



## Test Report

Product Name	Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client
Model No.	AWK-3121-US, AWK-3121-US-T
FCC ID	SLE-AWK-3121

Applicant	Moxa Inc.
Address	Fl.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.

Date of Receipt	Apr. 18, 2008
Issued Date	May. 19, 2008
Report No.	084316R-RFUSP05V01
Version	V1.0

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: May. 19, 2008

Report No.: 084316R-RFUSP05V01



Accredited by NIST (NVLAP)  
NVLAP Lab Code: 200533-0

Product Name	Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client
Applicant	Moxa Inc.
Address	F1.4, No. 135, Lane 235, Pao-Chiao Rd., Shing Tien City, Taipei, Taiwan, R.O.C.
Manufacturer	Moxa Inc.
Model No.	AWK-3121-US, AWK-3121-US-T
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 12V
Trade Name	Moxa
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2007 ANSI C63.4: 2003
Test Result	Complied



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Tested By : Johnson Liao  
( Assistant Engineer /Johnson Liao )



Testing Laboratory

0914

Approved By : 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	Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client
Trade Name	Moxa
Model No.	AWK-3121-US, AWK-3121-US-T
FCC ID	SLE-AWK-3121
Frequency Range	2412 – 2462MHz for 802.11 b/g 5180 – 5240MHz, 5745 – 5825MHz for 802.11a
Channel Number	11 for 802.11 b/g 9 for 802.11 a
Data Speed	802.11b – 1, 2, 5.5, 11Mbps 802.11a/g – 6, 9, 12, 18, 24, 36, 48, 54Mbps
Type of Modulation	802.11b:DSSS DBPSK, DQPSK, CCK 802.11 a/g: OFDM BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Dipole
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: ENG, M/N: 3A-161DA12 Input: AC 100V-240V, 50-60Hz, 0.6A Output: DC 12V, 1.25A Cable out: Non-Shielded, 1.8m with two ferrite cores bonded. Power Cord: Non-Shielded, 1.8m.

#### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	Smart Ant	SAA05-220420	2.0dBi in 2.4 GHz 2.0dBi in 5GHz
2	WANSHIH	N/A	1.76dBi in 2.4 GHz 1.33dBi in 5GHz
3	Wha Yu	C600- 510013-A	1.8dBi in 2.4 GHz 1.8dBi in 5GHz

## 2.4GHz Band 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		

## 5GHz Band Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1	5180 MHz	Channel 2	5200 MHz	Channel 3	5220 MHz	Channel 4	5240 MHz
Channel 5	5745 MHz	Channel 6	5765 MHz	Channel 7	5785 MHz	Channel 8	5805 MHz
Channel 9	5825 MHz						

## Note:

1. The EUT is an Industrial IEEE 802.11 a/b/g wireless Access Point/Bridge/Client with a built-in 2.4GHz and 5GHz 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 1Mbps and 802.11 a/g is 6Mbps)
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 an Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client with 11 channels for 802.11b/g and 9 channels for 802.11a. This device provide four kinds of transmitting speed 1, 2, 5.5 and 11Mbps. The modulation of device is BPSK, QPSK and CCK (IEEE 802.11b) and eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps are provided. The technology of this device used is OFDM (IEEE 802.11 a/g).

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

This Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client, compliant with IEEE 802.11b and IEEE 802.11 a/g, 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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11 a/g network.

Test Mode	Mode 1: Transmitter 802.11b
	Mode 2: Transmitter 802.11g
	Mode 3: Transmitter 802.11a

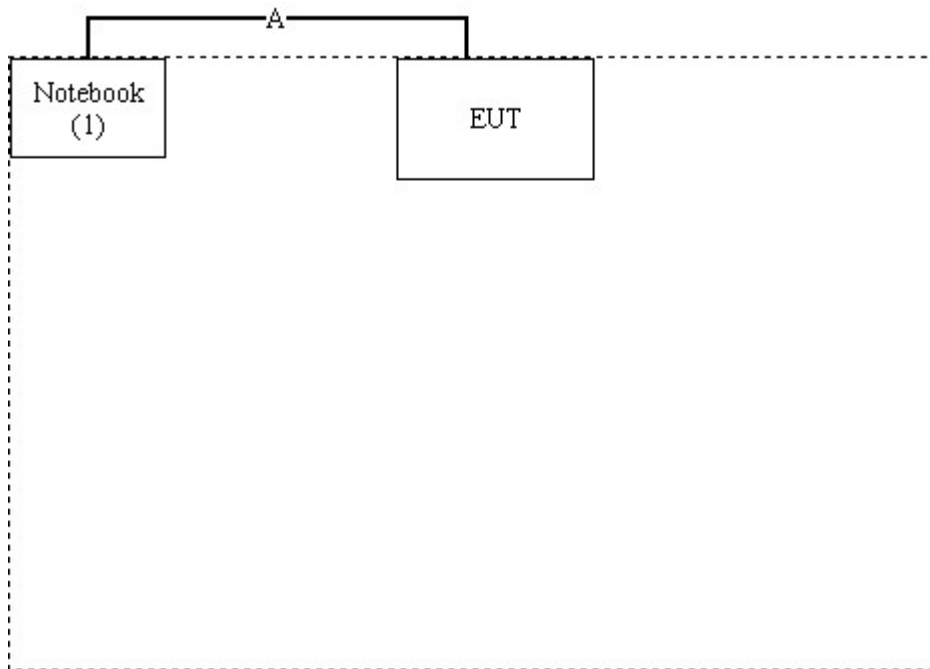
### 1.3. Tested System Details

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

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

	Signal Cable Type	Signal cable Description
A	USB to LAN Cable	Shielded, 2.0m

### 1.4. Configuration of Test System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute the RF program (the continuous transmission program) on the EUT
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous transmission.
- (5) Verify that the EUT works properly.



**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	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  
 Registration Number: 92195



Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0



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FCC Accreditation Number: TW1014



Testing Laboratory

**0914**

## 2. Conducted Emission

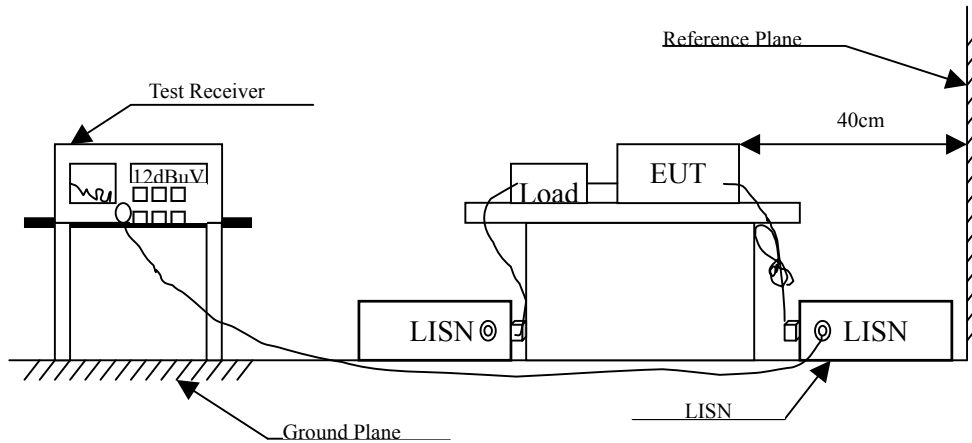
### 2.1. Test Equipment

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, 2008	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2008	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2008	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2008	
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 <sub>(註)</sub>	56-46 <sub>(註)</sub>
0.50-5.0	56	46
5.0 - 30	60	50

## 2.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

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

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

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

## 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.189	0.725	42.880	43.605	-21.281	64.886
0.244	0.360	40.370	40.730	-22.584	63.314
0.302	0.300	38.540	38.840	-22.817	61.657
0.357	0.300	39.820	40.120	-19.966	60.086
0.966	0.310	29.980	30.290	-25.710	56.000
2.380	0.350	28.130	28.480	-27.520	56.000
<b>Average</b>					
0.189	0.725	30.170	30.895	-23.991	54.886
0.244	0.360	32.030	32.390	-20.924	53.314
0.302	0.300	35.370	35.670	-15.987	51.657
0.357	0.300	32.590	32.890	-17.196	50.086
0.966	0.310	20.840	21.150	-24.850	46.000
2.380	0.350	18.550	18.900	-27.100	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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.185	0.300	45.650	45.950	-19.050	65.000
0.310	0.300	38.250	38.550	-22.879	61.429
0.361	0.310	36.910	37.220	-22.751	59.971
1.341	0.330	28.620	28.950	-27.050	56.000
1.494	0.330	28.530	28.860	-27.140	56.000
2.244	0.350	26.560	26.910	-29.090	56.000
<b>Average</b>					
0.185	0.300	34.790	35.090	-19.910	55.000
0.310	0.300	27.420	27.720	-23.709	51.429
0.361	0.310	33.010	33.320	-16.651	49.971
1.341	0.330	19.060	19.390	-26.610	46.000
1.494	0.330	18.180	18.510	-27.490	46.000
2.244	0.350	15.200	15.550	-30.450	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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.181	0.780	47.370	48.150	-16.964	65.114
0.236	0.395	38.480	38.875	-24.668	63.543
0.306	0.300	39.940	40.240	-21.303	61.543
0.365	0.300	38.840	39.140	-20.717	59.857
0.607	0.300	29.570	29.870	-26.130	56.000
2.537	0.360	25.960	26.320	-29.680	56.000
<b>Average</b>					
0.181	0.780	40.110	40.890	-14.224	55.114
0.236	0.395	25.940	26.335	-27.208	53.543
0.306	0.300	33.690	33.990	-17.553	51.543
0.365	0.300	36.040	36.340	-13.517	49.857
0.607	0.300	23.480	23.780	-22.220	46.000
2.537	0.360	14.960	15.320	-30.680	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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.173	0.300	38.960	39.260	-26.083	65.343
0.189	0.300	39.680	39.980	-24.906	64.886
0.244	0.300	37.760	38.060	-25.254	63.314
0.357	0.309	36.610	36.919	-23.167	60.086
1.025	0.320	30.510	30.830	-25.170	56.000
2.330	0.360	29.790	30.150	-25.850	56.000
<b>Average</b>					
0.173	0.300	23.980	24.280	-31.063	55.343
0.189	0.300	26.020	26.320	-28.566	54.886
0.244	0.300	28.290	28.590	-24.724	53.314
0.357	0.309	30.280	30.589	-19.497	50.086
1.025	0.320	21.280	21.600	-24.400	46.000
2.330	0.360	20.870	21.230	-24.770	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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.185	0.753	45.490	46.243	-18.757	65.000
0.244	0.360	38.850	39.210	-24.104	63.314
0.361	0.300	39.950	40.250	-19.721	59.971
0.521	0.300	34.940	35.240	-20.760	56.000
0.677	0.310	32.590	32.900	-23.100	56.000
1.654	0.330	31.950	32.280	-23.720	56.000
<b>Average</b>					
0.185	0.753	36.360	37.113	-17.887	55.000
0.244	0.360	31.010	31.370	-21.944	53.314
0.361	0.300	36.460	36.760	-13.211	49.971
0.521	0.300	27.070	27.370	-18.630	46.000
0.677	0.310	25.200	25.510	-20.490	46.000
1.654	0.330	21.370	21.700	-24.300	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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.177	0.300	44.230	44.530	-20.699	65.229
0.236	0.300	35.950	36.250	-27.293	63.543
0.302	0.300	37.100	37.400	-24.257	61.657
0.666	0.310	27.990	28.300	-27.700	56.000
1.283	0.330	28.900	29.230	-26.770	56.000
2.384	0.360	29.700	30.060	-25.940	56.000
<b>Average</b>					
0.177	0.300	32.560	32.860	-22.369	55.229
0.236	0.300	23.090	23.390	-30.153	53.543
0.302	0.300	33.960	34.260	-17.397	51.657
0.666	0.310	22.010	22.320	-23.680	46.000
1.283	0.330	19.240	19.570	-26.430	46.000
2.384	0.360	20.350	20.710	-25.290	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

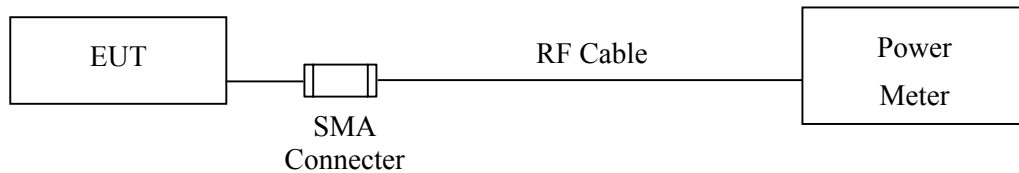
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2008
X Power Sensor	Anritsu	MA2491A/034457	May, 2008

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. Test procedures

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

#### 3.4. Limits

The maximum peak power shall be less 1 Watt.

#### 3.5. Uncertainty

± 1.27 dB

### 3.6. Test Result of Peak Power Output

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

Cable loss=0.5dB		Peak Power Output				
Channel No.	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412.00	17.39	--	--	--	1Watt= 30 dBm
6	2437.00	19.93	19.8	19.7	19.58	1Watt= 30 dBm
11	2462.00	16	--	--	--	1Watt= 30 dBm

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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

Cable loss=0.5dB		Peak Power Output								
Channel No.	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412.00	16.27	--	--	--	--	--	--	--	1Watt= 30 dBm
6	2437.00	23	22.34	22.51	22.05	22.1	21.74	21.88	21.62	1Watt= 30 dBm
11	2462.00	15.62	--	--	--	--	--	--	--	1Watt= 30 dBm

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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Peak Power Output Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a

Cable loss=0.5dB		Peak Power Output								
Channel No.	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
5	5745.00	22.63	--	--	--	--	--	--	--	1 Watt= 30 dBm
7	5785.00	22.89	22.7	22.75	22.14	22	22.41	22.35	22.44	1 Watt= 30 dBm
9	5825.00	23.23	--	--	--	--	--	--	--	1 Watt= 30 dBm

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

## 4. Radiated Emission

### 4.1. Test Equipment

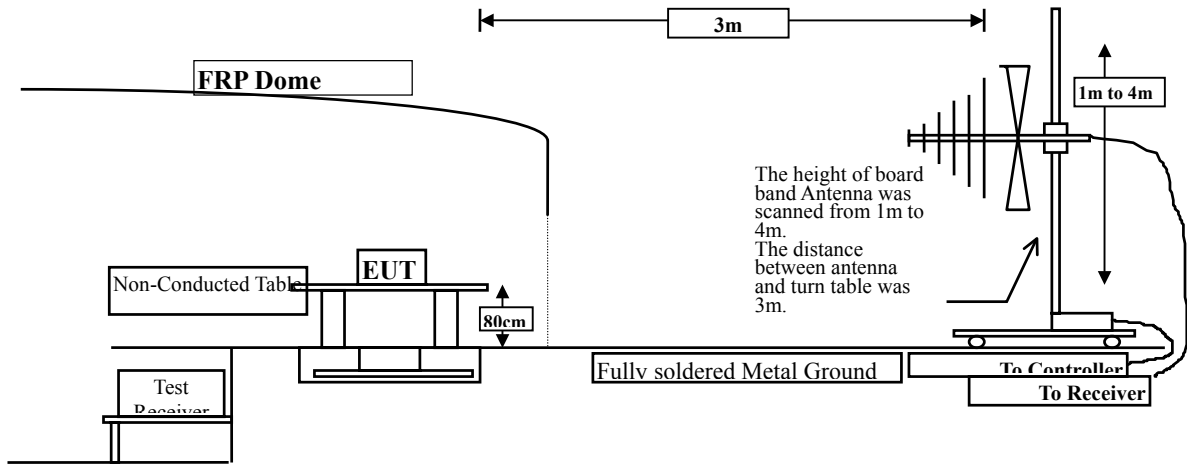
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2008
	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2008
	Pre-Amplifier	HP	8447D/3307A01812	May, 2008
	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2007
	Horn Antenna	EM	EM6917 / 103325	May, 2008
Site # 2	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2008
	Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2008
	Pre-Amplifier	HP	8447D/3307A01814	May, 2008
	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2007
	Horn Antenna	EM	EM6917 / 103325	May, 2008
Site # 3	X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
	X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
	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, 2008
	X Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

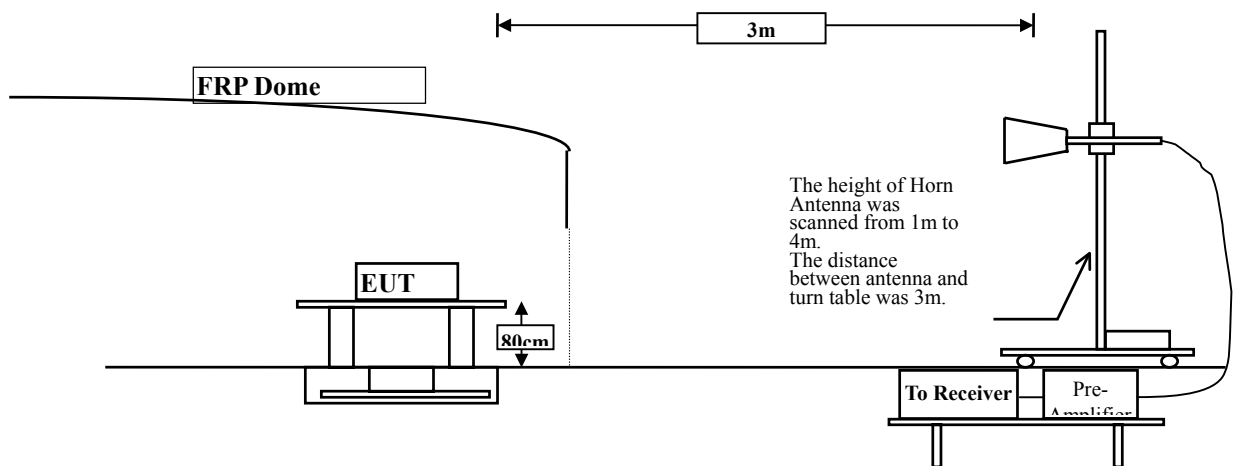
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

## 4.2. Test Setup

### Radiated Emission Below 1GHz



### Radiated Emission Above 1GHz



### 4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209(a) Limits</b>		
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 was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz. Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas. The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beam width of the antenna. The worst radiated emission is measured on the Final Measurement. 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 IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4824.000	-0.229	42.620	42.391	-31.609	74.000
7236.000	3.182	41.170	44.352	-29.648	74.000
9648.000	5.798	41.390	47.189	-26.811	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4824.000	-0.229	47.480	47.251	-26.749	74.000
7236.000	3.182	42.210	45.392	-28.608	74.000
9648.000	5.798	41.680	47.479	-26.521	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4874.000	-0.268	43.640	43.372	-30.628	74.000
7311.000	3.285	41.340	44.626	-29.374	74.000
9748.000	6.190	40.900	47.090	-26.910	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4874.000	-0.268	46.680	46.412	-27.588	74.000
7311.000	3.285	42.160	45.446	-28.554	74.000
9748.000	6.190	40.760	46.950	-27.050	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4924.000	0.105	41.250	41.355	-32.645	74.000
7386.000	3.644	39.930	43.575	-30.425	74.000
9848.000	6.582	40.380	46.962	-27.038	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4924.000	0.105	43.620	43.725	-30.275	74.000
7386.000	3.644	42.060	45.705	-28.295	74.000
9848.000	6.582	40.470	47.052	-26.948	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4824.000	-0.229	41.640	41.411	-32.589	74.000
7236.000	3.182	40.150	43.332	-30.668	74.000
9648.000	5.798	42.050	47.849	-26.151	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4824.000	-0.229	41.770	41.541	-32.459	74.000
7236.000	3.182	40.770	43.952	-30.048	74.000
9648.000	5.798	41.230	47.029	-26.971	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4874.000	-0.268	45.700	45.432	-28.568	74.000
7311.000	3.285	41.510	44.796	-29.204	74.000
9748.000	6.190	41.410	47.600	-26.400	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4874.000	-0.268	49.630	49.362	-24.638	74.000
7311.000	3.285	44.460	47.746	-26.254	74.000
9748.000	6.190	42.770	48.960	-25.040	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4924.000	0.105	41.840	41.945	-32.055	74.000
7386.000	3.644	40.950	44.595	-29.405	74.000
9848.000	6.582	40.740	47.322	-26.678	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4924.000	0.105	41.440	41.545	-32.455	74.000
7386.000	3.644	40.980	44.625	-29.375	74.000
9848.000	6.582	40.460	47.042	-26.958	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5745MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11490.000	6.655	46.990	53.644	-20.356	74.000
17235.000	5.738	44.540	50.278	-23.722	74.000
<b>Average</b>					
<b>Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11490.000	6.655	54.250	60.904	-13.096	74.000
17235.000	5.738	48.050	53.788	-20.212	74.000
<b>Average</b>					
<b>Detector:</b>					
11490.000	6.655	41.310	47.964	-6.036	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11570.000	6.386	44.850	51.236	-22.764	74.000
17385.000	6.018	45.470	51.488	-22.512	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11570.000	6.386	53.170	59.556	-14.444	74.000
17355.000	5.645	47.020	52.665	-21.335	74.000
<b>Average Detector:</b>					
11570.000	6.386	36.820	43.206	-10.794	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5825MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dBuV/m
	dB	dBuV	dBuV/m		
<b>Horizontal</b>					
<b>Peak Detector:</b>					
11650.000	7.199	46.410	53.609	-20.391	74.000
17475.000	5.834	45.540	51.374	-22.626	74.000
<b>Average</b>					
<b>Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
11650.000	7.199	45.030	52.229	-21.771	74.000
17475.000	5.834	43.040	48.874	-25.126	74.000
<b>Average</b>					
<b>Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:10MHz
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
121.180	12.759	9.880	22.639	-20.861	43.500
191.020	9.252	16.915	26.167	-17.333	43.500
264.740	14.127	11.250	25.377	-20.623	46.000
561.560	19.291	12.959	32.250	-13.750	46.000
660.580	20.928	3.932	24.859	-21.141	46.000
834.250	21.836	4.524	26.360	-19.640	46.000
<b>Vertical</b>					
95.850	10.293	16.117	26.410	-17.090	43.500
175.600	9.756	14.774	24.530	-18.970	43.500
379.250	16.651	8.819	25.470	-20.530	46.000
627.520	21.039	2.431	23.470	-22.530	46.000
725.740	22.565	4.595	27.160	-18.840	46.000
932.250	24.110	2.629	26.740	-19.260	46.000

Note:

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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
216.240	9.579	14.001	23.580	-22.420	46.000
363.680	15.740	9.620	25.360	-20.640	46.000
528.580	18.638	5.552	24.190	-21.810	46.000
598.630	19.928	3.730	23.658	-22.342	46.000
774.200	21.450	6.650	28.100	-17.900	46.000
852.560	22.568	0.792	23.360	-22.640	46.000
<b>Vertical</b>					
107.600	11.442	14.888	26.330	-17.170	43.500
225.940	10.783	10.237	21.020	-24.980	46.000
499.480	18.429	5.131	23.560	-22.440	46.000
685.720	20.300	7.390	27.690	-18.310	46.000
759.440	22.929	0.661	23.590	-22.410	46.000
924.340	24.092	0.458	24.550	-21.450	46.000

Note:

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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
142.520	12.083	12.607	24.690	-18.810	43.500
356.260	15.266	13.334	28.600	-17.400	46.000
379.250	15.665	5.915	21.580	-24.420	46.000
524.680	18.516	5.354	23.870	-22.130	46.000
683.780	20.977	5.333	26.310	-19.690	46.000
932.580	22.845	2.964	25.810	-20.190	46.000
<b>Vertical</b>					
254.870	13.847	9.022	22.870	-23.130	46.000
365.410	16.452	7.758	24.210	-21.790	46.000
498.600	18.427	11.753	30.180	-15.820	46.000
657.480	20.807	6.893	27.700	-18.300	46.000
748.690	21.027	3.922	24.950	-21.050	46.000
834.780	21.468	6.122	27.590	-18.410	46.000

Note:

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

**5. RF antenna conducted test**

**5.1. Test Equipment**

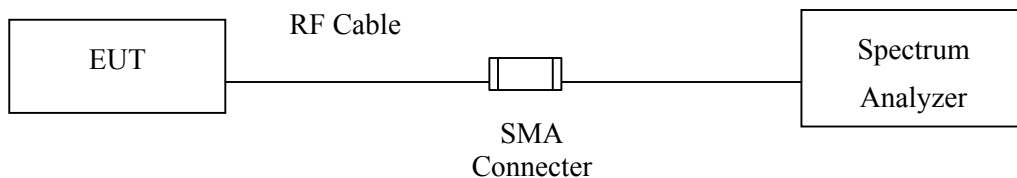
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008

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

**5.2. Test Setup**

**RF antenna Conducted 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 was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

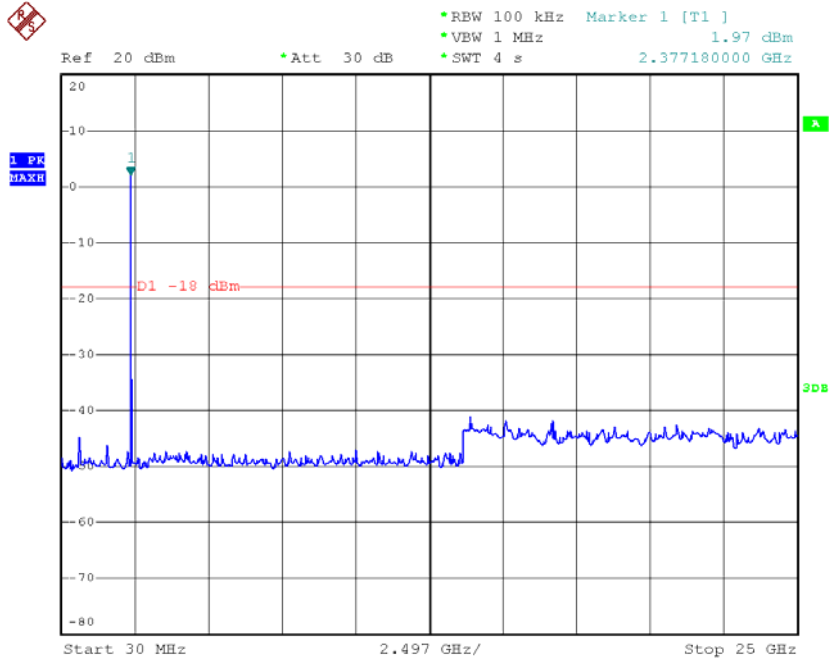
**5.5. Uncertainty**

The measurement uncertainty  
 Conducted is defined as  $\pm 1.27\text{dB}$

### 5.6. Test Result of RF antenna conducted test

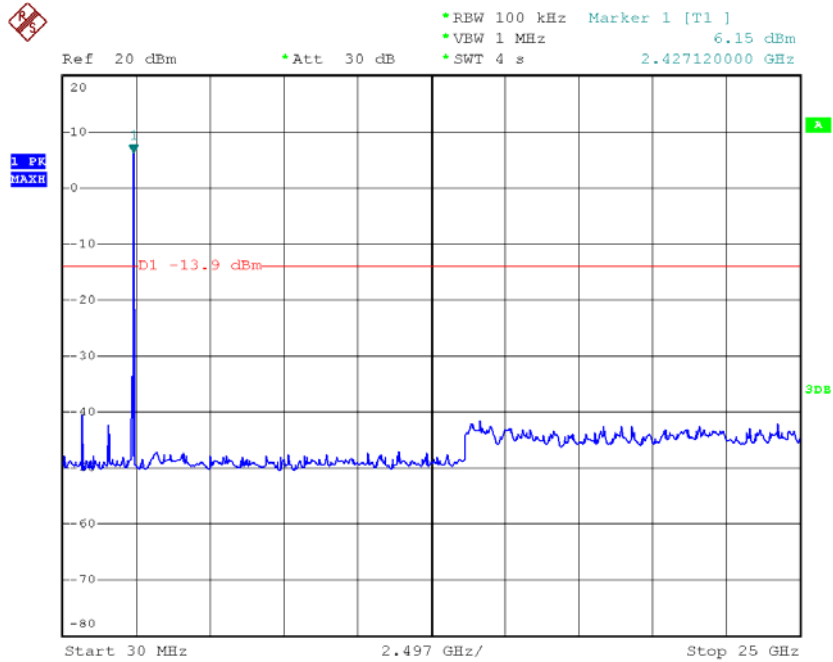
Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
Test Item : RF antenna conducted test  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter 802.11b

#### Channel 01 (2412MHz)



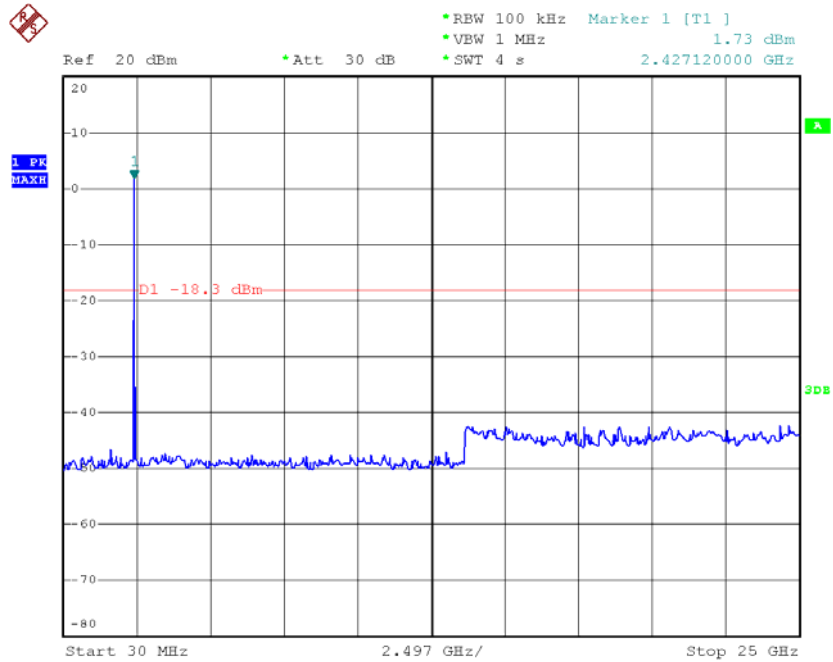
Date: 14.MAY.2008 14:25:15

### Channel 06 (2437MHz)



Date: 14.MAY.2008 14:27:26

### Channel 11 (2462MHz)

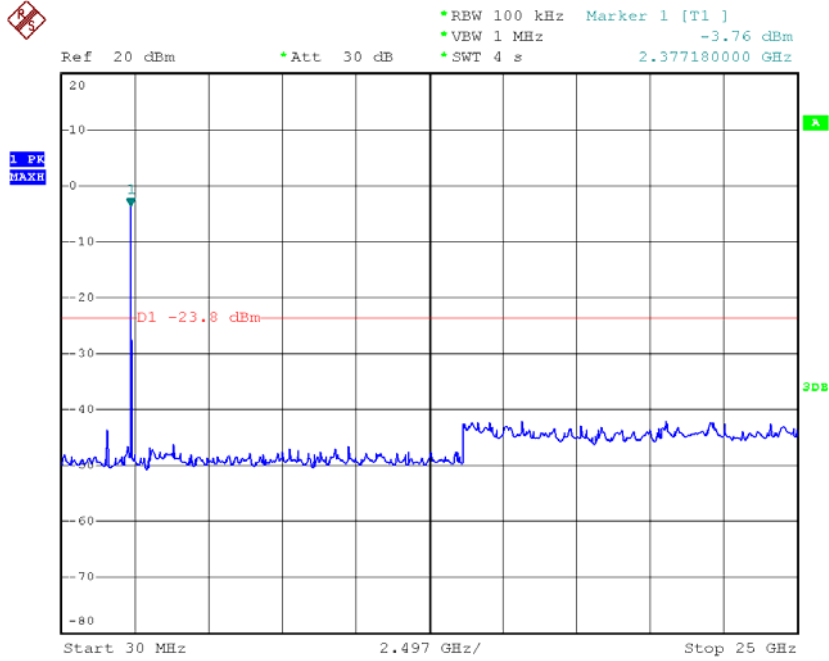


Date: 14.MAY.2008 14:28:09



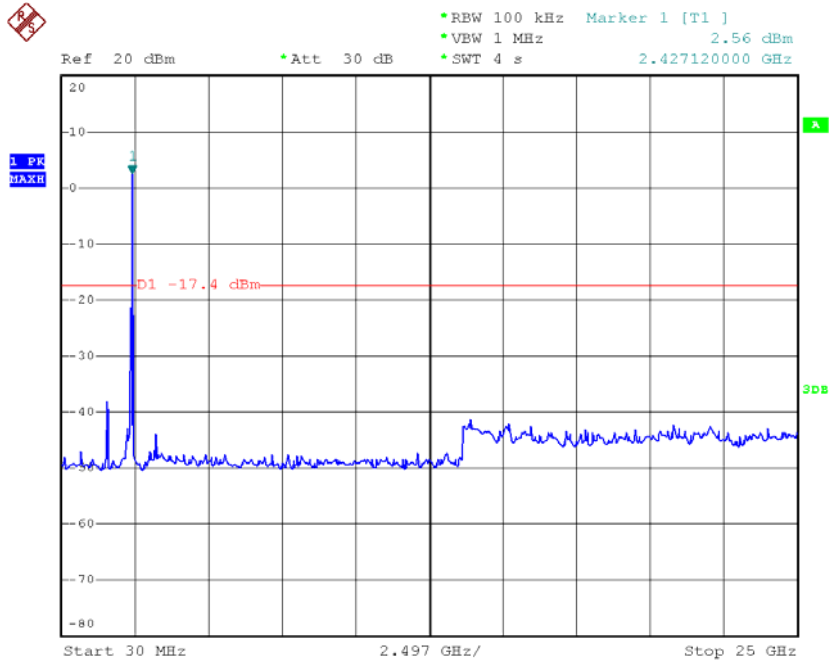
Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
Test Item : RF Antenna Conducted Spurious  
Test Site : No.3 OATS  
Test Mode : Mode 2: Transmitter 802.11g

### Channel 01 (2412MHz)



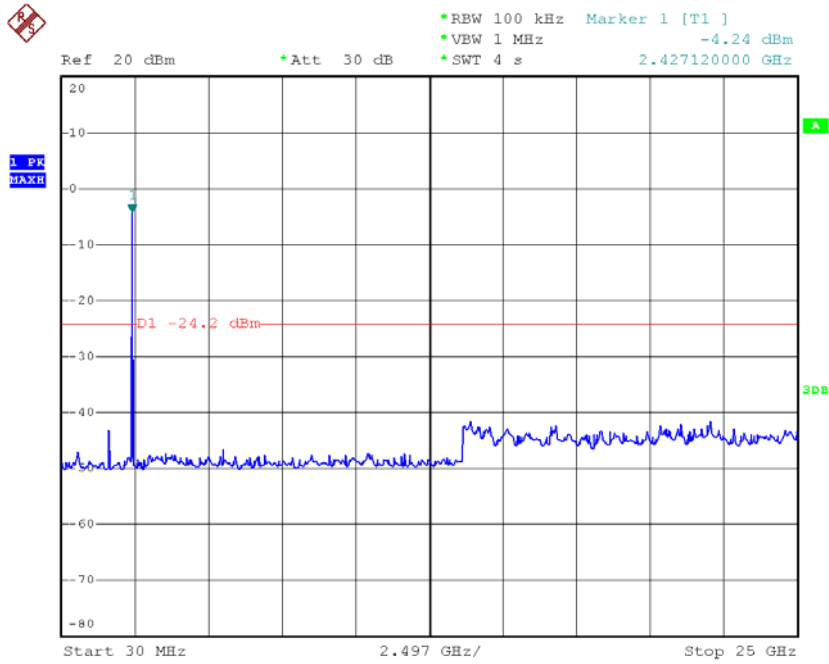
Date: 14.MAY.2008 14:28:52

### Channel 06 (2437MHz)



Date: 14.MAY.2008 14:29:45

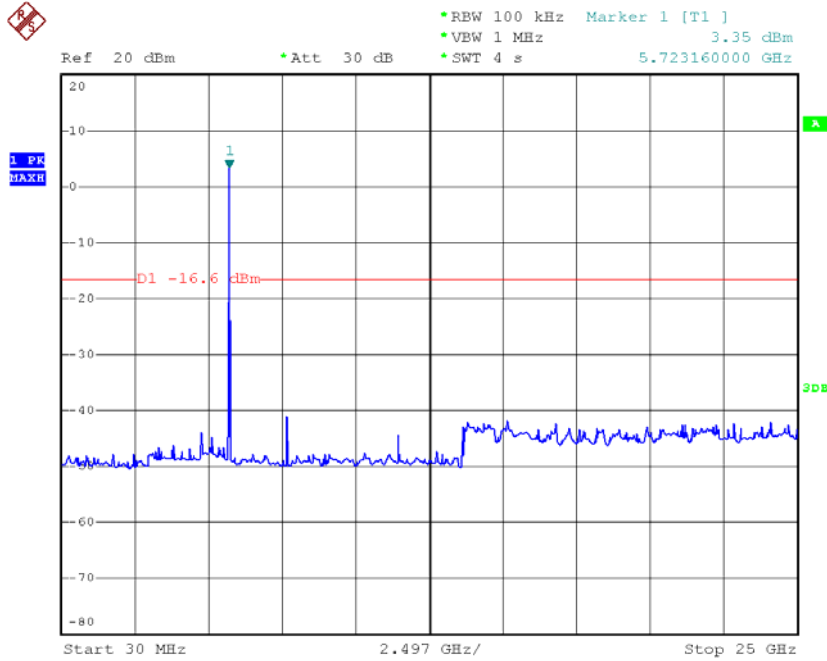
### Channel 11 (2462MHz)



Date: 14.MAY.2008 14:30:30

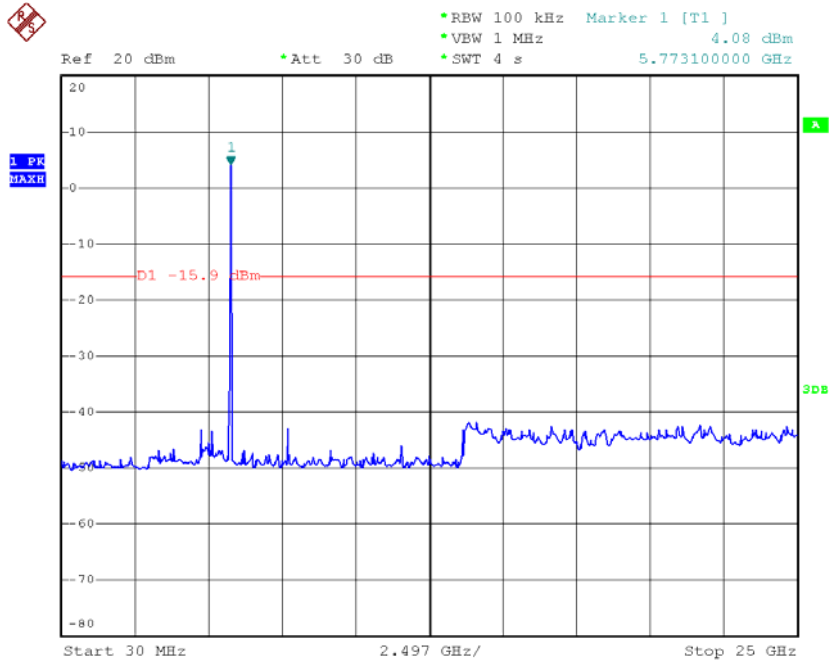
Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
Test Item : RF Antenna Conducted Spurious  
Test Site : No.3 OATS  
Test Mode : Mode 3: Transmitter 802.11a

### Channel 05 (5745MHz)



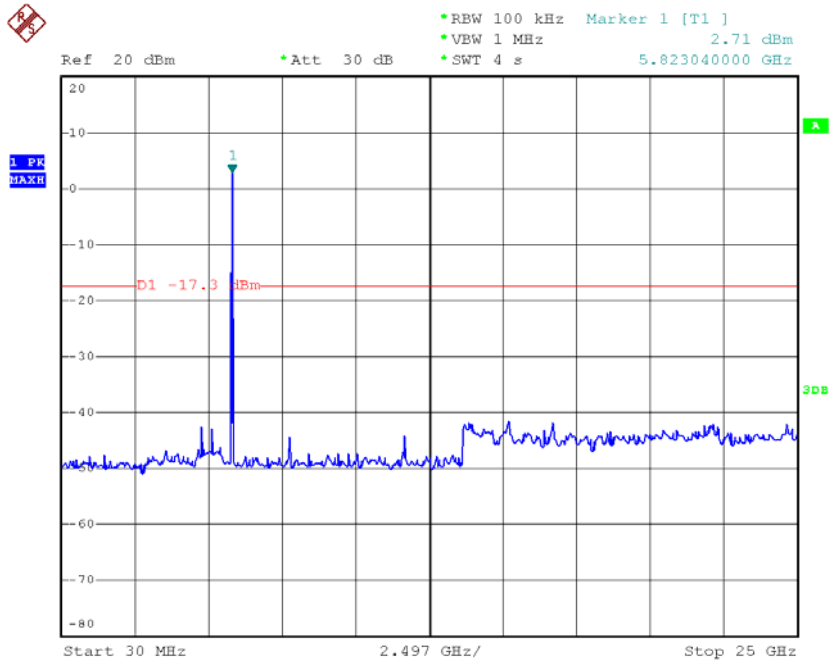
Date: 14.MAY.2008 14:31:40

### Channel 07 (5785MHz)



Date: 14.MAY.2008 14:32:20

### Channel 09 (5825MHz)



Date: 14.MAY.2008 14:33:01

## 6. Band Edge

### 6.1. Test Equipment

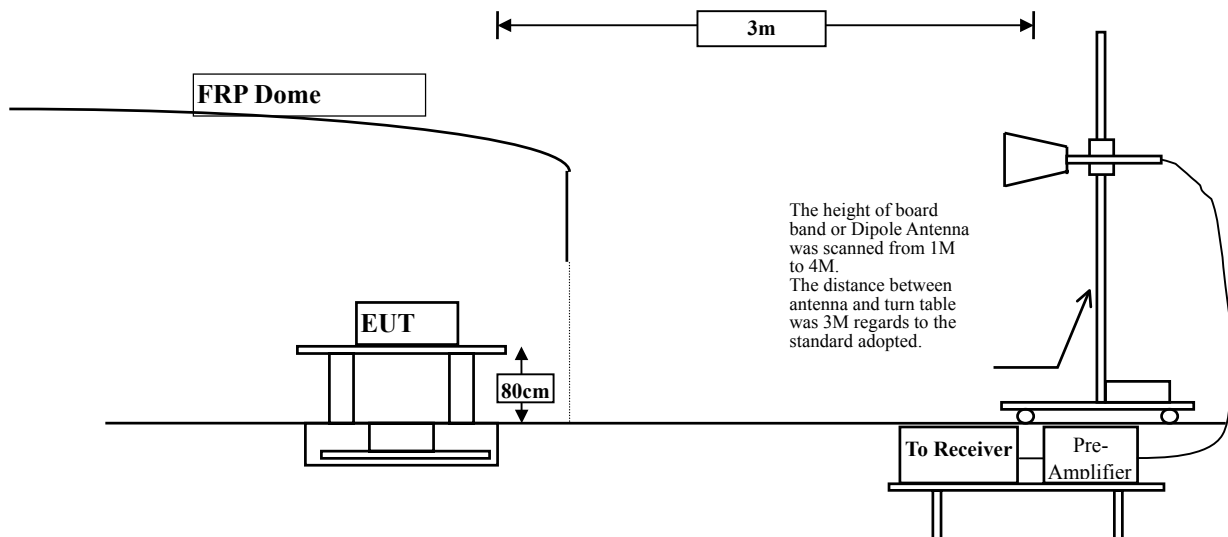
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2008
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, 2008
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

- 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

#### RF Conducted Measurement:



### **6.3. Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

### **6.4. Test Procedure**

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

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

### **6.5. Uncertainty**

± 3.9 dB above 1GHz

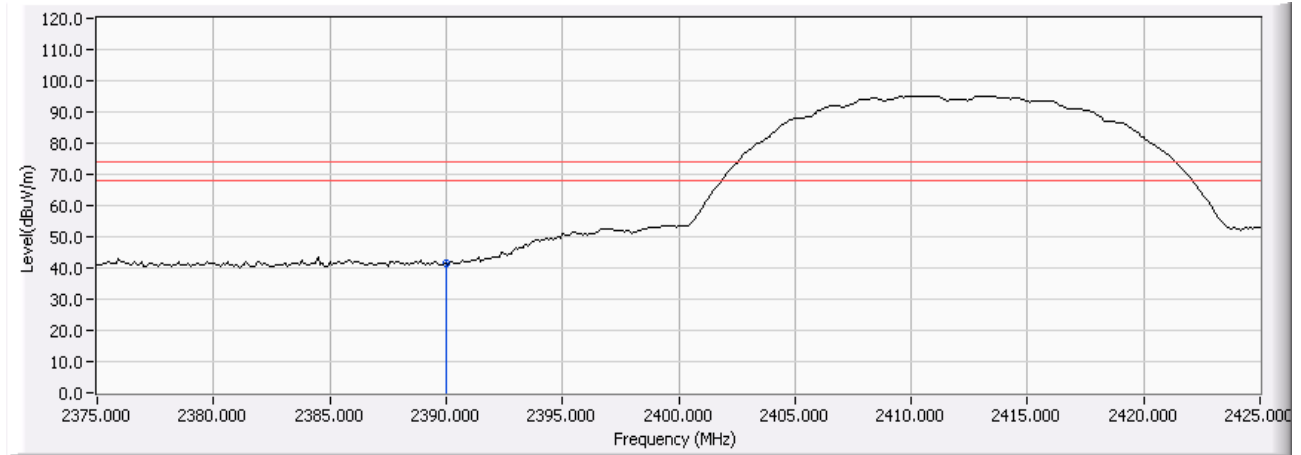
**6.6. Test Result of Band Edge**

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

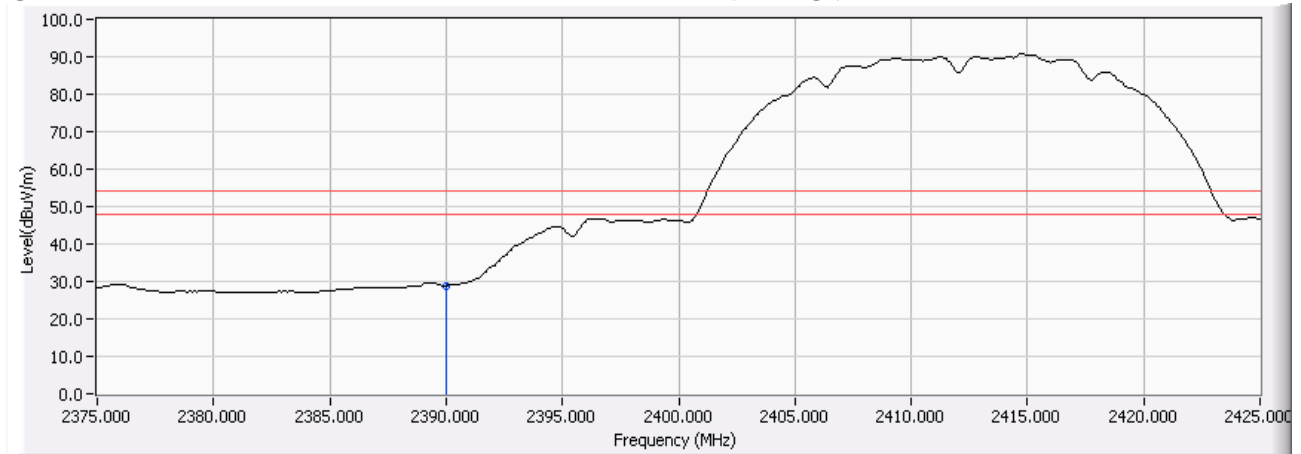
**RF Radiated Measurement (Horizontal):**

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	-6.769	48.236	41.468	74.00	54.00	Pass
1 (Average)	2390.000	-6.769	35.633	28.865	74.00	54.00	Pass

**Figure Channel 1: Horizontal (Peak)**



**Figure Channel 1: Horizontal (Average)**



**Note:**

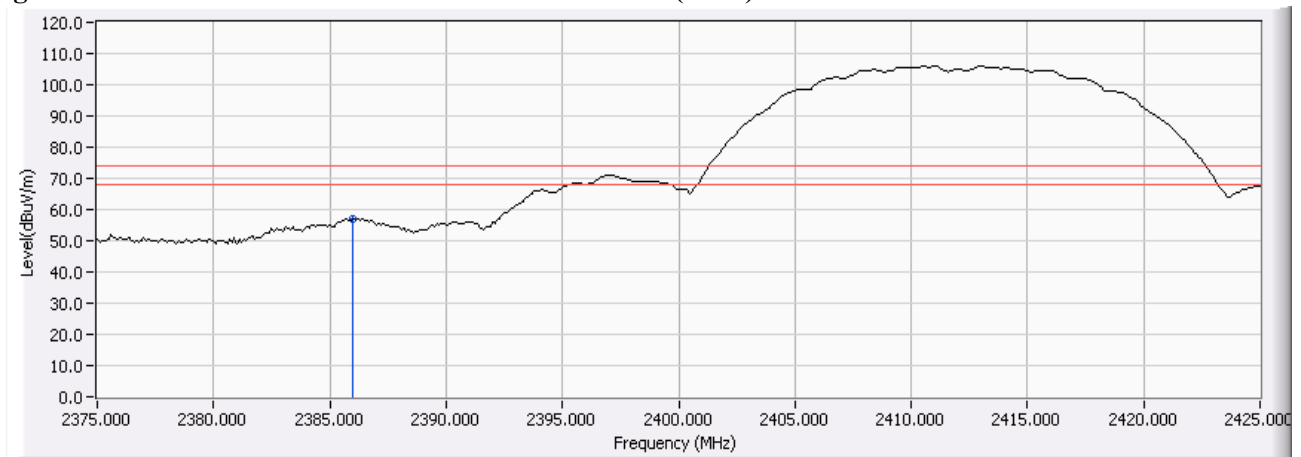
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

**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)	2386.000	-6.780	63.575	56.795	74.00	54.00	Pass
1 (Average)	2386.000	-6.780	54.128	47.348	74.00	54.00	Pass

**Figure Channel 1: Vertical (Peak)**



**Figure Channel 1: Vertical (Average)**



**Note:**

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

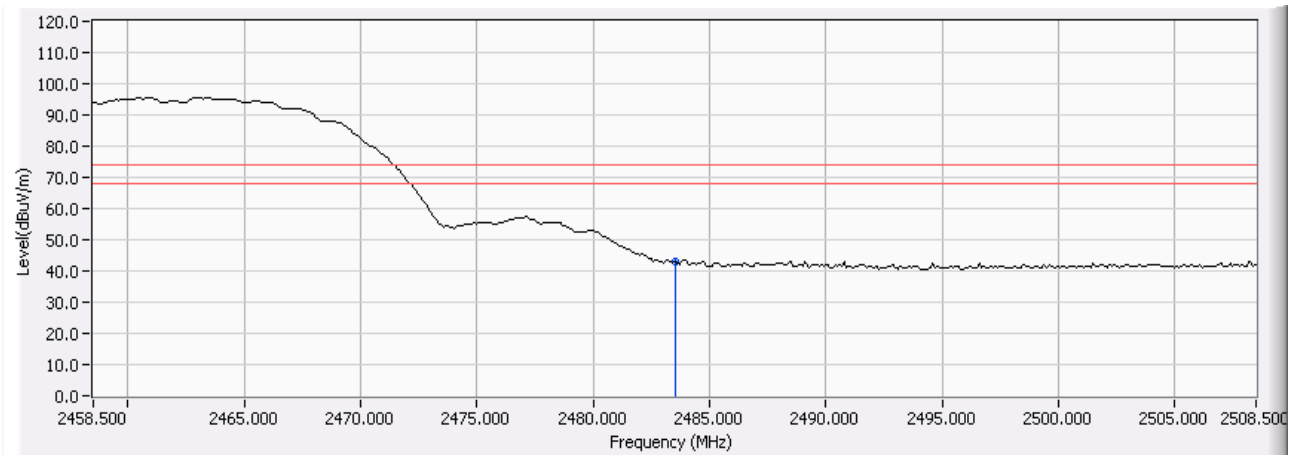


Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

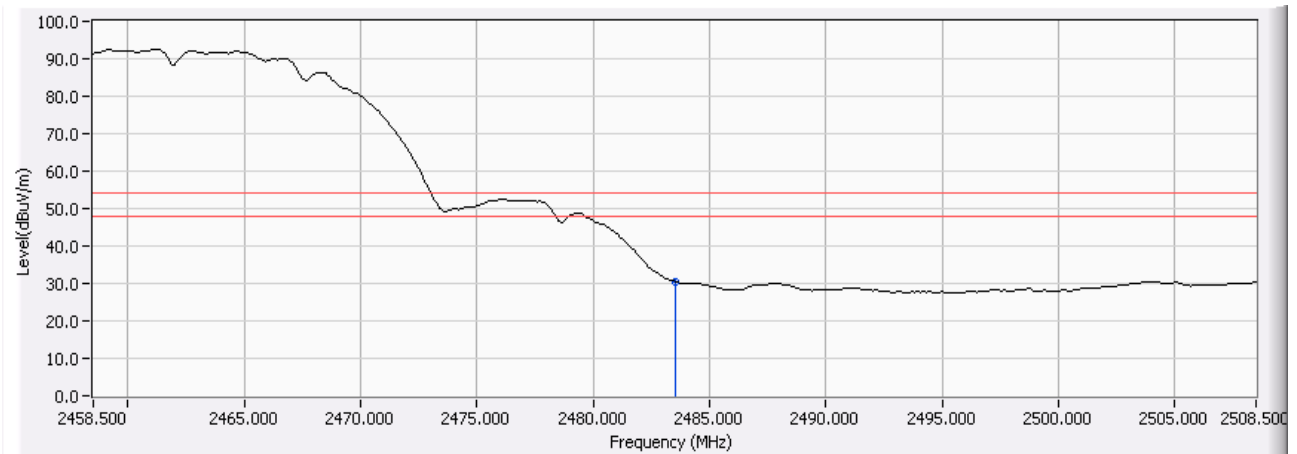
**RF Radiated Measurement (Horizontal):**

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	-6.469	49.671	43.203	74.00	54.00	Pass
11(Average)	2483.500	-6.469	36.946	30.478	74.00	54.00	Pass

**Figure Channel 11: Horizontal (Peak)**



**Figure Channel 11: Horizontal (Average)**



Note:

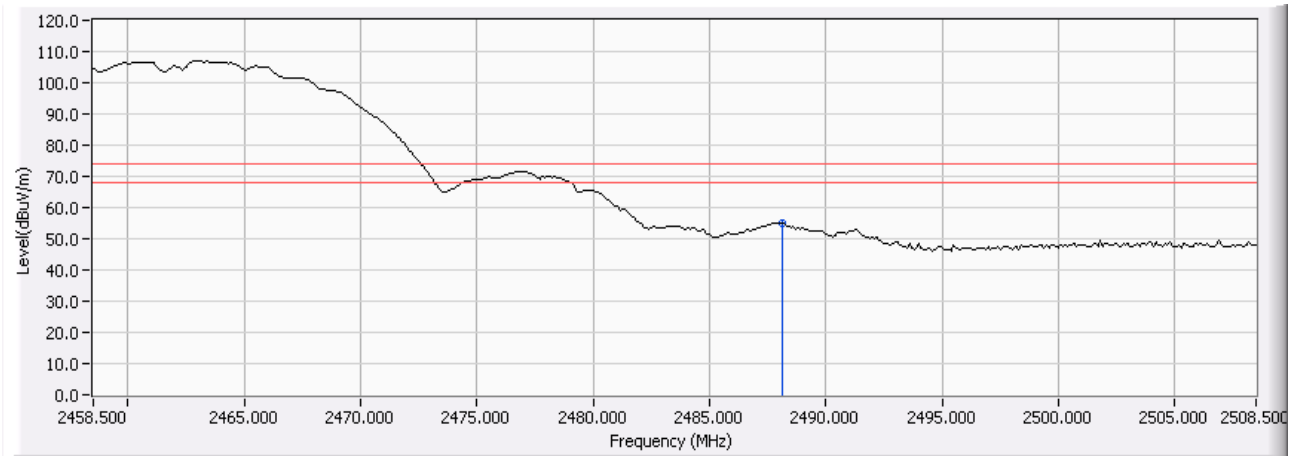
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b

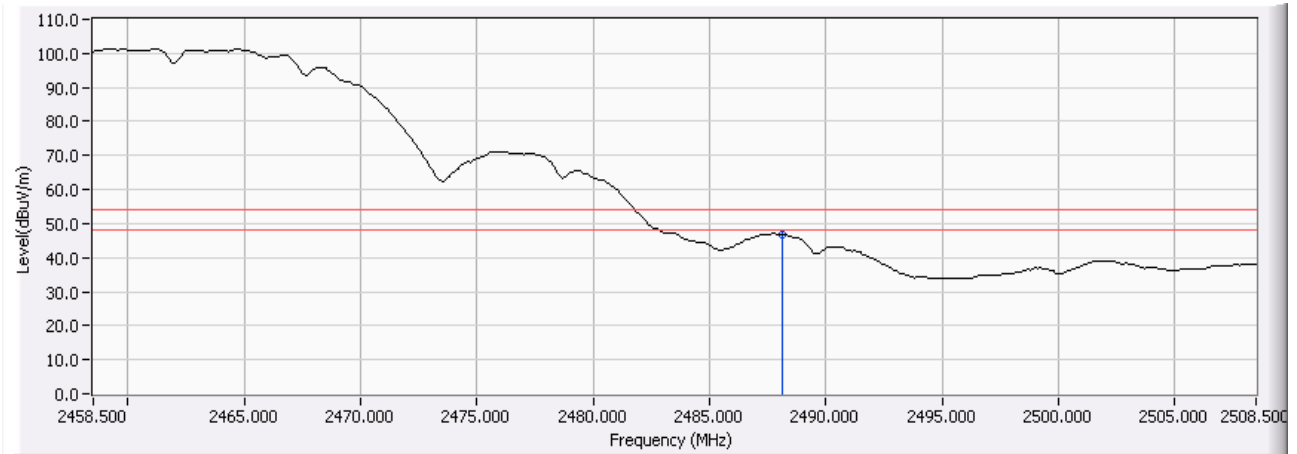
**RF Radiated Measurement (Vertical):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11(Peak)	2488.100	-6.462	61.645	55.183	74.00	54.00	Pass
11(Average)	2488.100	-6.462	53.204	46.742	74.00	54.00	Pass

**Figure Channel 11: (Vertical) (Peak)**



**Figure Channel 11: (Vertical) (Average)**



Note:

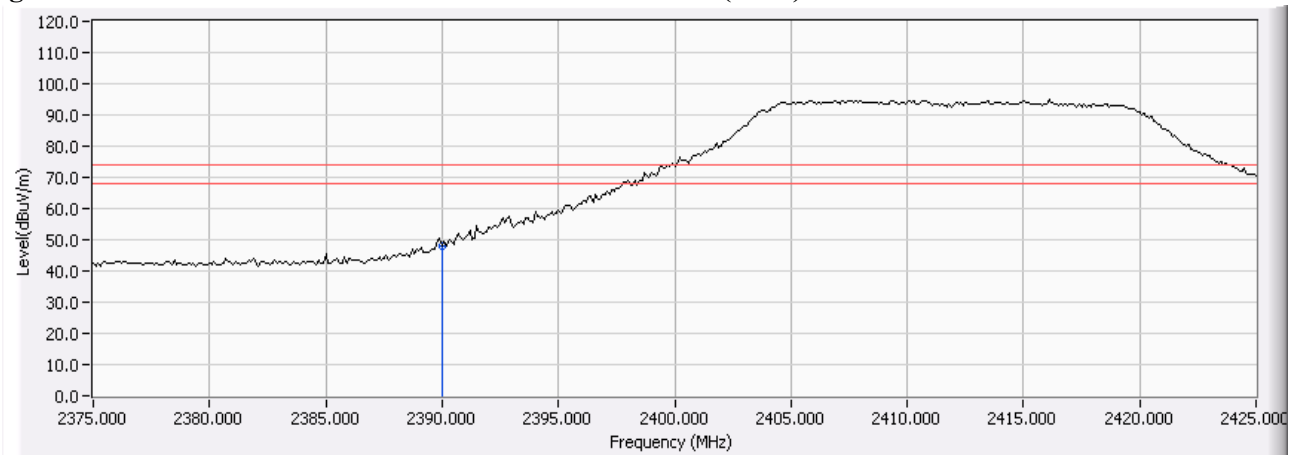
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

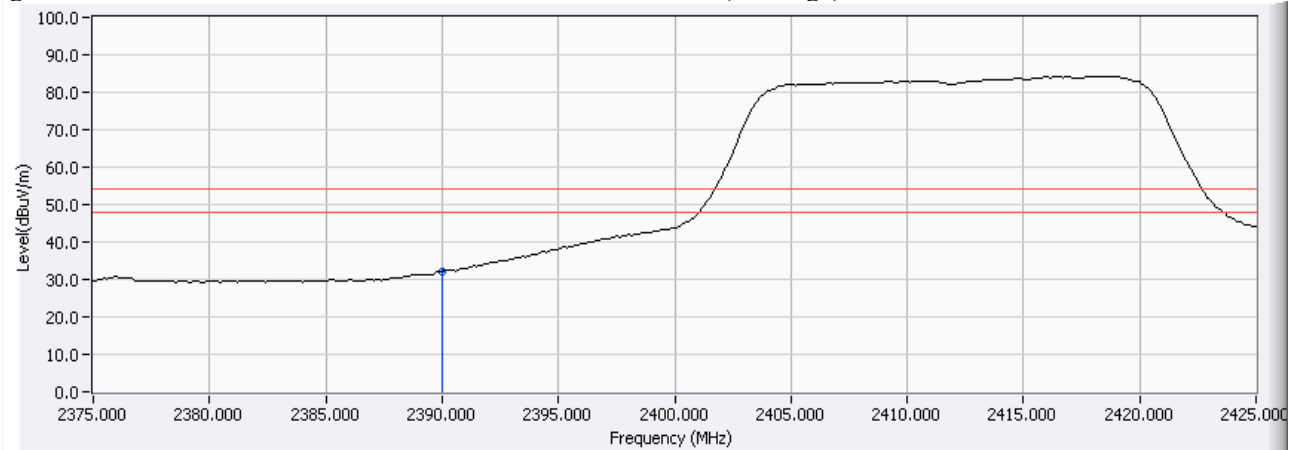
**RF Radiated Measurement (Horizontal):**

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	-6.769	54.530	47.762	74.00	54.00	Pass
1(Average)	2390.000	-6.769	39.037	32.269	74.00	54.00	Pass

**Figure Channel 1: Horizontal (Peak)**



**Figure Channel 1: Horizontal (Average)**



**Note:**

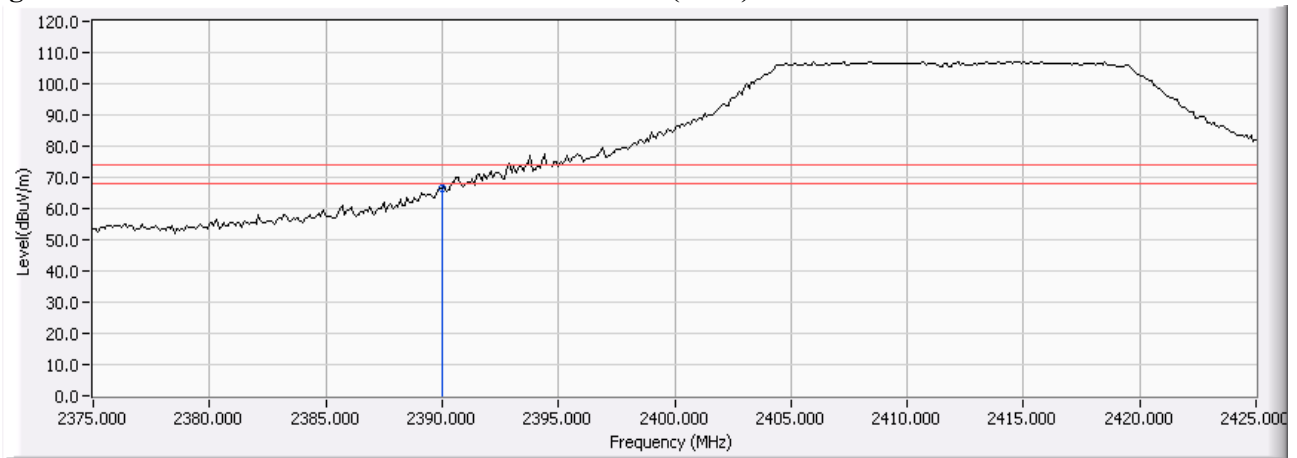
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

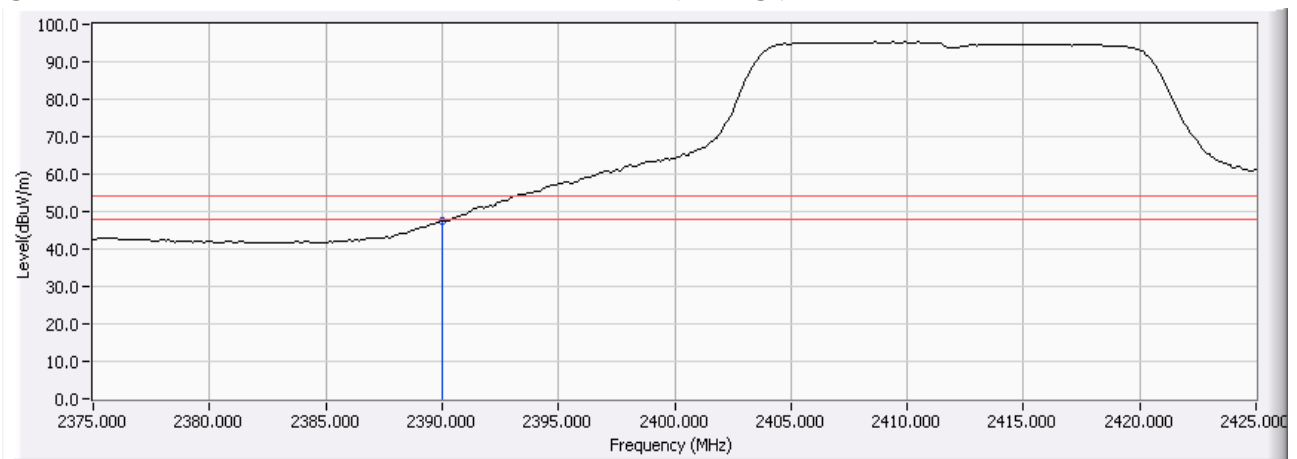
**RF Radiated Measurement (Vertical):**

Channel	Frequency (MHz)	Correct Fcator (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
1 (Peak)	2390.000	-6.769	73.101	66.333	74.00	54.00	Pass
1(Average)	2390.000	-6.769	54.125	47.357	74.00	54.00	Pass

**Figure Channel 1: Vertical (Peak)**



**Figure Channel 1: Vertical (Average)**



**Note:**

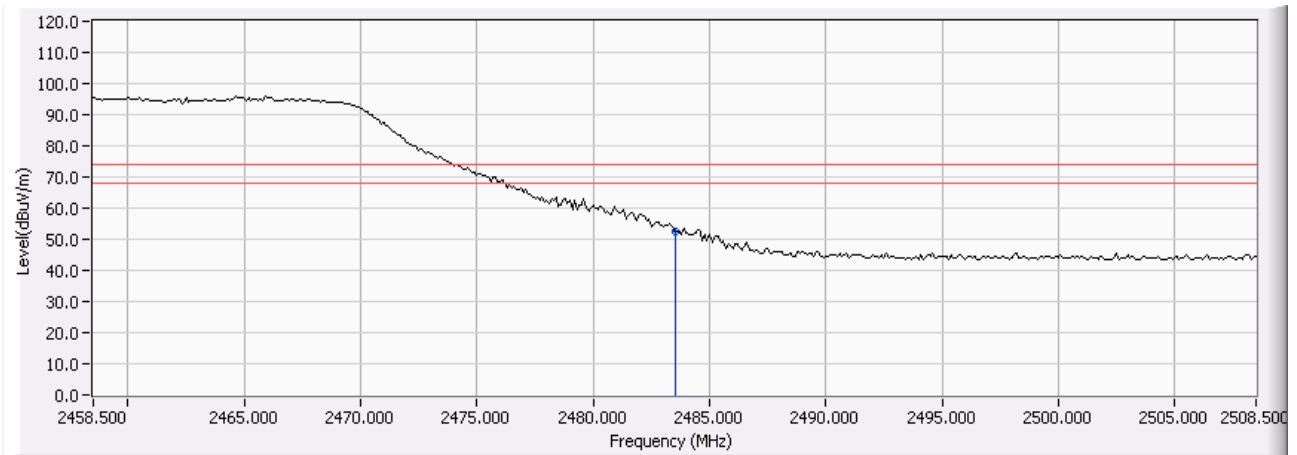
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

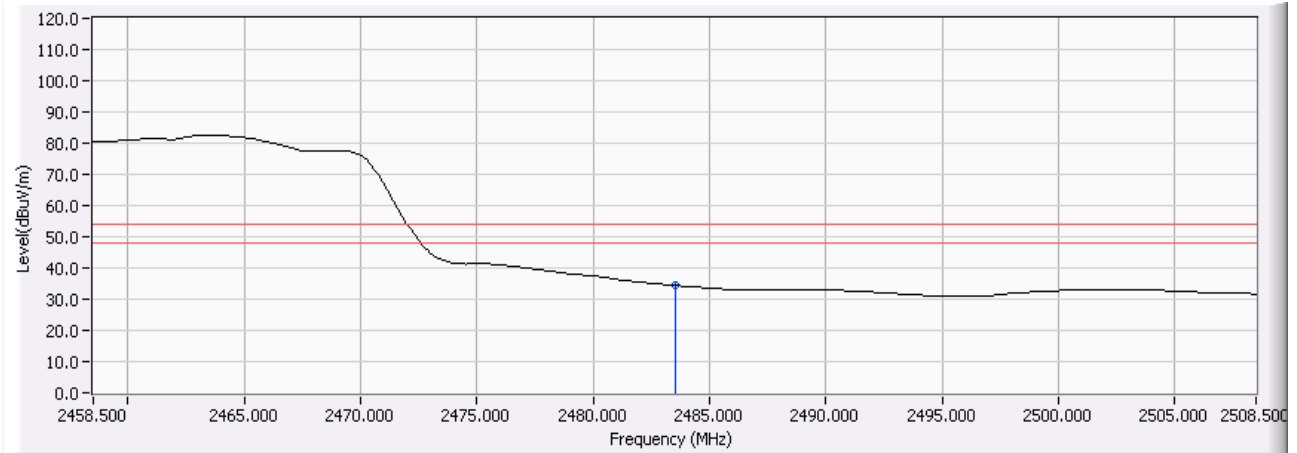
**RF Radiated Measurement (Horizontal):**

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	-6.469	58.999	52.531	74.00	54.00	Pass
11(Average)	2483.500	-6.469	40.885	34.417	74.00	54.00	Pass

**Figure Channel 11: Horizontal (Peak)**



**Figure Channel 11: Horizontal (Average)**



Note:

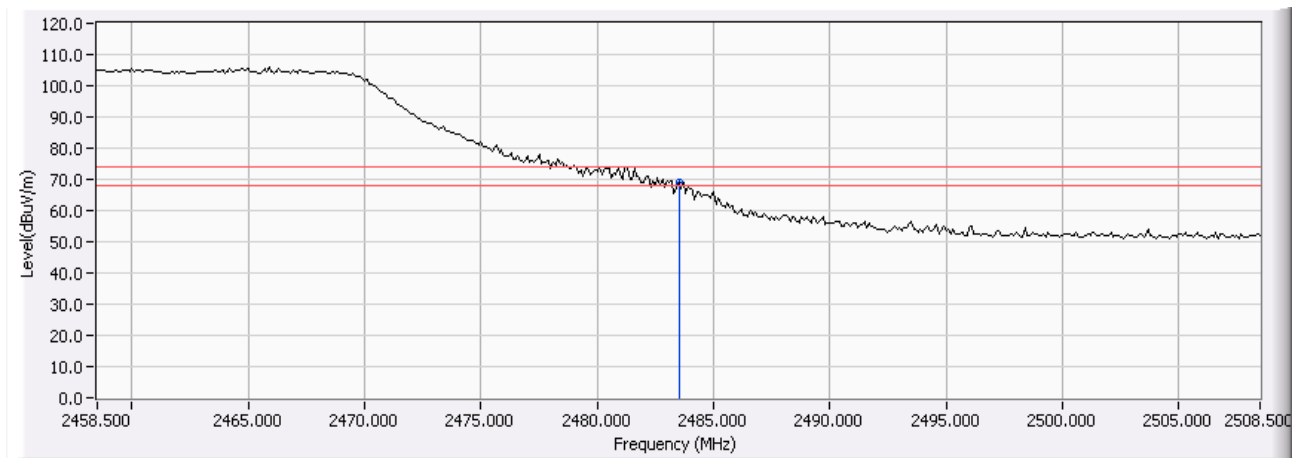
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading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

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 2: Transmitter 802.11g

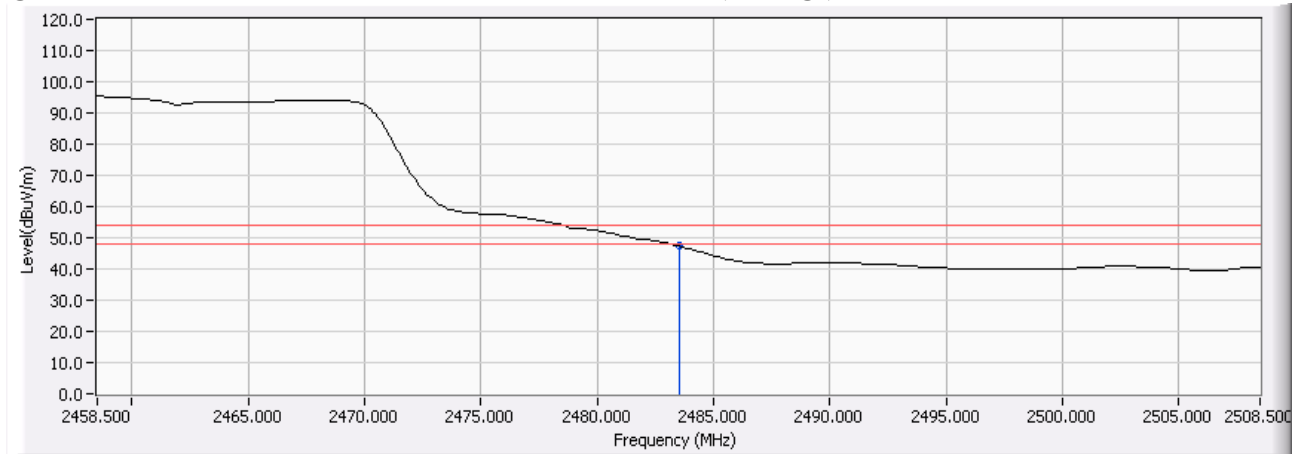
**RF Radiated Measurement (Vertical):**

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	-6.469	75.394	68.926	74.00	54.00	Pass
11(Average)	2483.500	-6.469	53.806	47.338	74.00	54.00	Pass

**Figure Channel 11: (Vertical) (Peak)**



**Figure Channel 11: Vertical (Average)**



Note:

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

## 7. Occupied Bandwidth

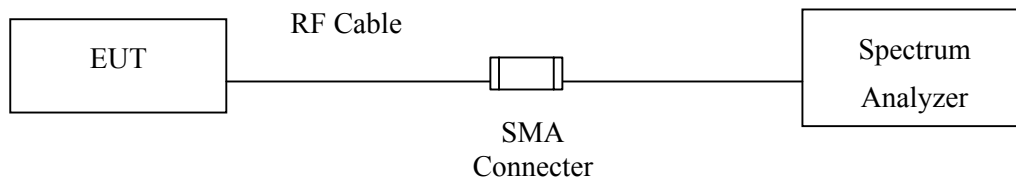
### 7.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008

Note: 1. All instruments 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. Test Procedures

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

### 7.4. Limits

The minimum bandwidth shall be at least 500kHz.

### 7.5. Uncertainty

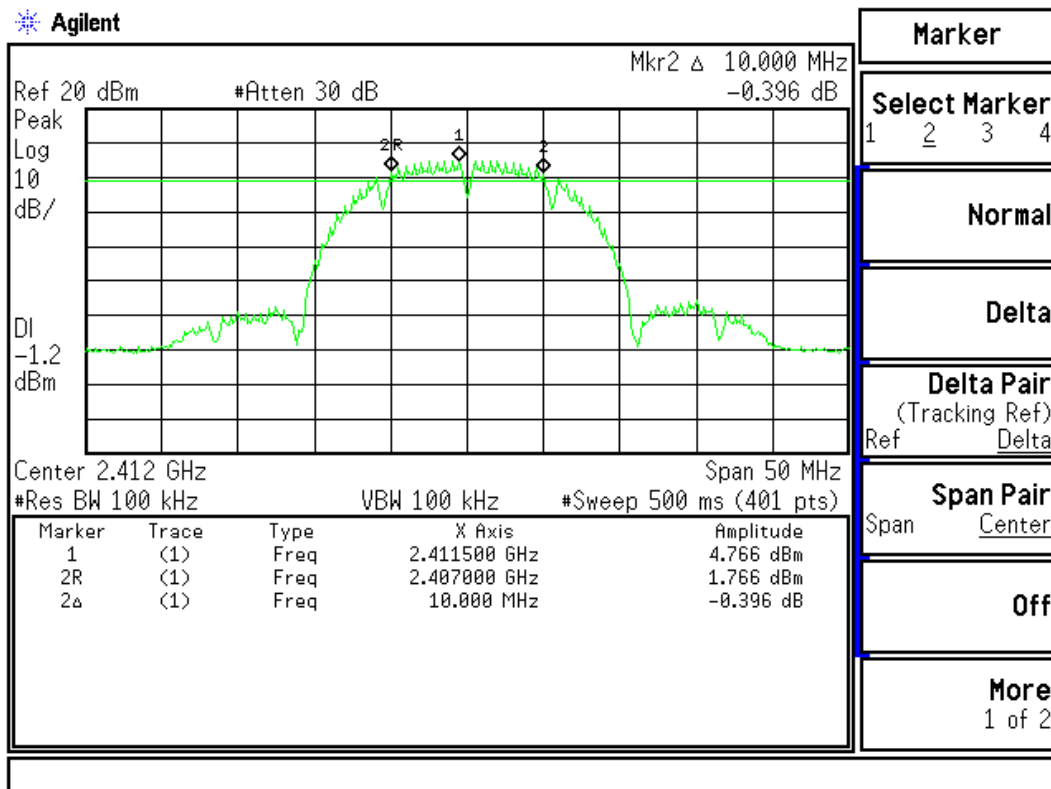
± 150Hz

### 7.6. Test Result of Occupied Bandwidth

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (1Mbps)	2412.00	10000	>500	Pass

**Figure Channel 1: 11Mbps**

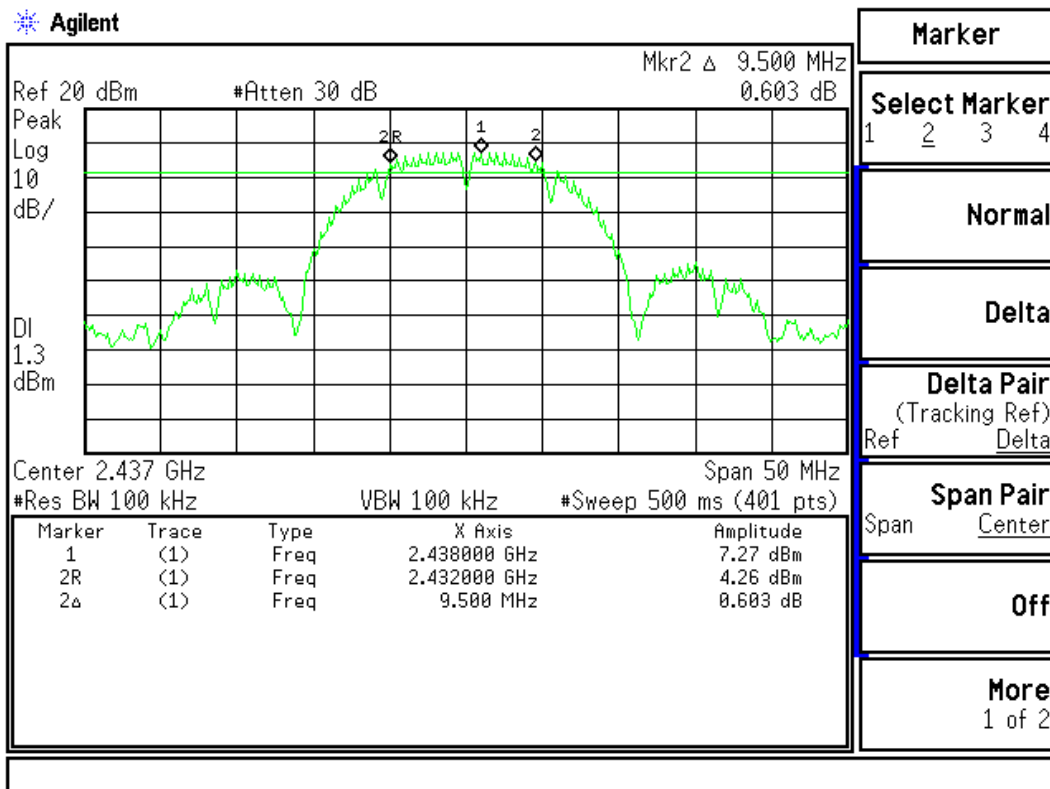




Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter 802.11b (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6 (1Mbps)	2437.00	9500	>500	Pass

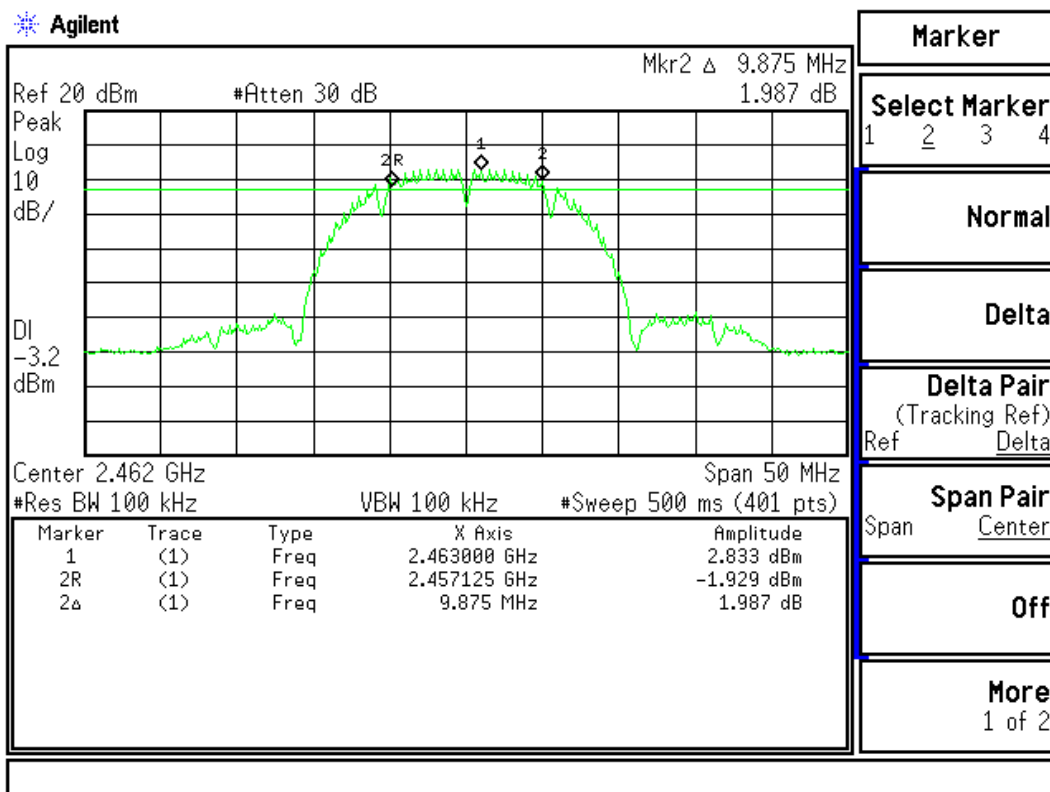
**Figure Channel 6: 11Mbps**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (1Mbps)	2462.00	9875	>500	Pass

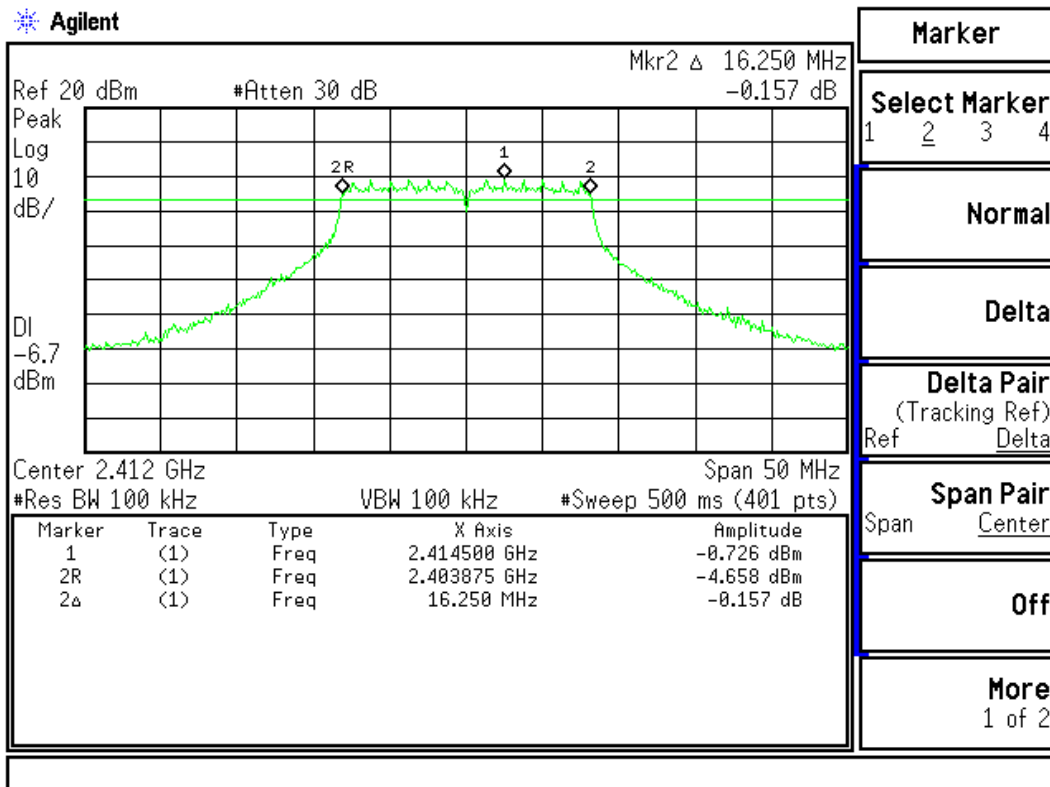
**Figure Channel 11: 11Mbps**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2412.00	16250	>500	Pass

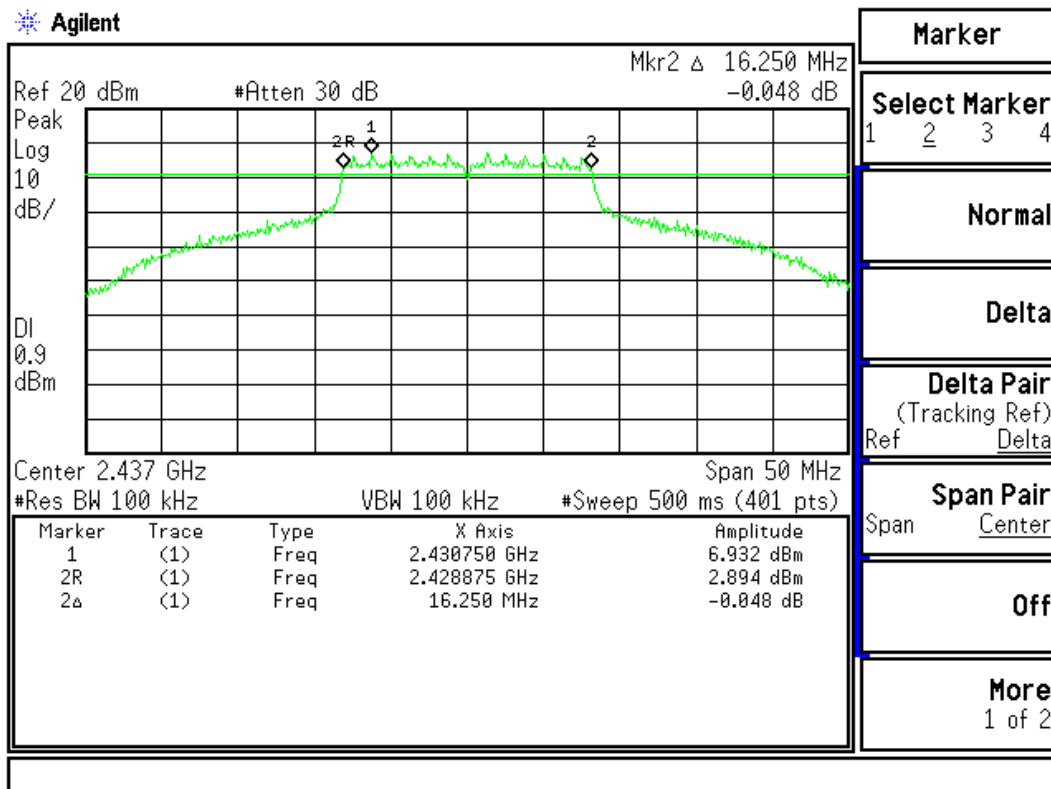
**Figure Channel 1:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2437.00	16250	>500	Pass

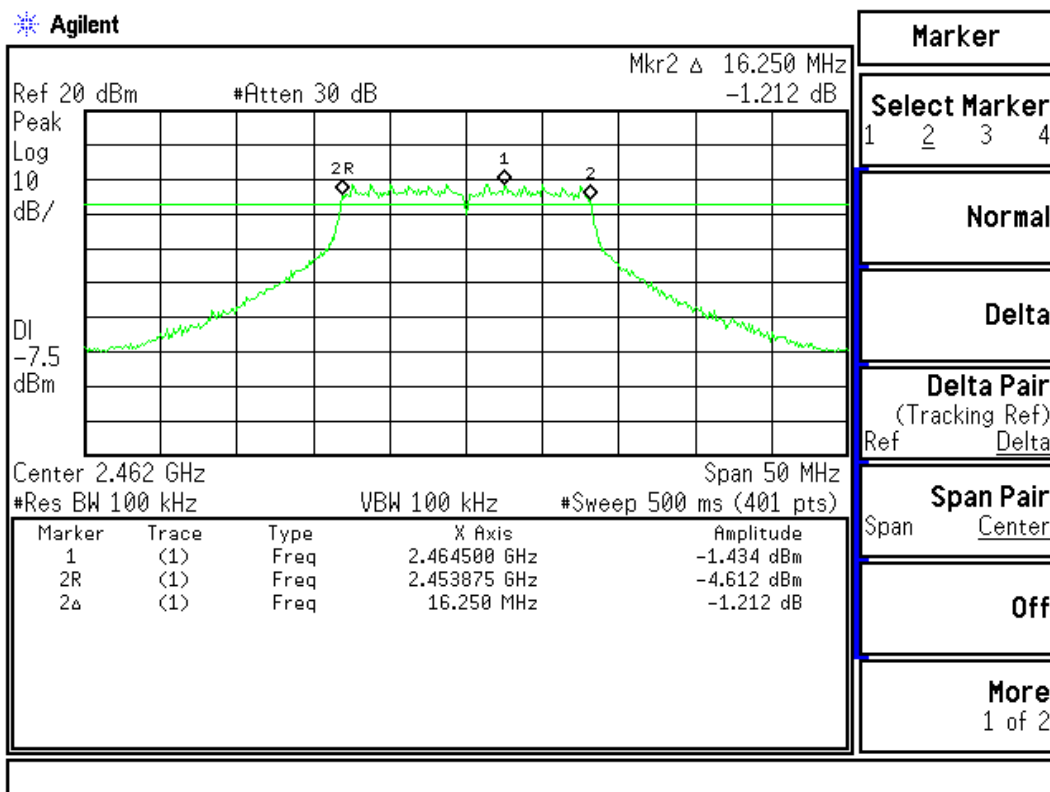
**Figure Channel 6:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2462.00	16250	>500	Pass

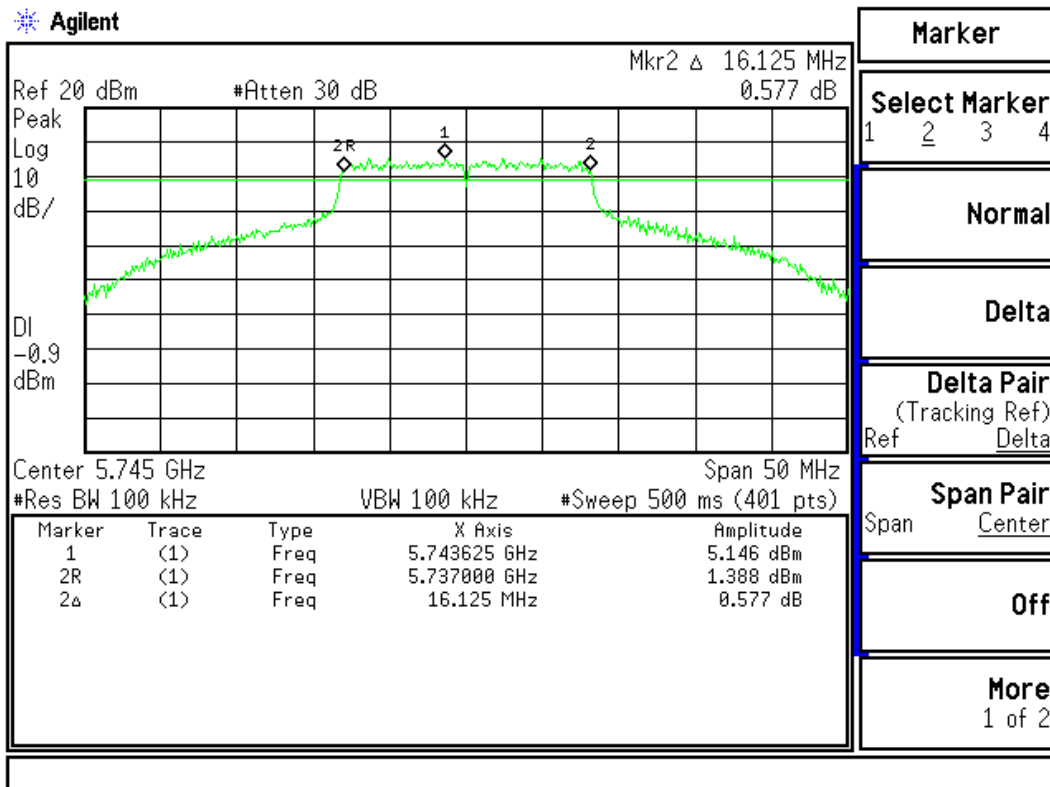
**Figure Channel 11:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
5 (6Mbps)	5745.00	16125	>500	Pass

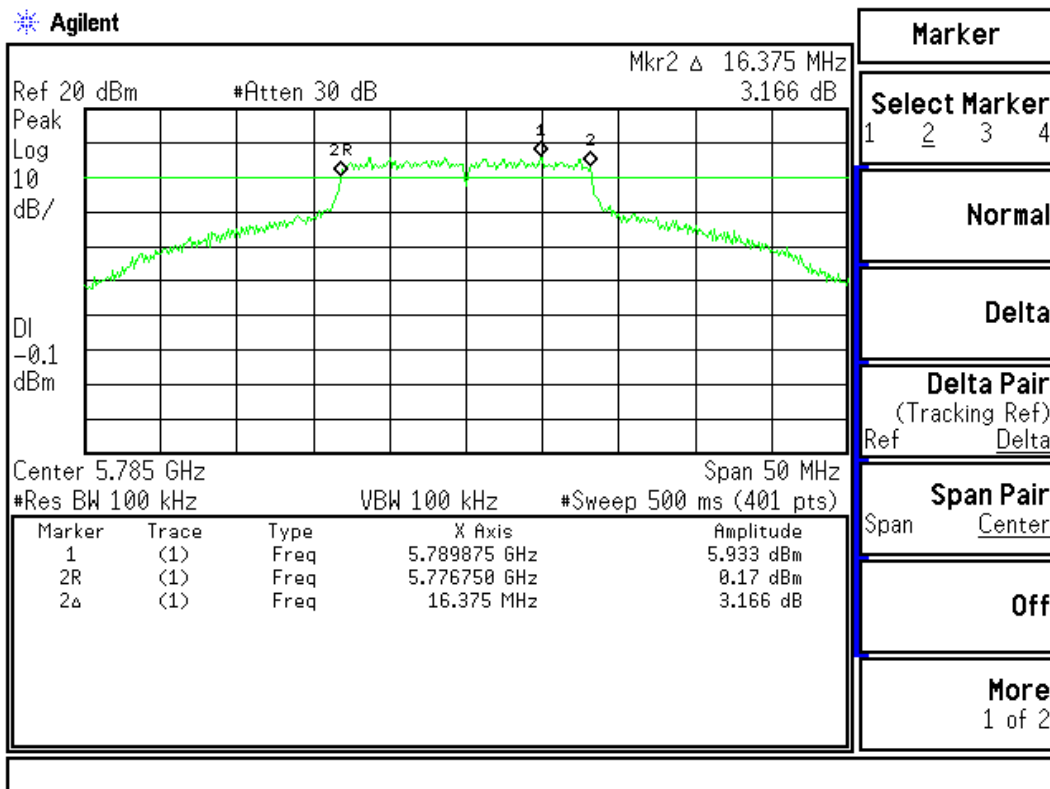
**Figure Channel 5:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
7 (6Mbps)	5785.00	16375	>500	Pass

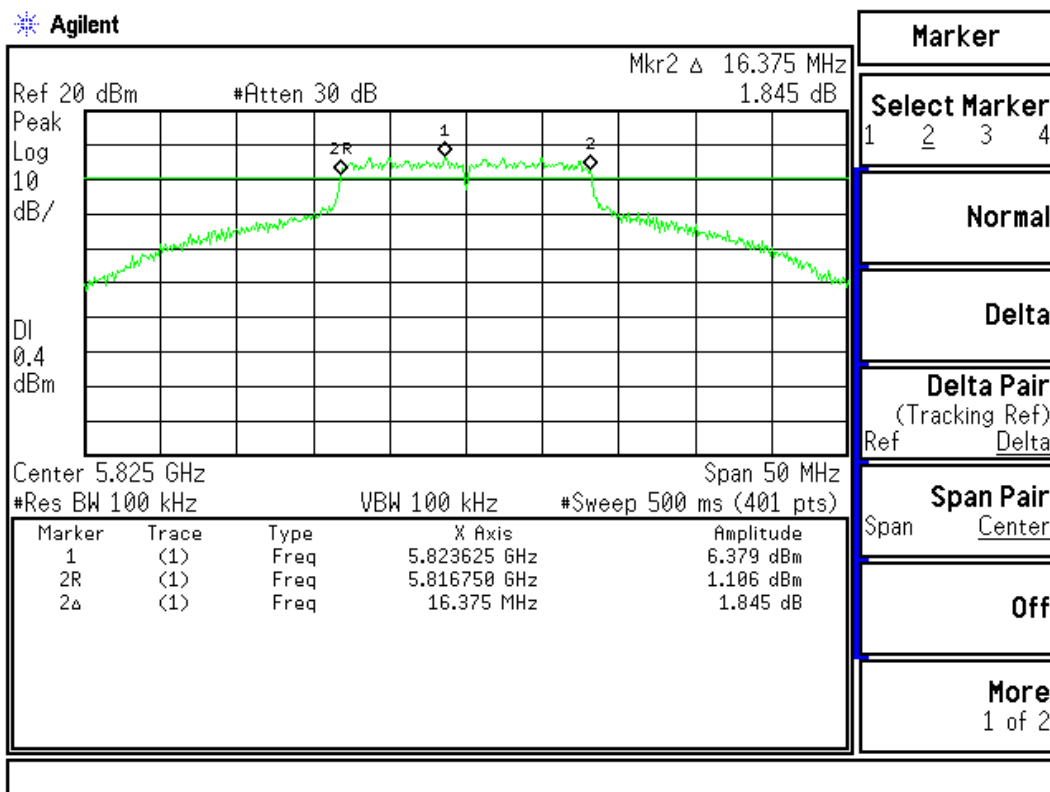
**Figure Channel 7:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
9 (6Mbps)	5825.00	16375	>500	Pass

**Figure Channel 9:**





**8. Power Density**

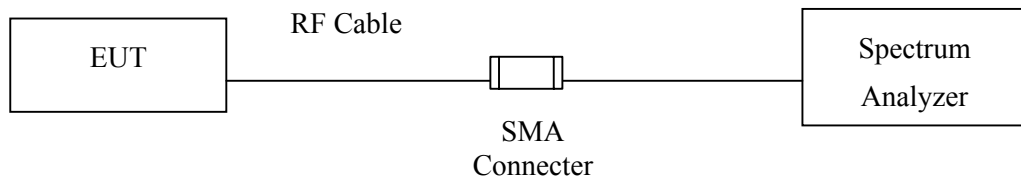
**8.1. Test Equipment**

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2008
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2008

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. Limits**

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

**8.4. Test Procedures**

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

**8.5. Uncertainty**

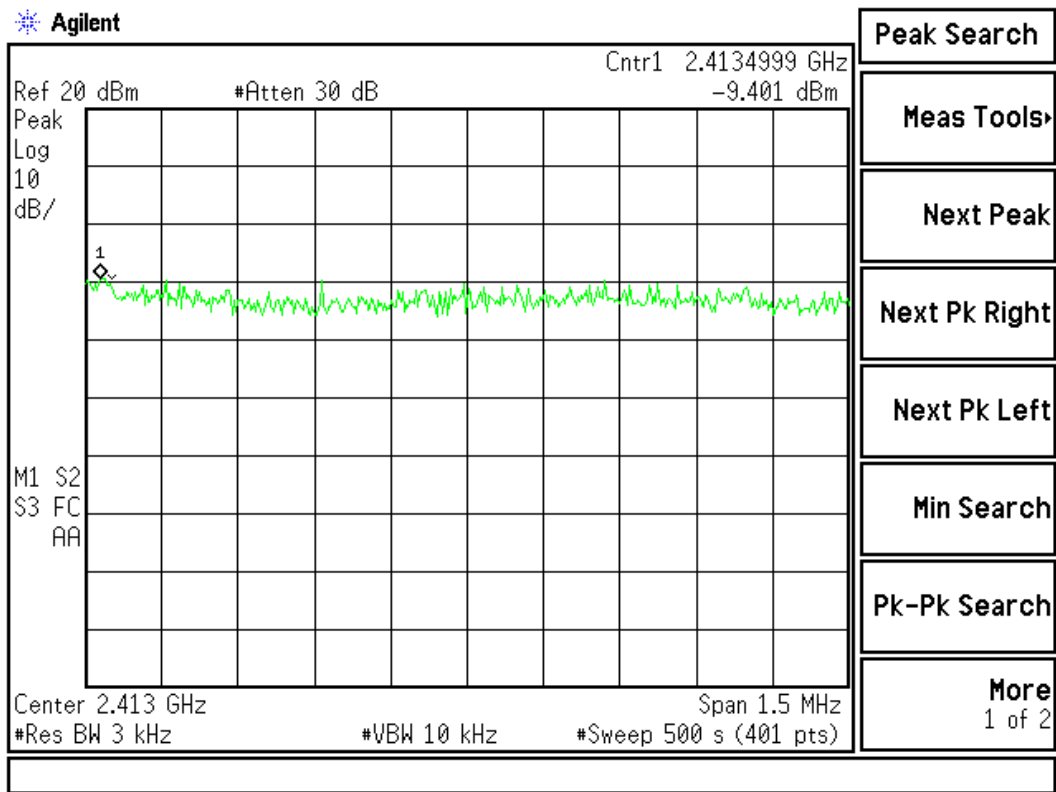
± 1.27 dB

**8.6. Test Result of Power Density**

Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (1Mbps)	2412.00	-9.40	< 10dBm	Pass

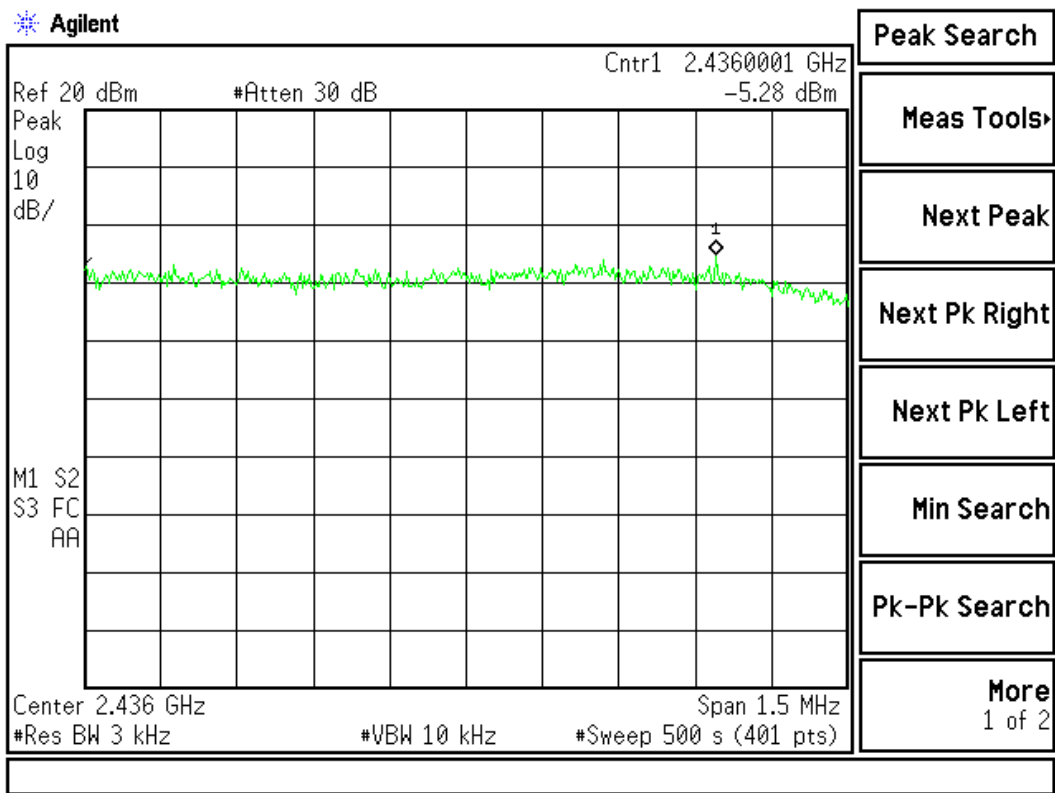
**Figure Channel 1:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (1Mbps)	2437.000	-5.28	< 10dBm	Pass

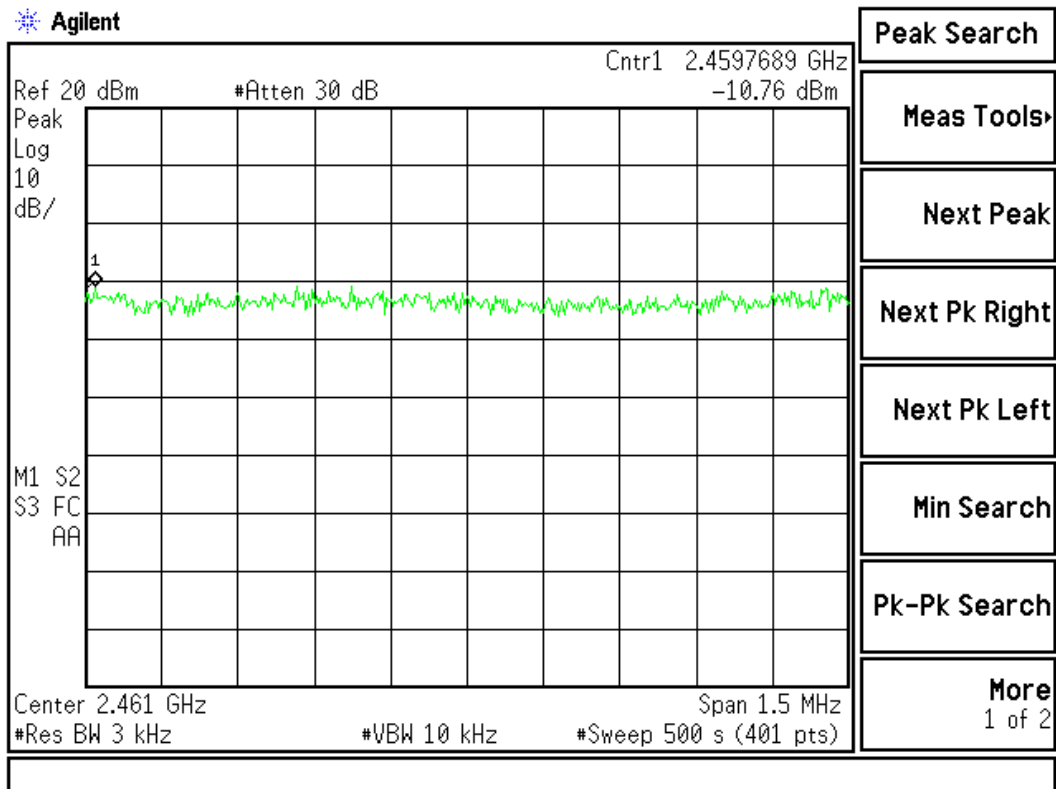
**Figure Channel 6:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (1Mbps)	2462.00	-10.76	< 10dBm	Pass

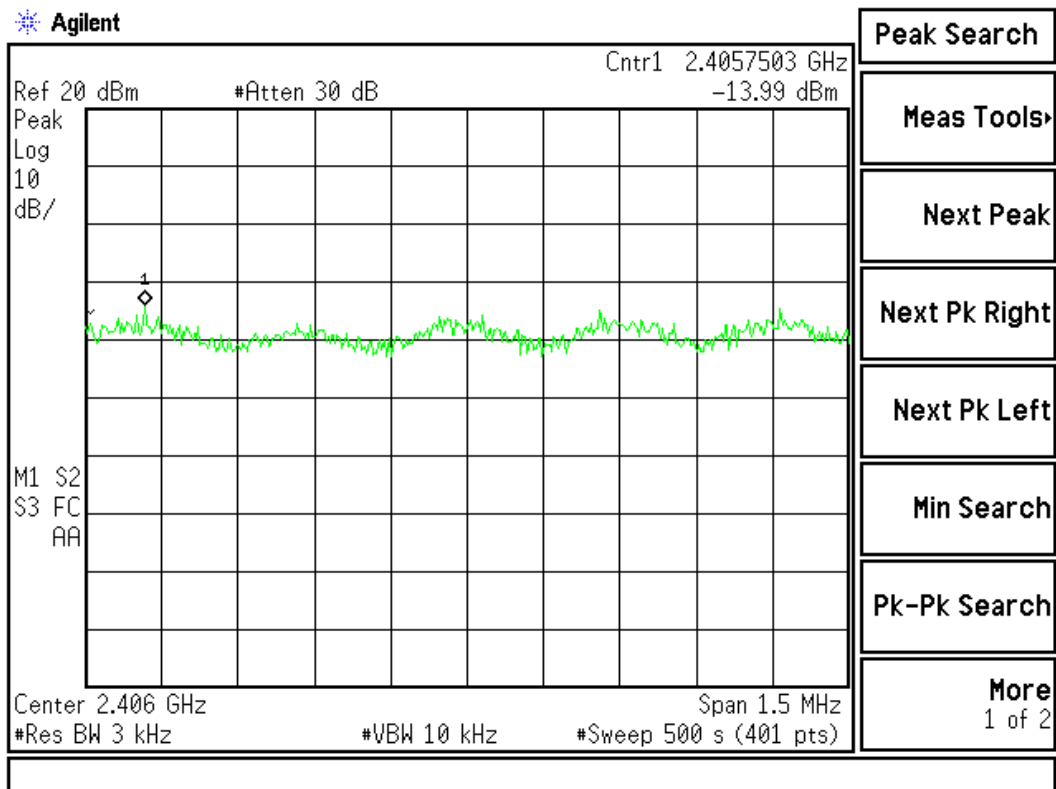
**Figure Channel 11:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2412.00	-13.99	< 10dBm	Pass

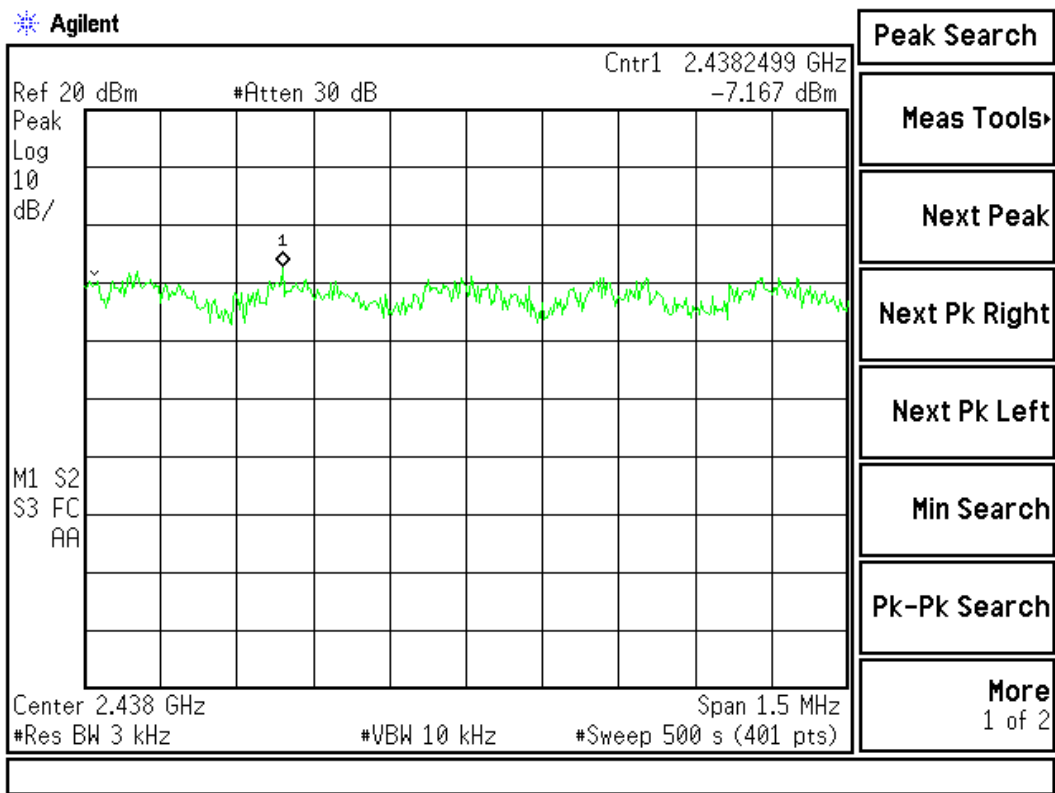
**Figure Channel 1:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2437.000	-7.167	< 10dBm	Pass

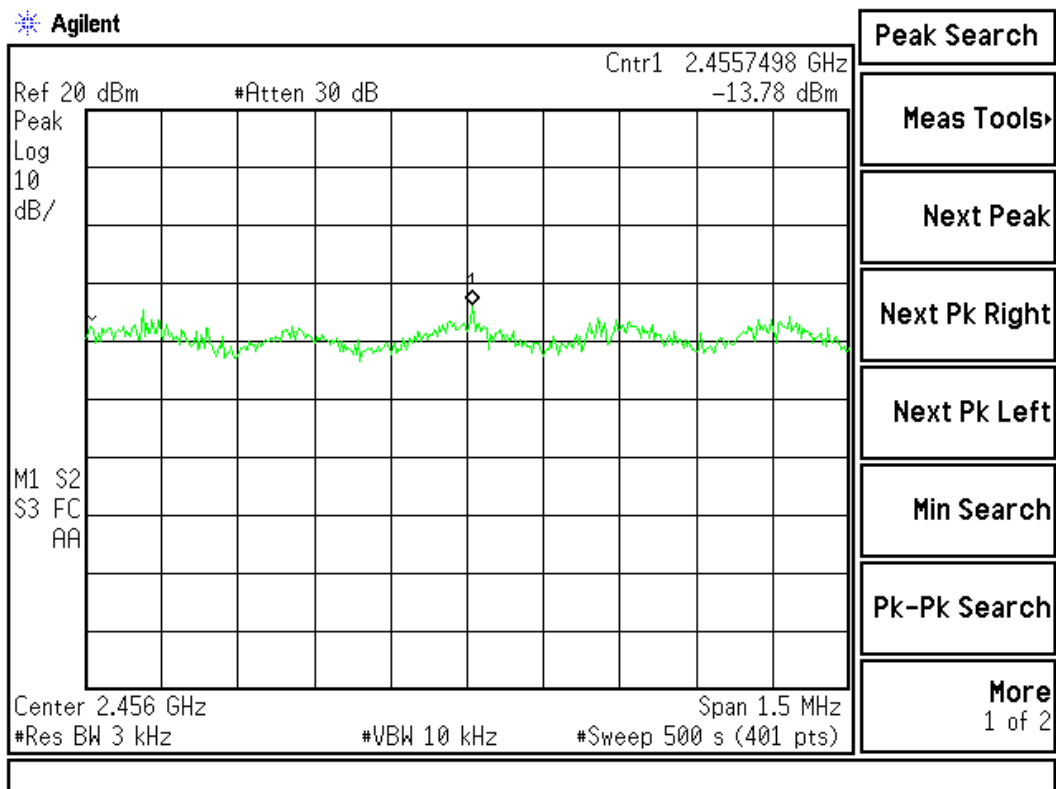
**Figure Channel 6:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 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 (6Mbps)	2462.00	-13.78	< 10dBm	Pass

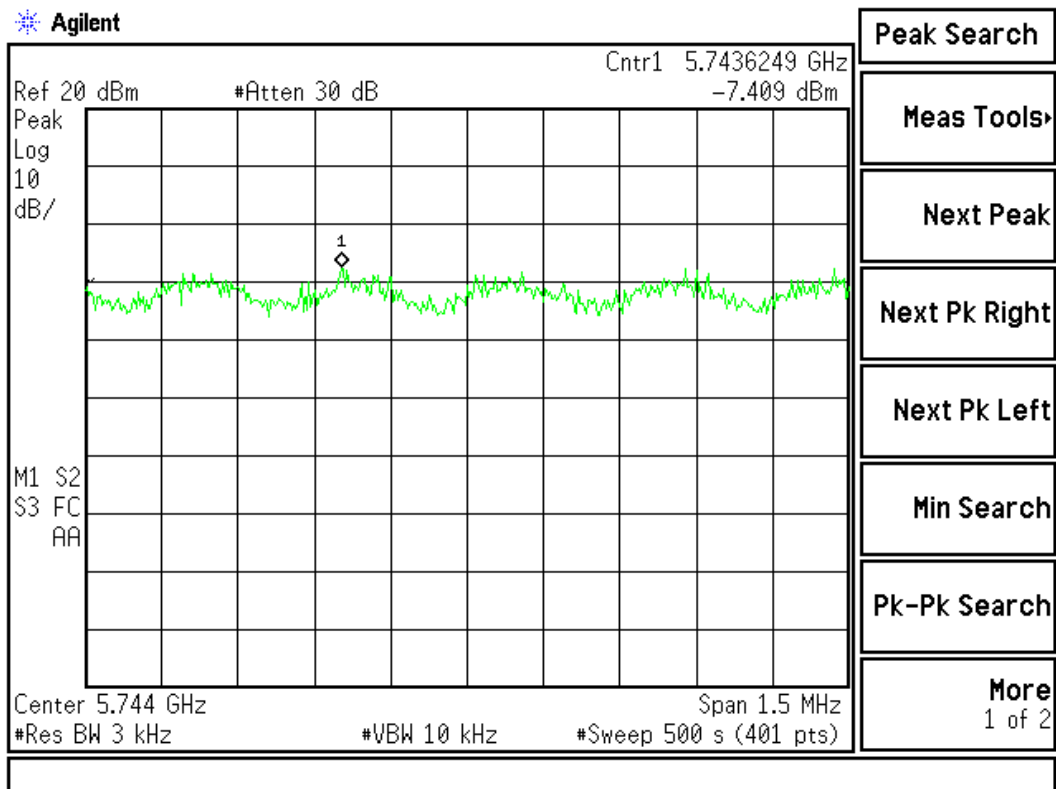
**Figure Channel 11:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5745MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
5 (6Mbps)	5745.00	-7.409	< 10dBm	Pass

**Figure Channel 5:**

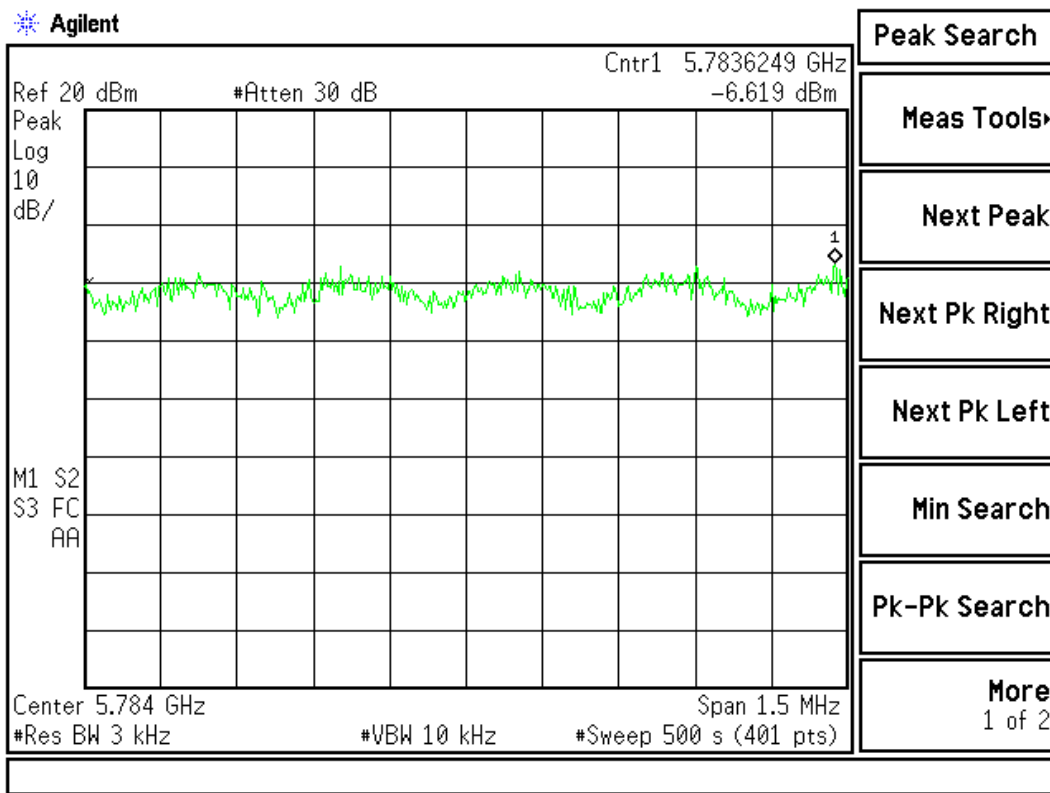




Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Power Density Data  
 Test Site : No.3OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
7 (6Mbps)	5785.000	-6.619	< 10dBm	Pass

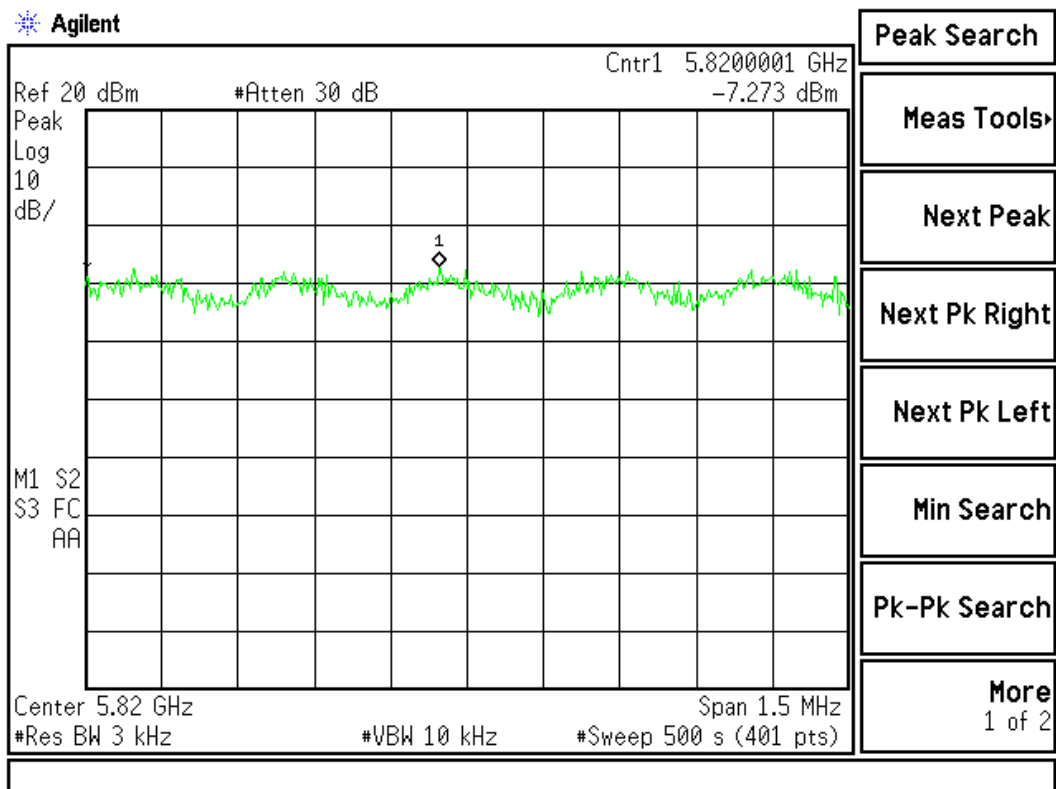
**Figure Channel 7:**



Product : Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client  
 Test Item : Power Density Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 3: Transmitter 802.11a (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
9 (6Mbps)	5825.00	-7.273	< 10dBm	Pass

**Figure Channel 9:**



## 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.