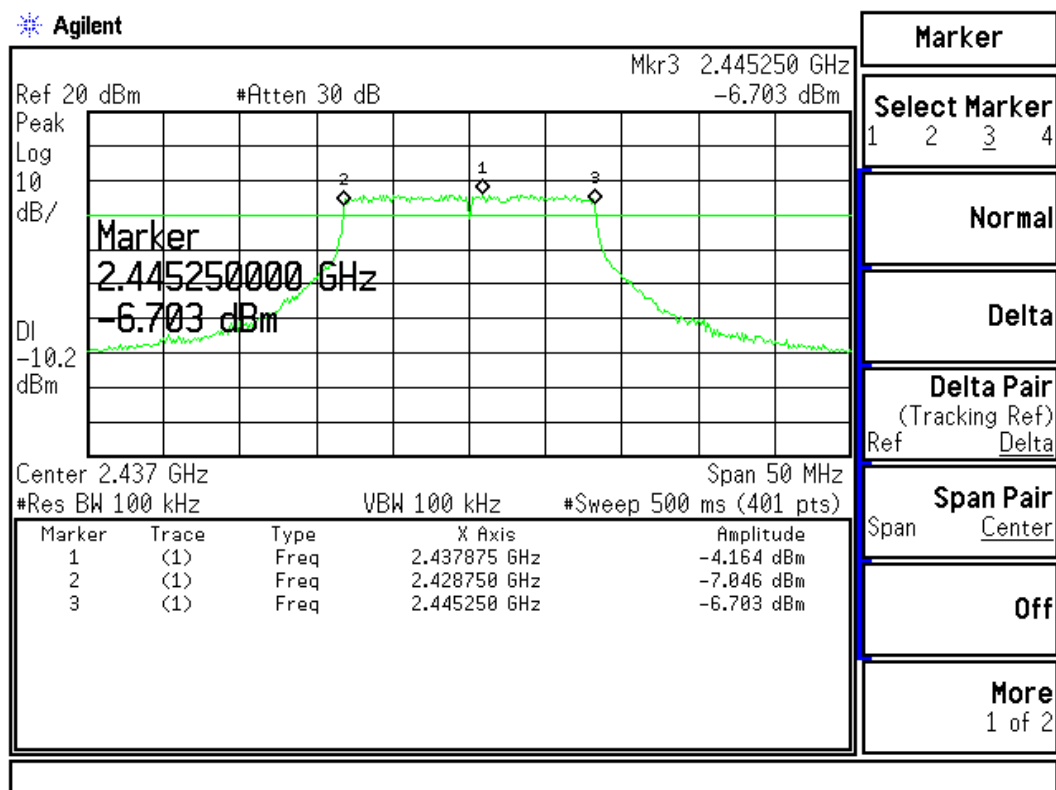
Figure Channel 1:



Product : Industrial PDA
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (54Mbps)	2437.00	16500	>500	Pass

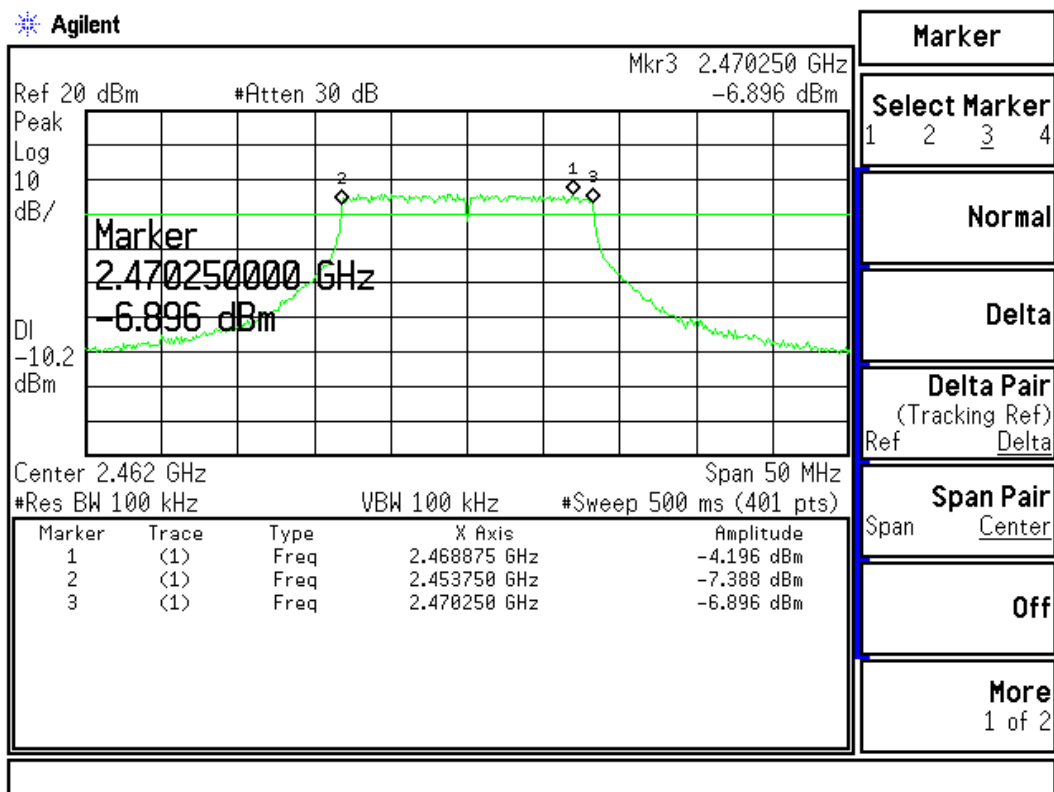
Figure Channel 6:



Product : Industrial PDA
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11 (54Mbps)	2462.00	16500	>500	Pass

Figure Channel 11:



7. Power Density

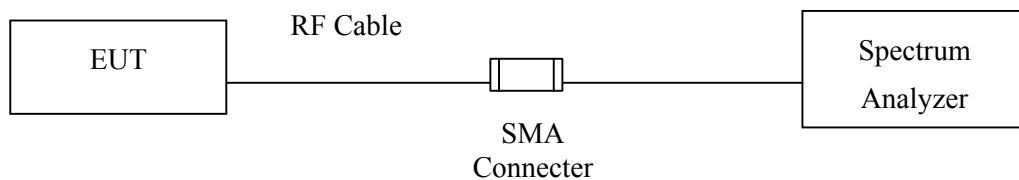
7.1. Test Equipment

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, 2006
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

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. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

7.4. Uncertainty

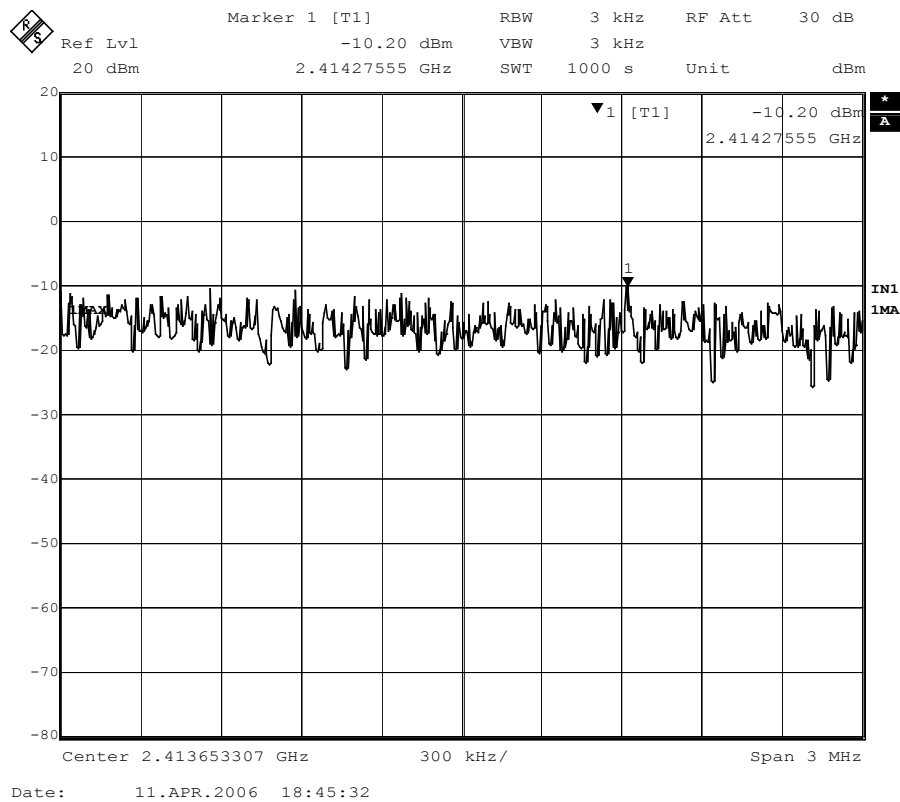
± 1.27 dB

7.5. Test Result of Power Density

Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (11Mbps)	2412.00	-10.20	< 10dBm	Pass

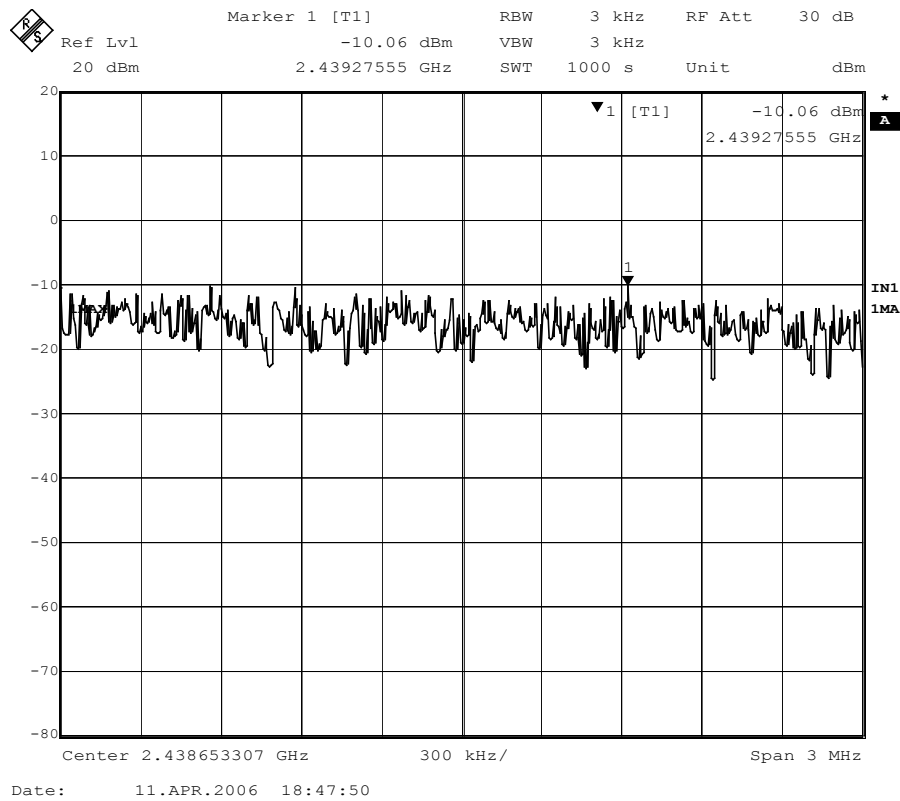
Figure Channel 1: 11Mbps



Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (11Mbps)	2437.000	-10.06	< 10dBm	Pass

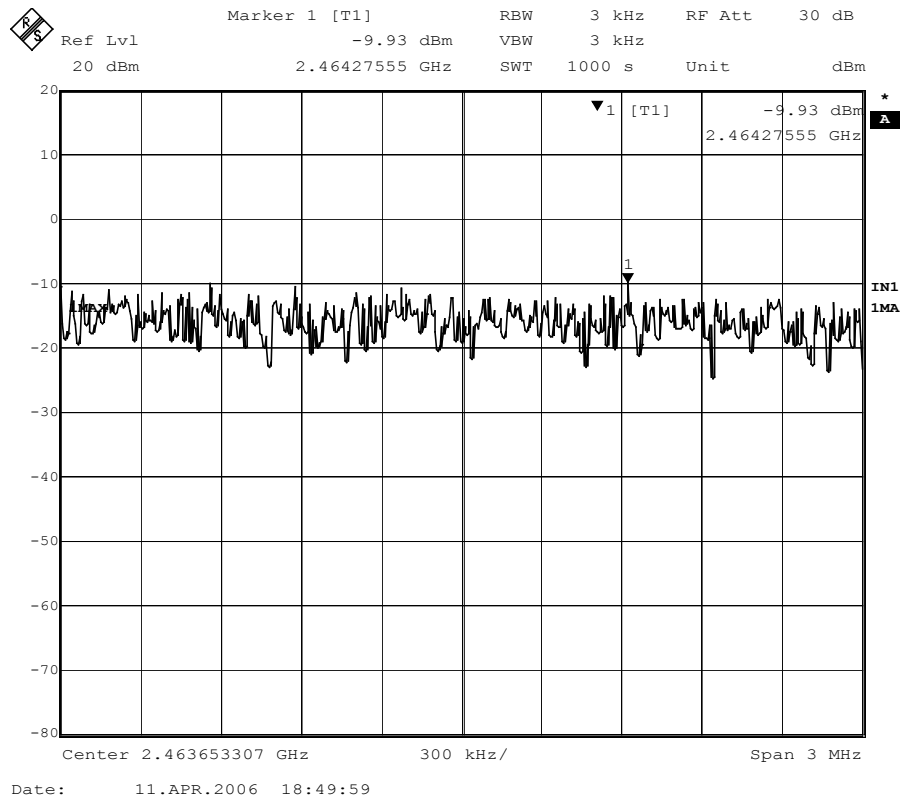
Figure Channel 6: 11Mbps



Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter 802.11b (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (11Mbps)	2462.00	-9.93	< 10dBm	Pass

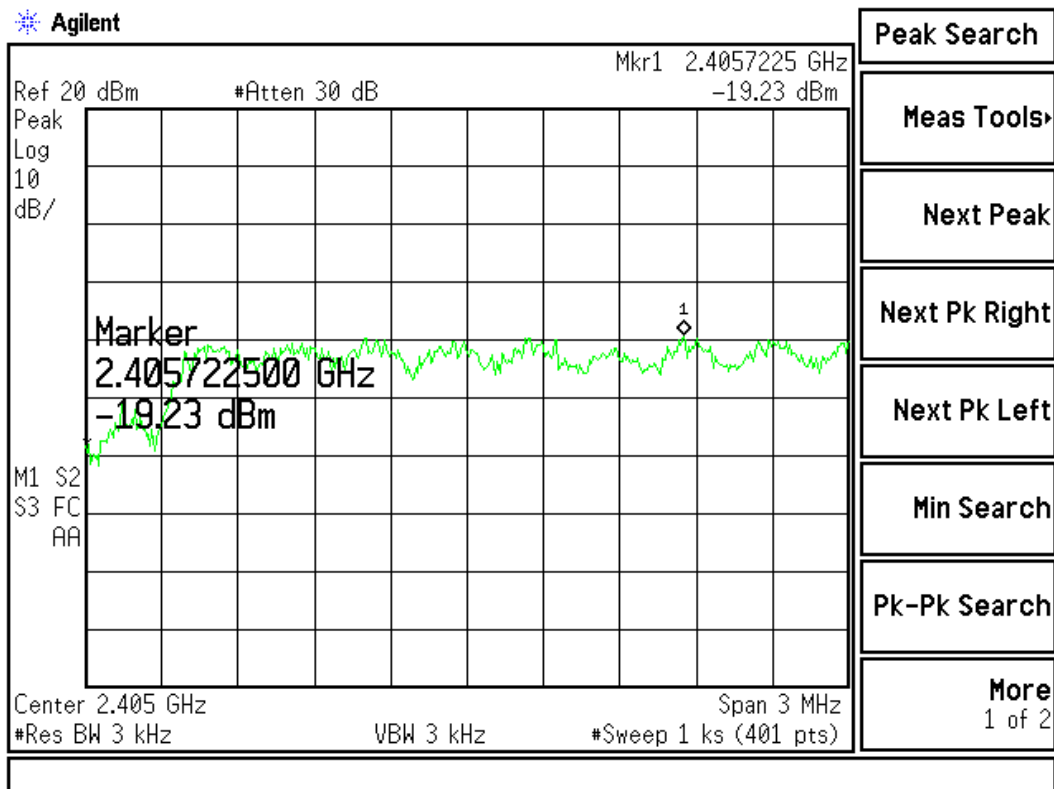
Figure Channel 11: 11Mbps



Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1 (54Mbps)	2412.00	-19.23	< 10dBm	Pass

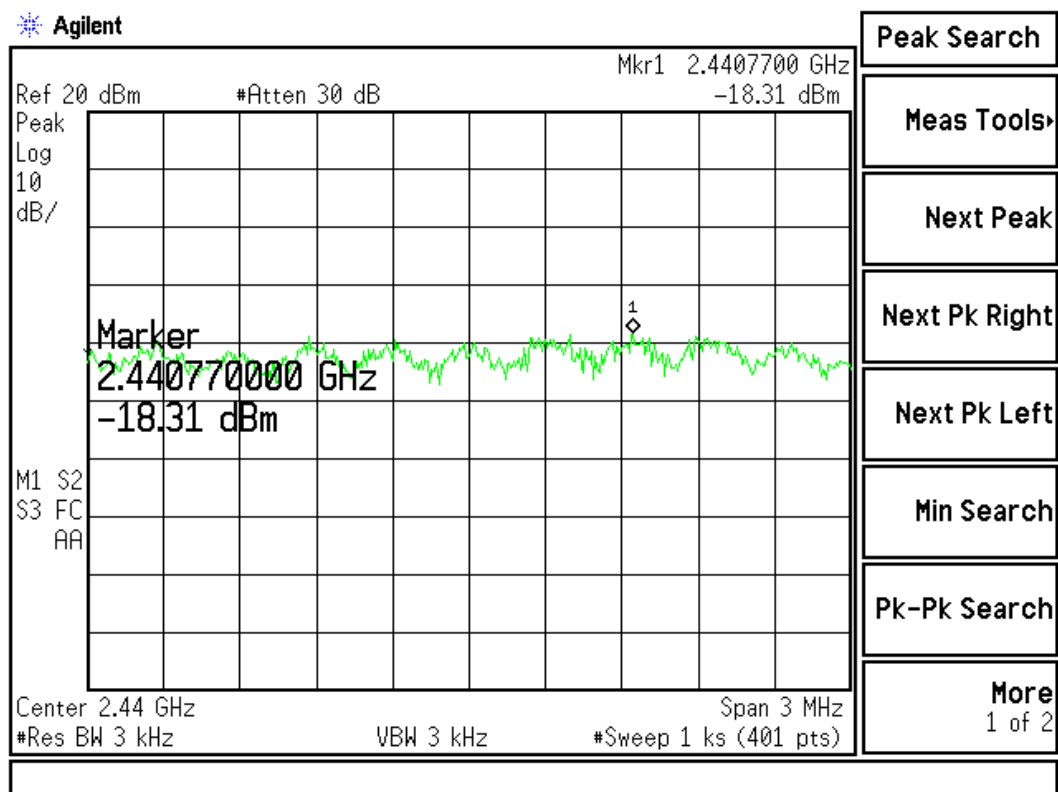
Figure Channel 1:



Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6 (54Mbps)	2437.000	-18.31	< 10dBm	Pass

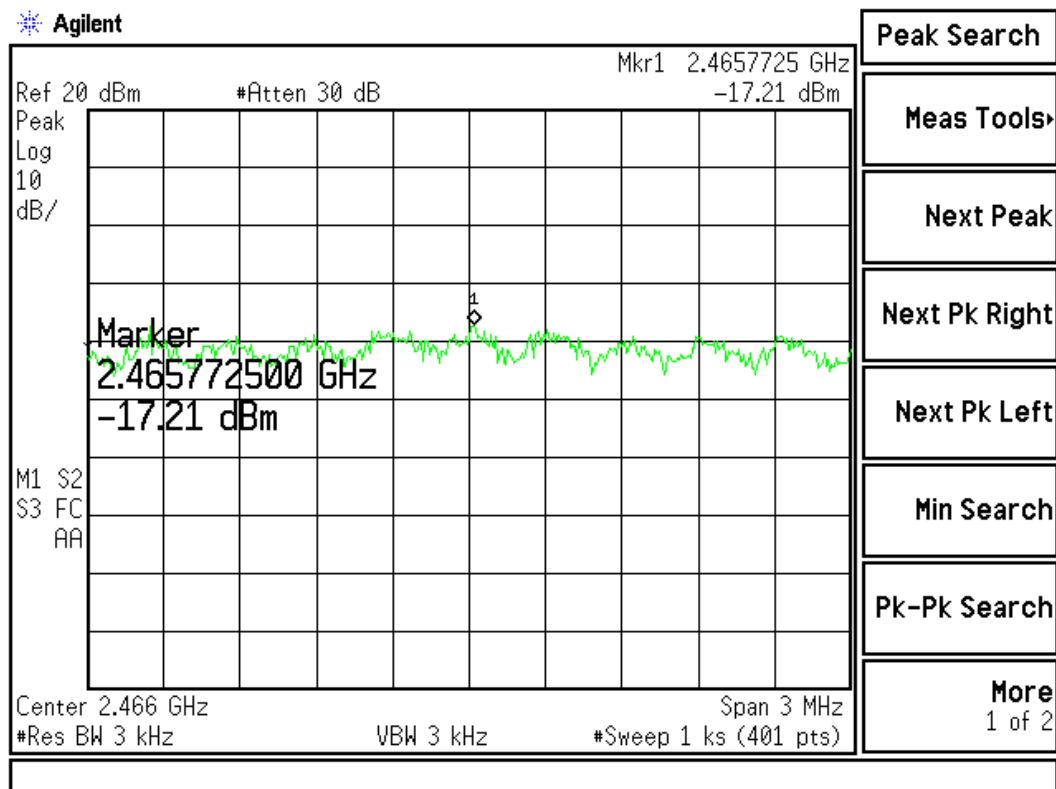
Figure Channel 6:



Product : Industrial PDA
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmitter 802.11g (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11 (54Mbps)	2462.00	-17.21	< 10dBm	Pass

Figure Channel 11:



8. EMI Reduction Method During Compliance Testing

No modification was made during testing.