



Test Report

Product Name	Smart Handheld
Model No	M900DF
FCC ID.	HLZSHM900DF

Applicant	Acer Incorporated
Address	8F, 88, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan

Date of Receipt	Dec. 12, 2009
Issue Date	Jan. 05, 2010
Report No.	09C210R-RFUSP42V01
Report Version	V1.0

The test results relate only to the samples tested.

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Test Report Certification

Issue Date: Jan. 05, 2010

Report No.: 09C210R-RFUSP42V01



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

Product Name	Smart Handheld
Applicant	Acer Incorporated
Address	8F, 88, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan
Manufacturer	Compal Communications, INC.
Model No.	M900DF
EUT Rated Voltage	DC 3.7V
EUT Test Voltage	AC 120V/60Hz
Trade Name	acer
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2008 ANSI C63.4: 2003
Test Result	Complied

The test results relate only to the samples tested.

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(Engineer / Nono Chang)



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(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	Smart Handheld
Trade Name	acer
Model No.	M900DF
FCC ID.	HLZSHM900DF
Frequency Range	2412-2462MHz
Number of Channels	802.11b/g: 11
Data Speed	802.11b: 1 - 11Mbps, 802.11g: 6 - 54Mbps
Type of Modulation	802.11b:DSSS DBPSK, DQPSK, CCK 802.11g: OFDM BPSK, QPSK, 16QAM, 64QAM
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Power Adapter	MFR: PHIHONG, M/N: PSAC05R-050 Input: AC 100-240V~300mA, 50-60Hz 12-18VA Output: DC +5V, 1A MAX. Cable Out: Non-Shielded, 1.4m

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	acer	N/A	-3.56 dBi for 2.4 GHz

802.11b/g Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

Note:

1. The EUT is an Smart Handheld 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 1Mbps 、 802.11g is 6Mbps)
4. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

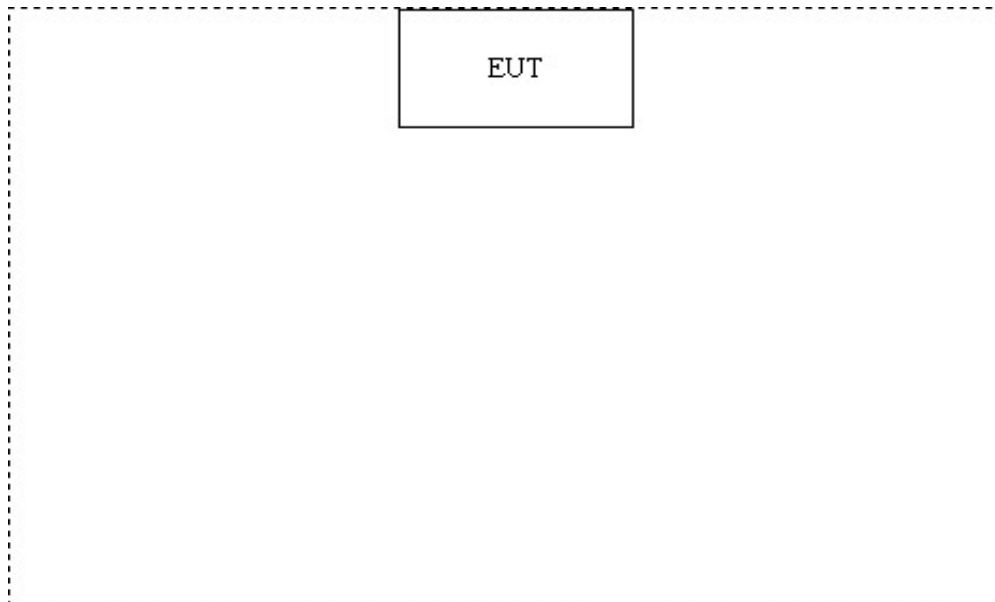
1.3. Tested System Details

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

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	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 Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4
- (2) Power on the EUT.
- (3) Execute Azurewave GH-600 Program.
- (4) Configure the test channel and the data rate.
- (5) Click on “Start” to transmit continuously.
- (6) 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

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/tw/emc/accreditations/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

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



2. Conducted Emission

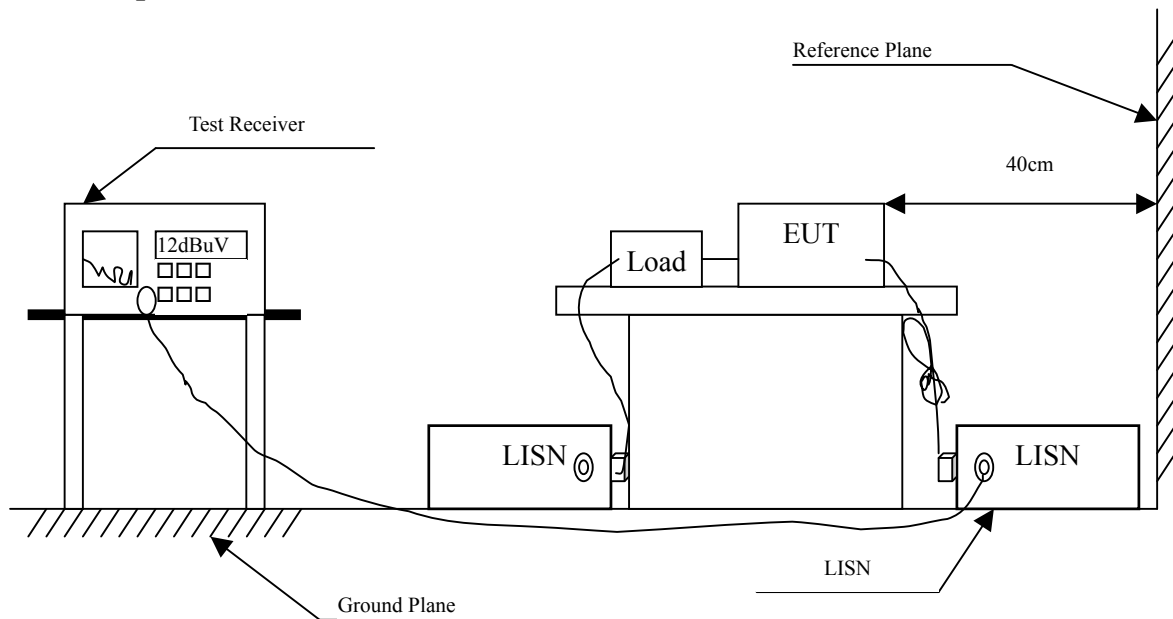
2.1. Test Equipment

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, 2009	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2009	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2009	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2009	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
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 refers 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 of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested 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 : Smart Handheld
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.197	9.709	35.480	45.189	-19.468	64.657
0.259	9.670	32.360	42.030	-20.856	62.886
0.513	9.640	31.320	40.960	-15.040	56.000
0.584	9.638	30.560	40.198	-15.802	56.000
1.306	9.670	24.810	34.480	-21.520	56.000
6.486	9.740	22.940	32.680	-27.320	60.000
Average					
0.197	9.709	22.420	32.129	-22.528	54.657
0.259	9.670	21.940	31.610	-21.276	52.886
0.513	9.640	20.030	29.670	-16.330	46.000
0.584	9.638	18.200	27.838	-18.162	46.000
1.306	9.670	12.230	21.900	-24.100	46.000
6.486	9.740	10.590	20.330	-29.670	50.000

Note:

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

Product : Smart Handheld
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.193	9.721	37.630	47.351	-17.420	64.771
0.259	9.680	31.720	41.400	-21.486	62.886
0.314	9.660	27.020	36.680	-24.634	61.314
0.588	9.643	25.170	34.813	-21.187	56.000
1.439	9.670	21.070	30.740	-25.260	56.000
4.470	9.700	20.140	29.840	-26.160	56.000
Average					
0.193	9.721	25.890	35.611	-19.160	54.771
0.259	9.680	20.200	29.880	-23.006	52.886
0.314	9.660	14.780	24.440	-26.874	51.314
0.588	9.643	16.680	26.323	-19.677	46.000
1.439	9.670	12.430	22.100	-23.900	46.000
4.470	9.700	11.330	21.030	-24.970	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

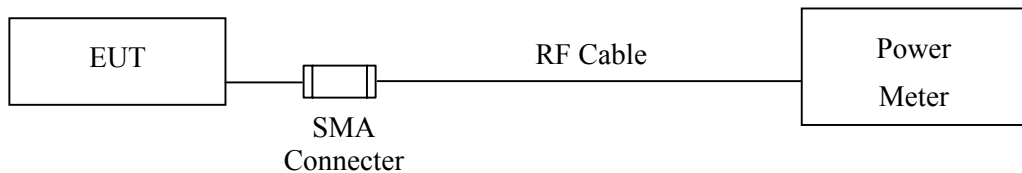
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2009
X Power Sensor	Anritsu	MA2411B/0738448	Jun, 2009

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. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Smart Handheld
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No	Frequency (MHz)	Peak Power Output (dBm)						
		Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
01	2412	13.16	13.13	13.1	12.98	16.21	<30dBm	Pass
06	2437	--	--	--	--	16.25	<30dBm	Pass
11	2462	--	--	--	--	16.26	<30dBm	Pass

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

Product : Smart Handheld
 Test Item : Peak Power Output Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No	Frequency (MHz)	Peak Power Output (dBm)										
		Average Power								Peak Power	Required Limit	Result
		For different Data Rate (Mbps)										
6	9	12	18	24	36	48	54	6				
01	2412	12.84	12.81	12.78	12.75	12.73	12.71	12.69	12.65	22.19	<30dBm	Pass
06	2437	--	--	--	--	--	--	--	--	22.08	<30dBm	Pass
11	2462	--	--	--	--	--	--	--	--	22.11	<30dBm	Pass

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

4. Radiated Emission

4.1. Test Equipment

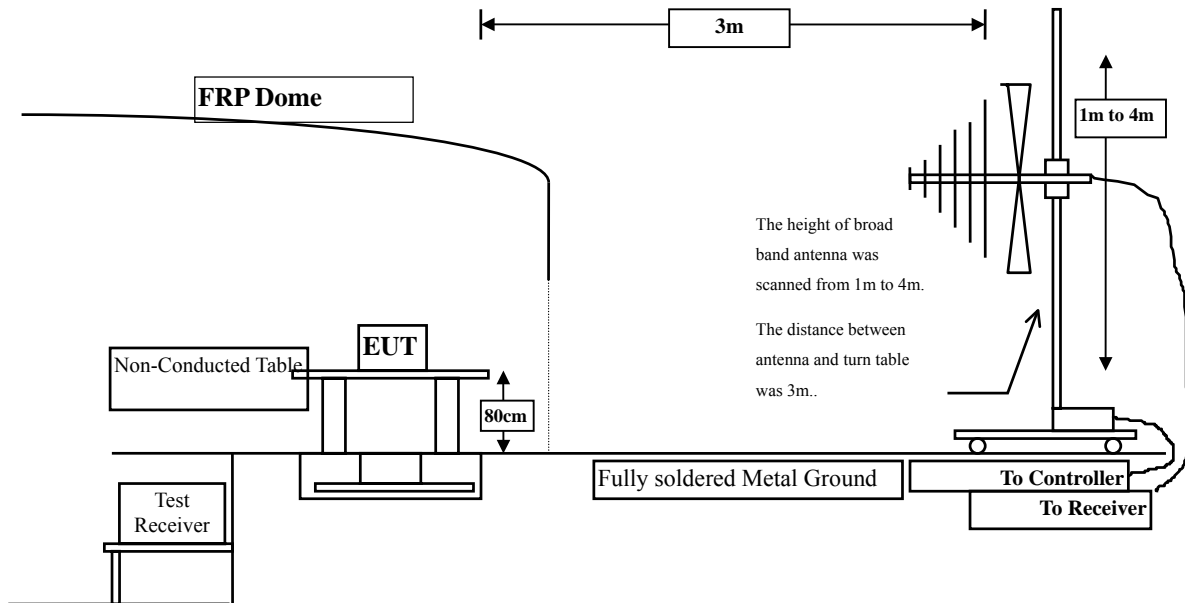
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X Pre-Amplifier	AGILENT	8447D/2944A09549	Sep., 2009
	X Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2009
	X Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2009
	X Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

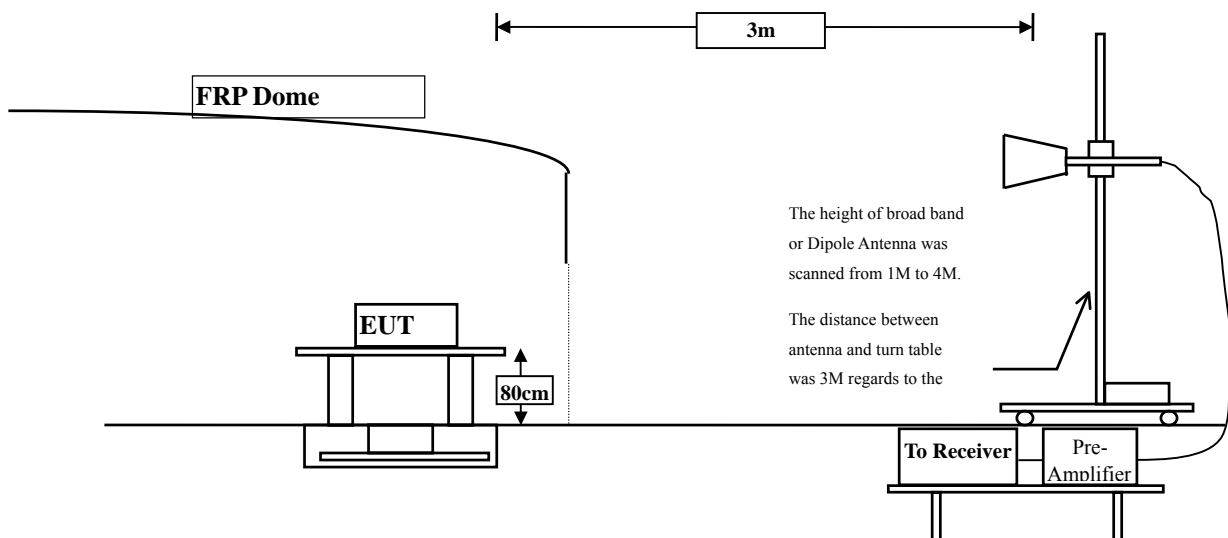
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

4.2. Test Setup

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.

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: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 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 between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

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

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 bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	9.582	47.610	57.192	-16.808	74.000
7236.000	14.401	36.520	50.921	-23.079	74.000
9648.000	19.795	41.050	60.845	-13.155	74.000
Average					
Detector:					
4824.000	9.582	36.820	46.402	-7.598	54.000
9648.000	19.795	26.850	46.645	-7.355	54.000
Vertical					
Peak Detector:					
4824.000	8.462	46.520	54.982	-19.018	74.000
7236.000	15.412	34.960	50.372	-23.628	74.000
9648.000	19.005	35.980	54.985	-19.015	74.000
Average					
Detector:					
4824.000	8.462	36.780	45.242	-8.758	54.000
9648.000	19.005	28.350	47.355	-6.645	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	9.473	46.940	56.413	-17.587	74.000
7311.000	14.540	37.850	52.389	-21.611	74.000
9748.000	20.024	38.510	58.535	-15.465	74.000
Average Detector:					
4874.000	9.473	35.620	45.093	-8.907	54.000
9748.000	20.024	26.680	46.705	-7.295	54.000
Vertical					
Peak Detector:					
4874.000	8.882	44.590	53.471	-20.529	74.000
7311.000	15.283	35.740	51.023	-22.977	74.000
9748.000	19.228	36.020	55.249	-18.751	74.000
Average Detector:					
4874.000	8.882	37.350	46.231	-7.769	54.000
9748.000	19.228	26.250	45.479	-8.521	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	9.487	50.340	59.826	-14.174	74.000
7386.000	14.798	38.120	52.918	-21.082	74.000
9848.000	20.005	35.510	55.516	-18.484	74.000
Average Detector:					
4924.000	9.487	36.680	46.166	-7.834	54.000
9848.000	20.005	26.680	46.686	-7.314	54.000
Vertical					
Peak Detector:					
4924.000	9.415	48.350	57.764	-16.236	74.000
7386.000	15.269	34.630	49.899	-24.101	74.000
9848.000	19.191	36.970	56.161	-17.839	74.000
Average Detector:					
4924.000	9.415	36.250	45.664	-8.336	54.000
9848.000	19.191	28.350	47.541	-6.459	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	9.582	47.150	56.732	-17.268	74.000
7236.000	14.401	37.300	51.701	-22.299	74.000
9648.000	19.795	36.580	56.375	-17.625	74.000
Average					
Detector:					
4824.000	9.582	37.270	46.852	-7.148	54.000
9648.000	19.795	26.580	46.375	-7.625	54.000
Vertical					
Peak Detector:					
4824.000	8.462	48.050	56.512	-17.488	74.000
7236.000	15.412	36.150	51.562	-22.438	74.000
9648.000	19.005	37.250	56.255	-17.745	74.000
Average					
Detector:					
4824.000	8.462	37.650	46.112	-7.888	54.000
9648.000	19.005	26.940	45.945	-8.055	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	9.473	48.096	57.569	-16.431	74.000
7311.000	14.540	35.360	49.899	-24.101	74.000
9748.000	20.024	35.820	55.845	-18.155	74.000
Average Detector:					
4874.000	9.473	36.250	45.723	-8.277	54.000
9748.000	20.024	25.350	45.375	-8.625	54.000
Vertical					
Peak Detector:					
4874.000	8.882	45.850	54.731	-19.269	74.000
7311.000	15.283	35.520	50.803	-23.197	74.000
9748.000	19.228	36.520	55.749	-18.251	74.000
Average Detector:					
4874.000	8.882	37.700	46.581	-7.419	54.000
9748.000	19.228	27.702	46.931	-7.069	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	9.487	46.940	56.426	-17.574	74.000
7386.000	14.798	35.210	50.008	-23.992	74.000
9848.000	20.005	37.570	57.576	-16.424	74.000
Average Detector:					
4924.000	9.487	36.230	45.716	-8.284	54.000
9848.000	20.005	26.650	46.656	-7.344	54.000
Vertical					
Peak Detector:					
4924.000	9.415	45.850	55.264	-18.736	74.000
7386.000	15.269	34.790	50.059	-23.941	74.000
9848.000	19.191	36.530	55.721	-18.279	74.000
Average Detector:					
4924.000	9.415	36.360	45.774	-8.226	54.000
9848.000	19.191	28.500	47.691	-6.309	54.000

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.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Handheld
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
402.480	-2.750	28.796	26.046	-19.954	46.000
515.000	1.104	26.940	28.044	-17.956	46.000
573.200	2.015	26.601	28.616	-17.384	46.000
644.980	1.040	26.009	27.049	-18.951	46.000
745.860	2.793	26.734	29.528	-16.472	46.000
930.160	6.700	22.998	29.698	-16.302	46.000
Vertical					
332.640	-5.159	28.593	23.434	-22.566	46.000
365.620	-2.667	24.602	21.935	-24.065	46.000
515.000	-1.596	24.439	22.843	-23.157	46.000
544.100	-1.208	25.091	23.883	-22.117	46.000
745.860	1.313	24.686	26.000	-20.000	46.000
965.080	7.397	21.097	28.494	-25.506	54.000

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 : Smart Handheld
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
171.620	-10.747	39.131	28.384	-15.116	43.500
326.820	-4.819	29.362	24.544	-21.456	46.000
544.100	2.992	25.873	28.865	-17.135	46.000
644.980	1.040	26.398	27.438	-18.562	46.000
745.860	2.793	24.917	27.711	-18.289	46.000
926.280	6.010	22.214	28.224	-17.776	46.000
Vertical					
332.640	-5.159	29.297	24.138	-21.862	46.000
402.480	-6.310	28.011	21.701	-24.299	46.000
515.000	-1.596	26.350	24.754	-21.246	46.000
677.960	0.089	22.720	22.809	-23.191	46.000
745.860	1.313	26.232	27.546	-18.454	46.000
967.020	7.541	22.393	29.934	-24.066	54.000

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

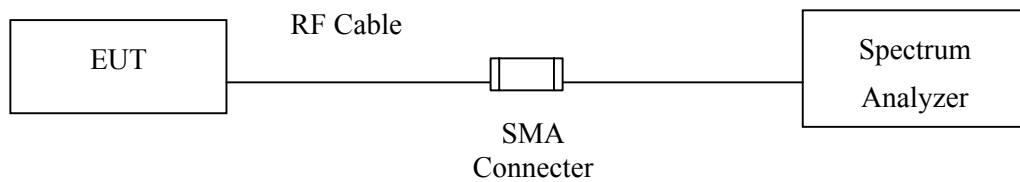
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

- 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 Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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

5.5. Uncertainty

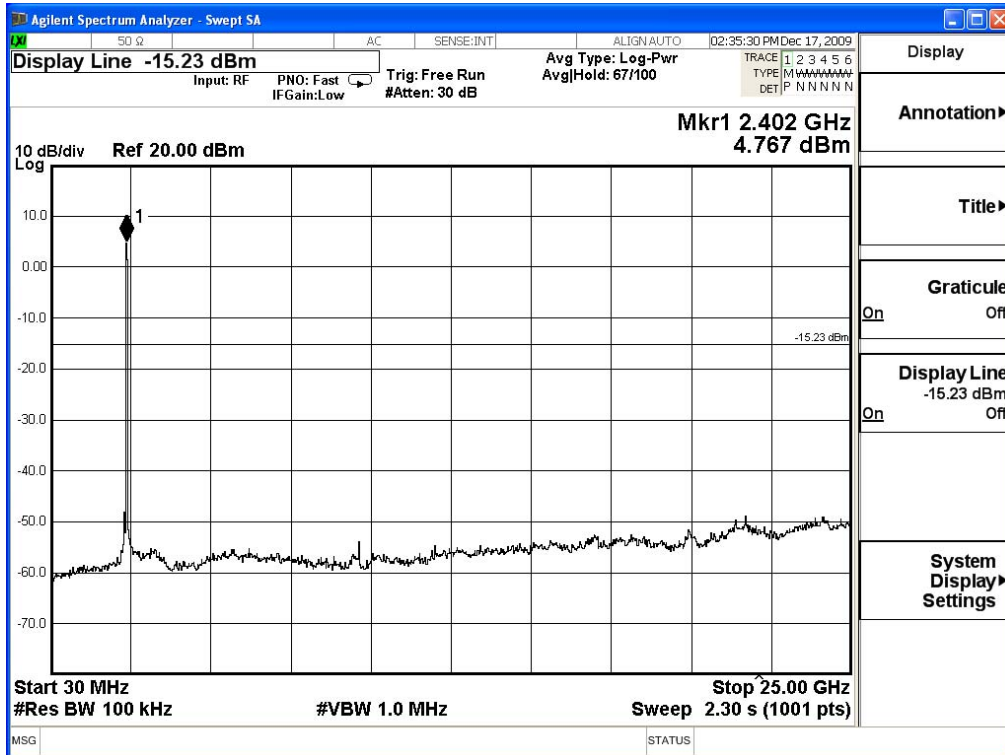
The measurement uncertainty

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

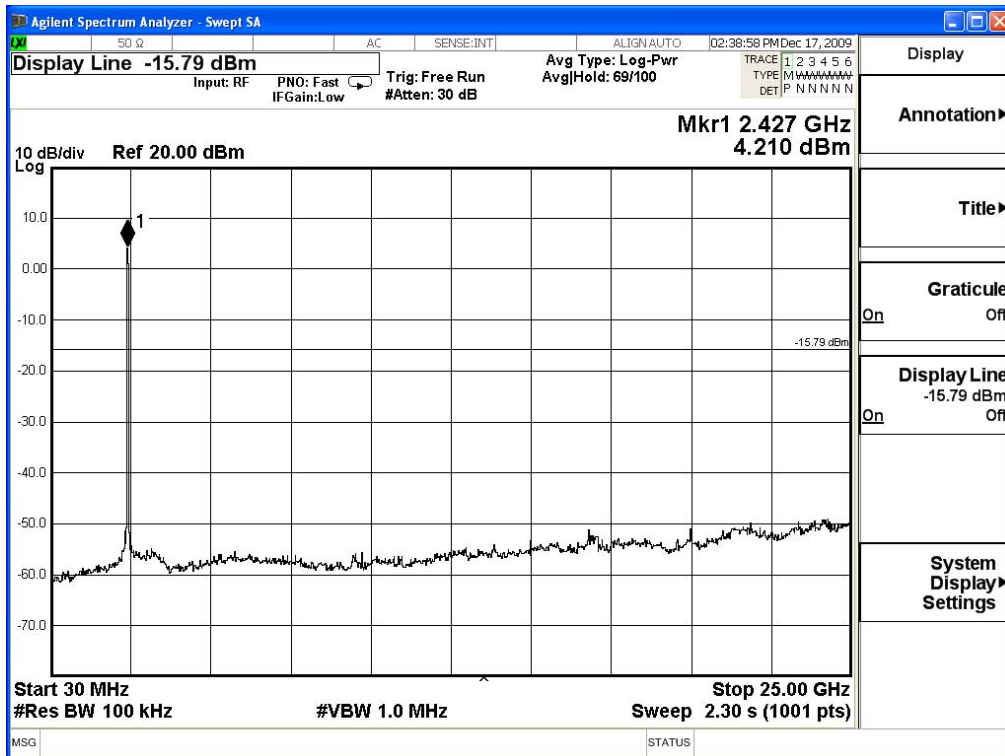
5.6. Test Result of RF antenna conducted test

Product : Smart Handheld
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel 01 (2412MHz) 30-25GHz



Channel 06 (2437MHz) 30-25GHz



Channel 11 (2462MHz) 30-25GHz



Product : Smart Handheld
 Test Item : RF Antenna Conducted Spurious
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel 01 (2412MHz) 30-25GHz



Channel 06 (2437MHz) 30-25GHz



Channel 11 (2462MHz) 30-25GHz



6. Band Edge

6.1. Test Equipment

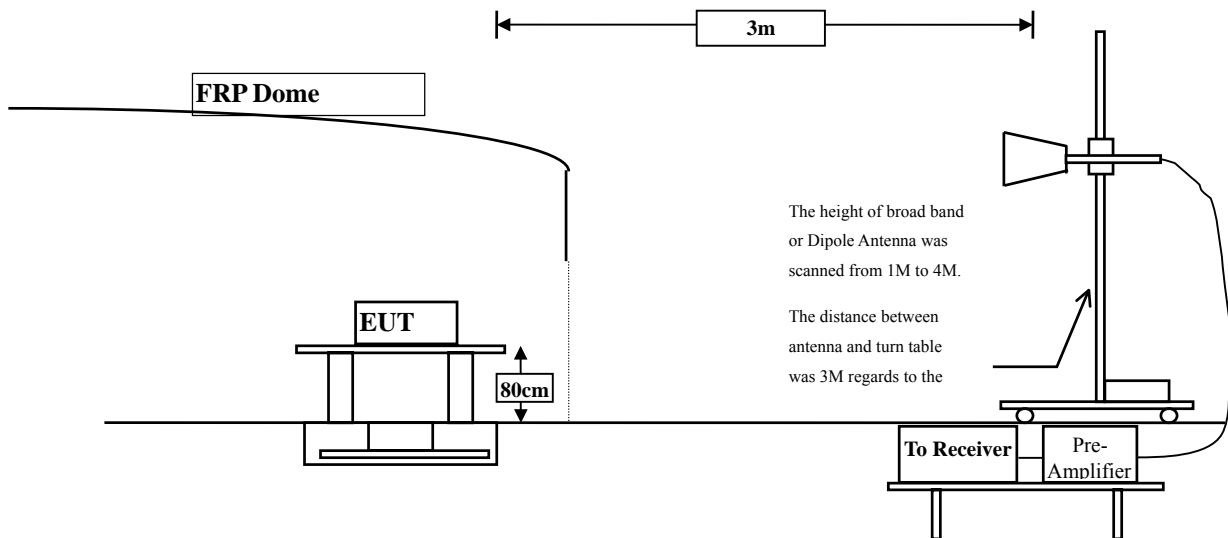
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Pre-Amplifier	AGILENT	8447D/2944A09549	Sep., 2009
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2009
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2009
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- 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 Radiated 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 Mar. 2005 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

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Smart Handheld
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	36.613	72.65	109.263	Peak
Horizontal	2412	36.613	61.1	97.713	Average
Vertical	2412	35.629	67.49	103.119	Peak
Vertical	2412	35.629	55.26	90.889	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2386.2	109.263	48.498	60.765	Peak
Horizontal	2386.2	97.713	53.743	43.97	Average
Vertical	2386.2	103.119	48.498	54.621	Peak
Vertical	2386.2	90.889	53.743	37.146	Average

Note:

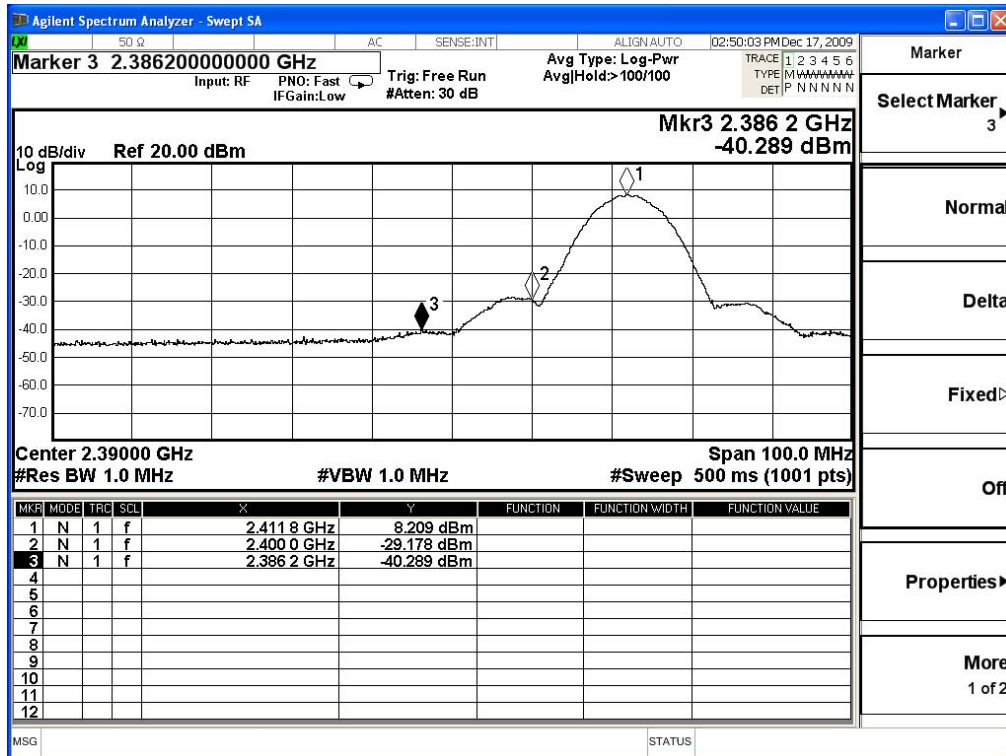
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = $F - \Delta$

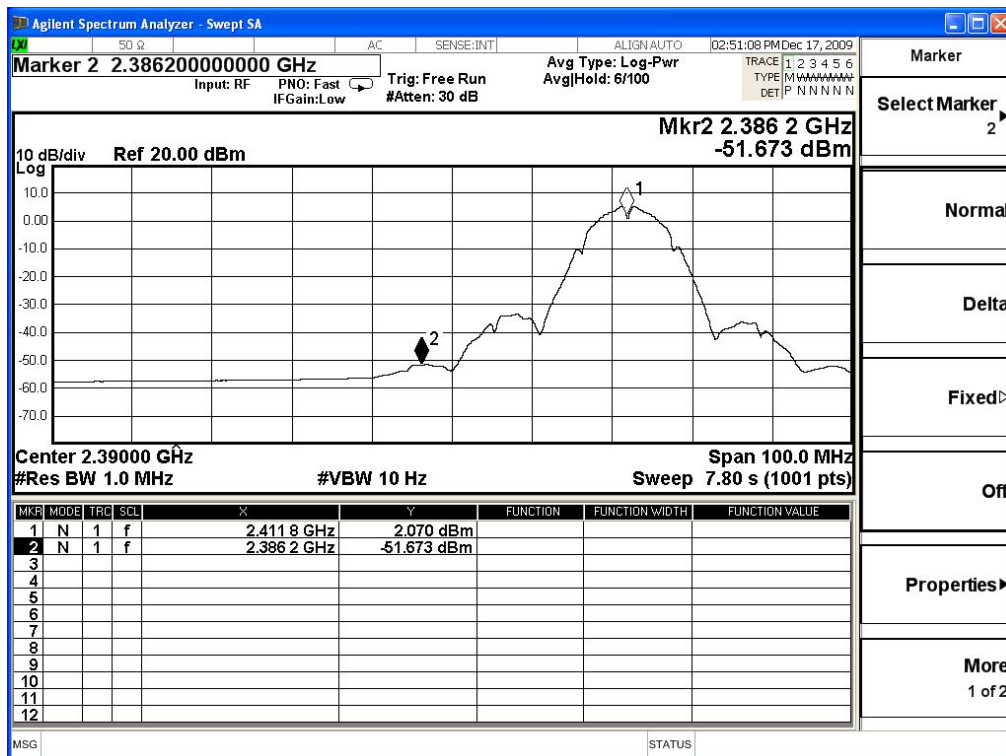
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Smart Handheld
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dB(uV/m)]	Detector
Horizontal	2462	36.699	71.33	108.029	Peak
Horizontal	2462	36.699	60.19	96.889	Average
Vertical	2462	36.039	67.28	103.319	Peak
Vertical	2462	36.039	55.19	91.229	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2485.4	108.029	48.706	59.323	Peak
Horizontal	2485.4	96.889	59.237	37.652	Average
Vertical	2485.4	103.319	48.706	54.613	Peak
Vertical	2485.4	91.229	59.237	31.992	Average

Note:

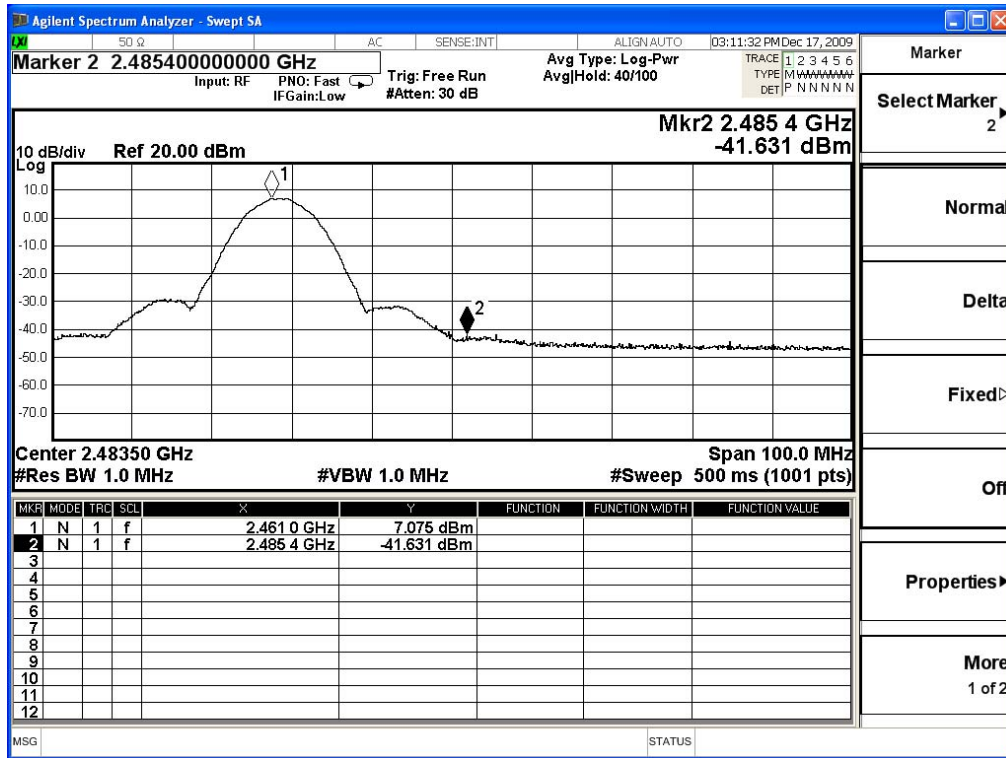
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

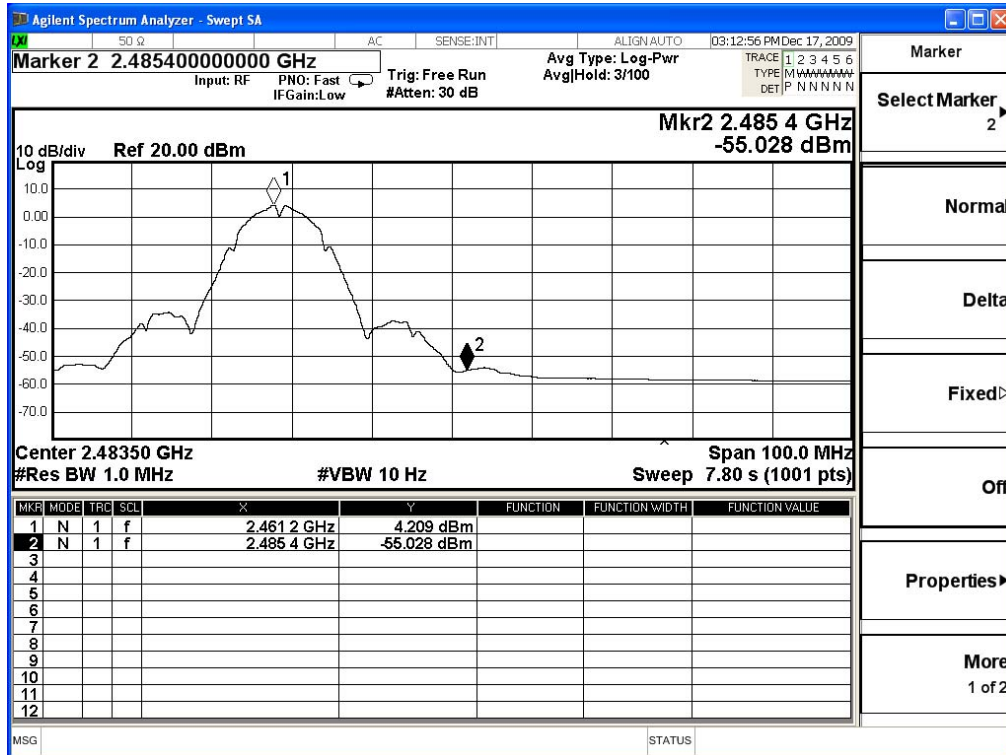
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Smart Handheld
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2412	36.613	64.647	101.26	Peak
Horizontal	2412	36.613	55.898	92.511	Average
Vertical	2412	35.629	65.021	100.65	Peak
Vertical	2412	35.629	56.486	92.115	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2389	101.26	31.691	69.569	Peak
Horizontal	2389	92.511	39.727	52.784	Average
Vertical	2389	100.65	31.691	68.959	Peak
Vertical	2389	92.115	39.727	52.388	Average

Note:

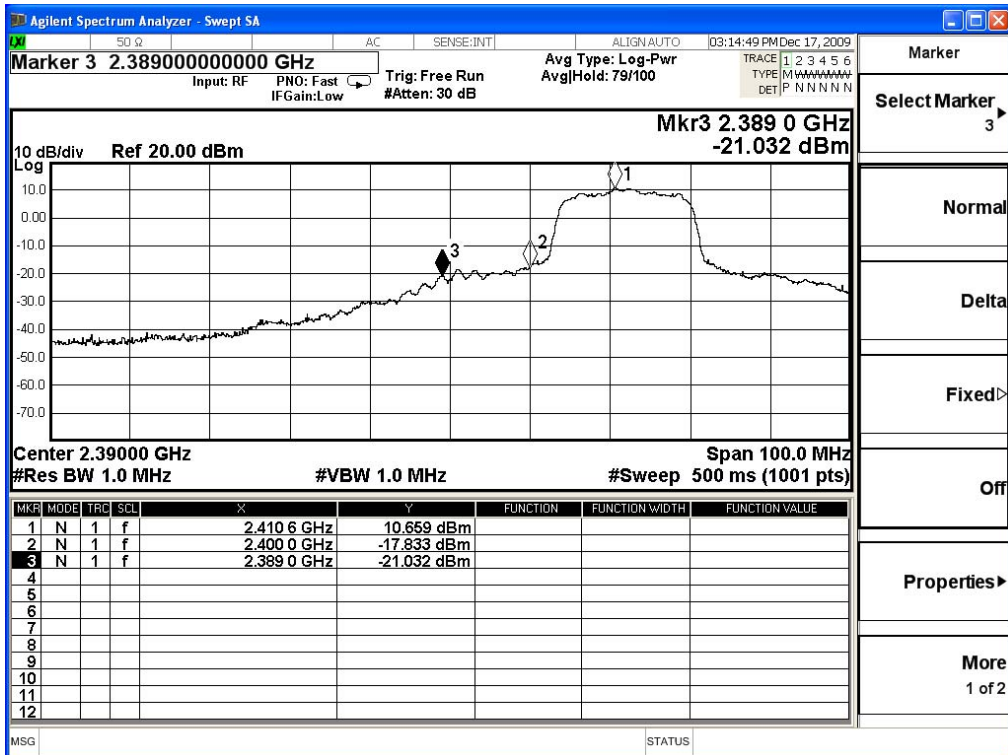
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

$$\text{Band Edge field Strength} = F - \Delta$$

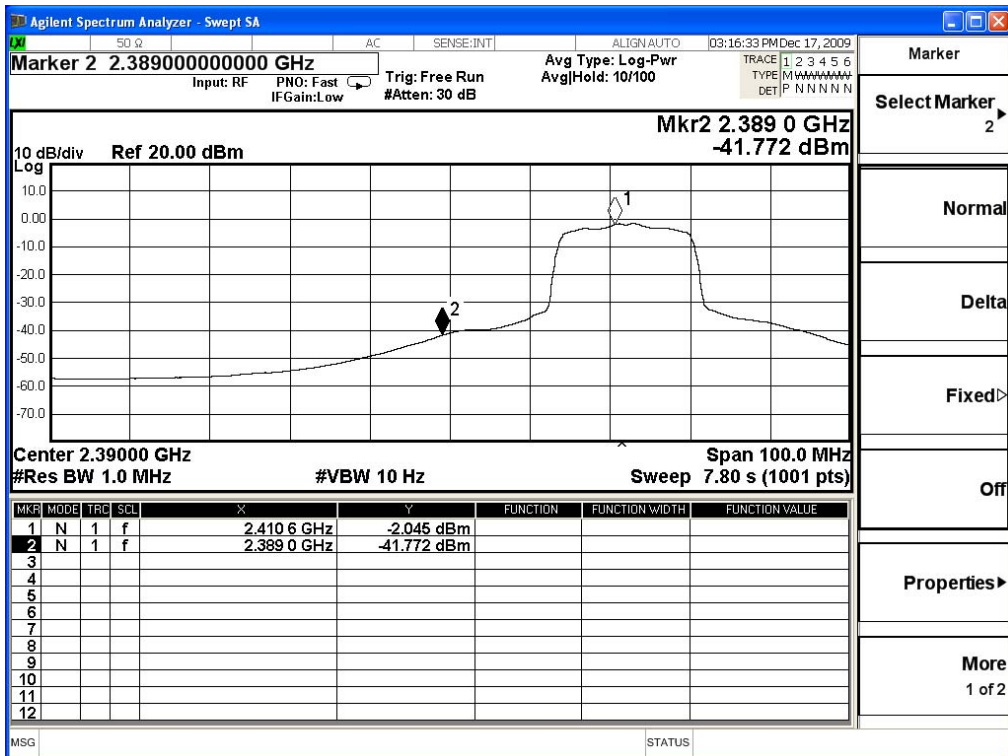
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Smart Handheld
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dB(uV/m)]	Detector
Horizontal	2462	36.699	68.926	105.625	Peak
Horizontal	2462	36.699	54.849	91.548	Average
Vertical	2462	36.039	68.18	104.219	Peak
Vertical	2462	36.039	55.189	91.224	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	105.625	33.924	71.701	Peak
Horizontal	2483.5	91.548	38.691	52.857	Average
Vertical	2483.5	104.219	33.924	70.295	Peak
Vertical	2483.5	91.224	38.691	52.533	Average

Note:

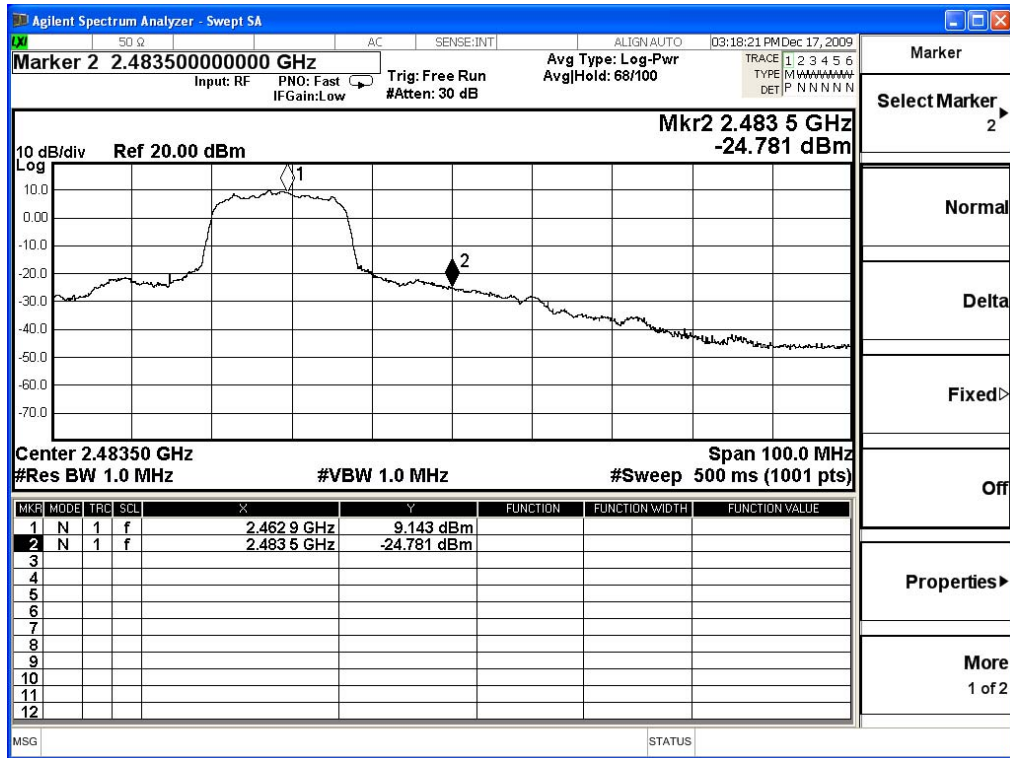
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

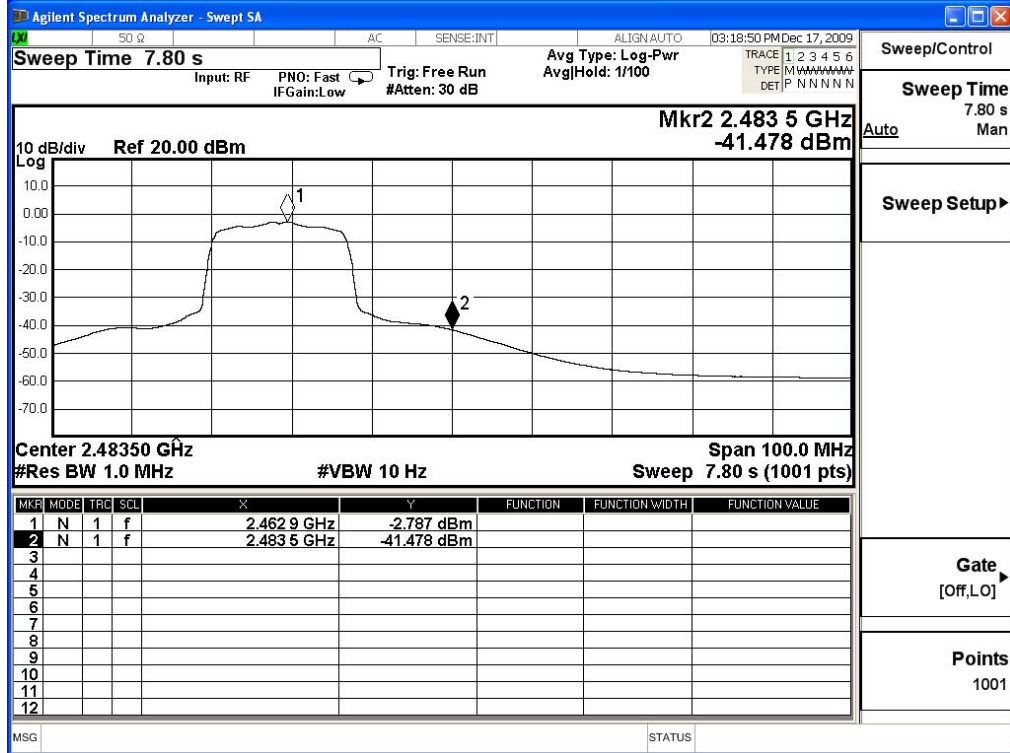
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



7. Occupied Bandwidth

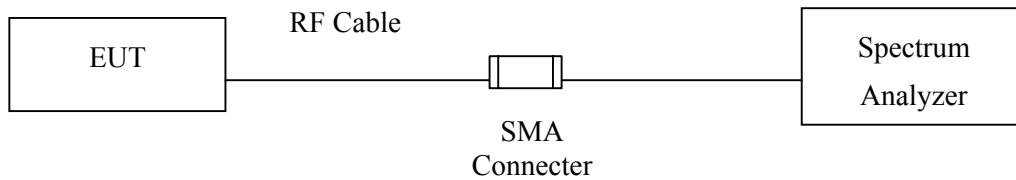
7.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

- 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. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

7.5. Uncertainty

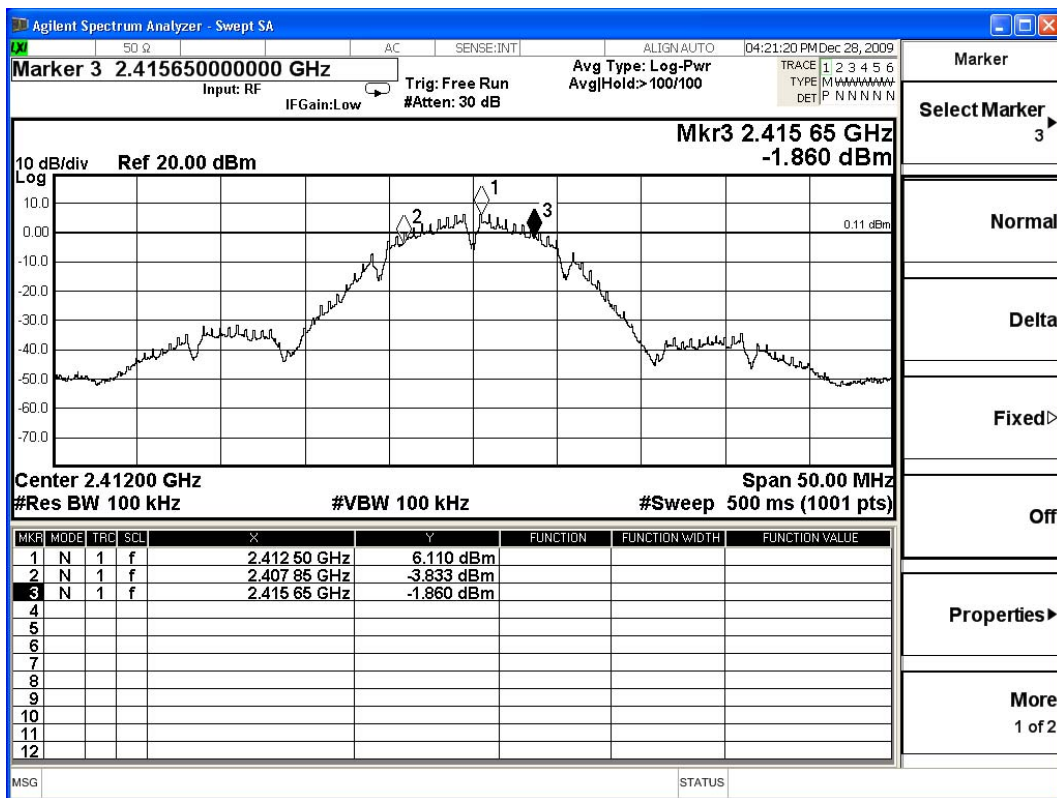
± 150Hz

7.6. Test Result of Occupied Bandwidth

Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	7800	>500	Pass

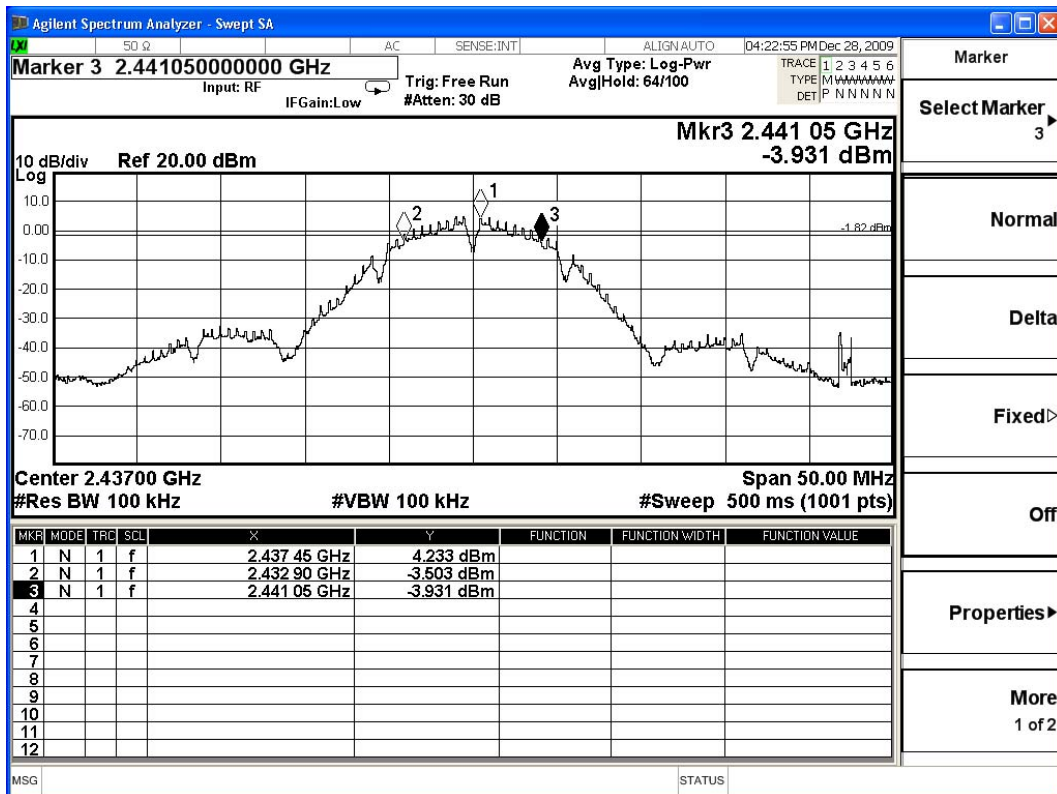
Figure Channel 1:



Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	8150	>500	Pass

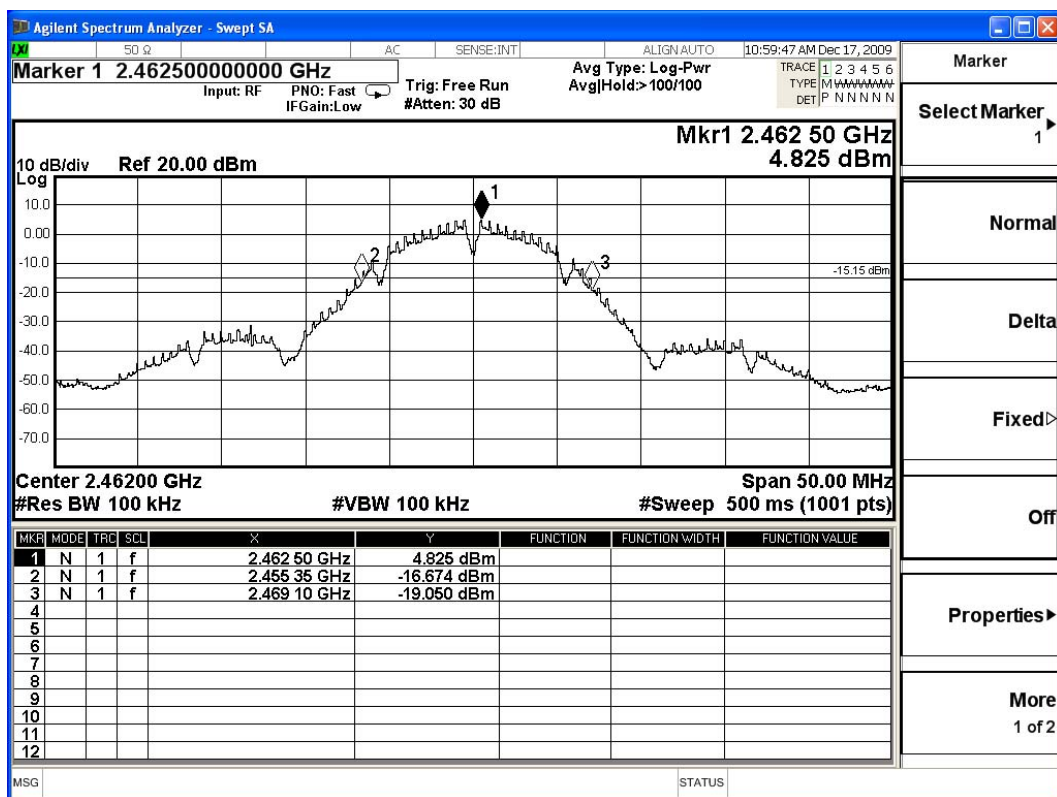
Figure Channel 6:



Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	8150	>500	Pass

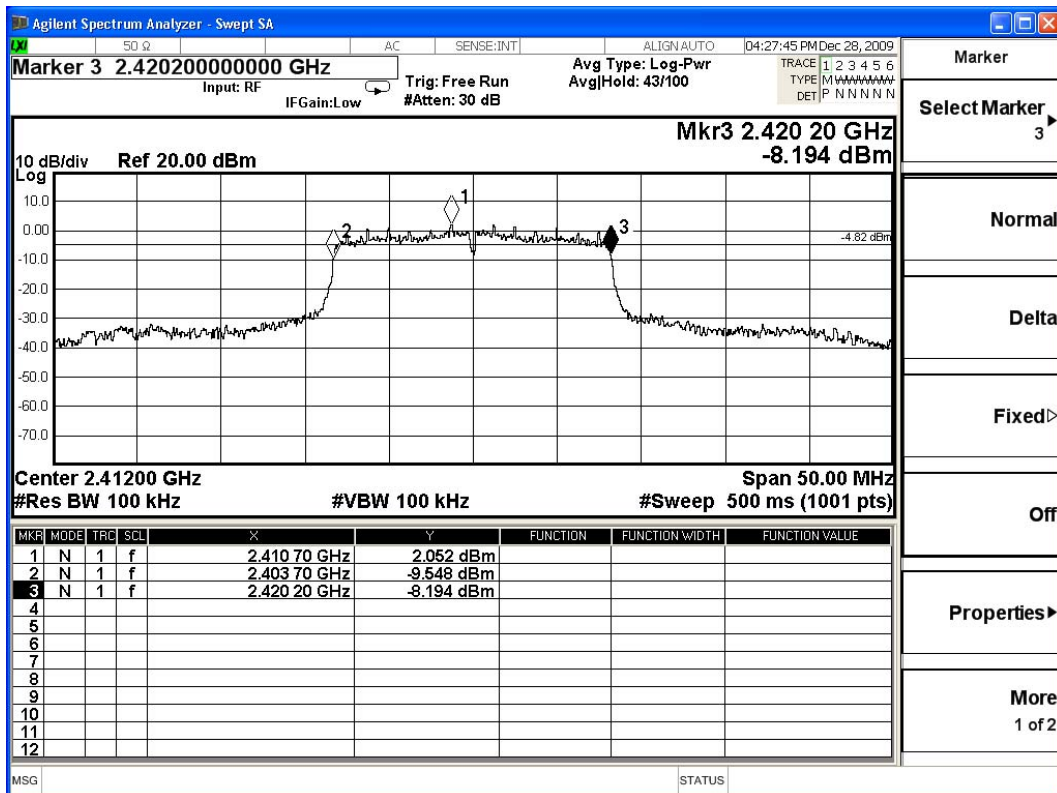
Figure Channel 11:



Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	16500	>500	Pass

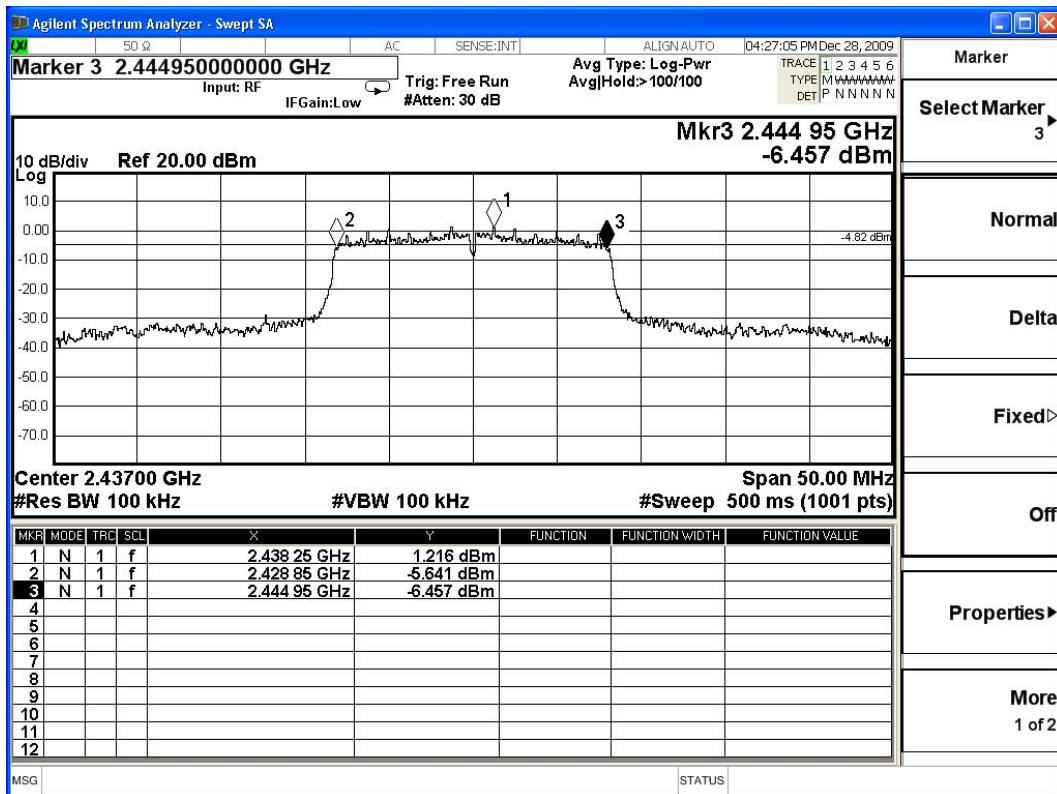
Figure Channel 1:



Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	16100	>500	Pass

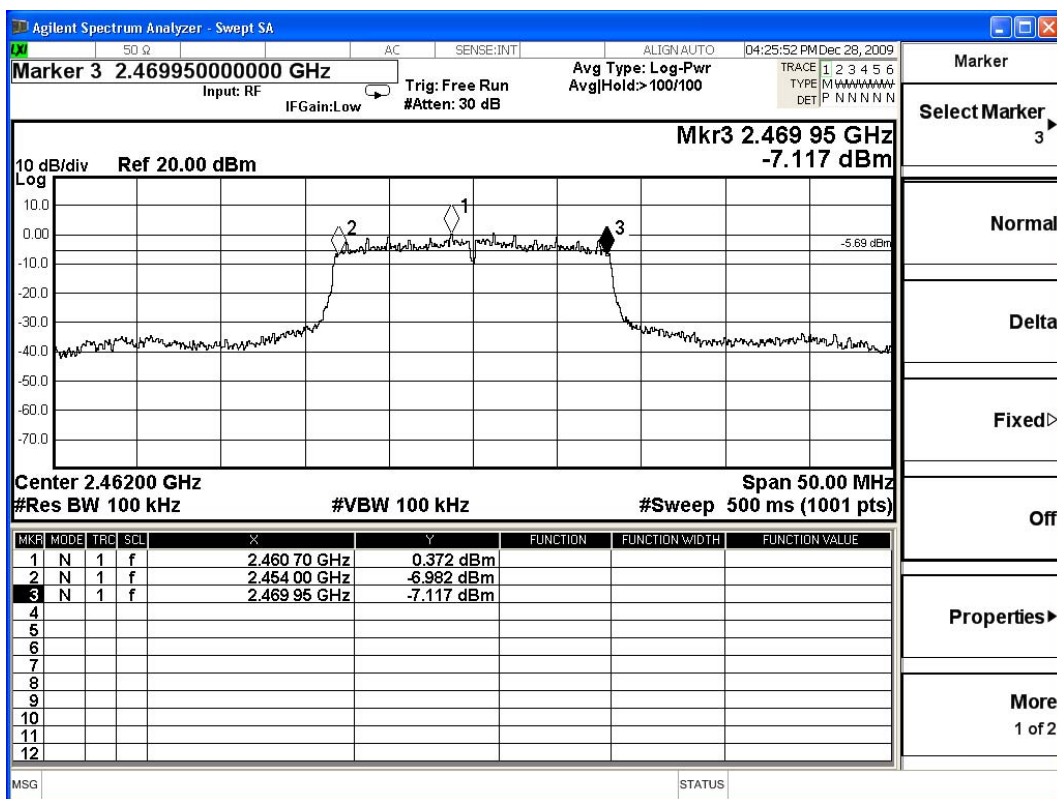
Figure Channel 6:



Product : Smart Handheld
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	15950	>500	Pass

Figure Channel 11:



8. Power Density

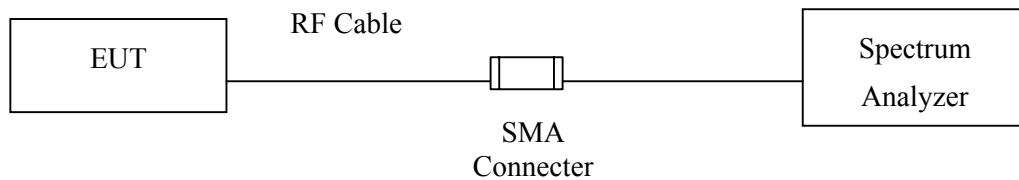
8.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

- 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 Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 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

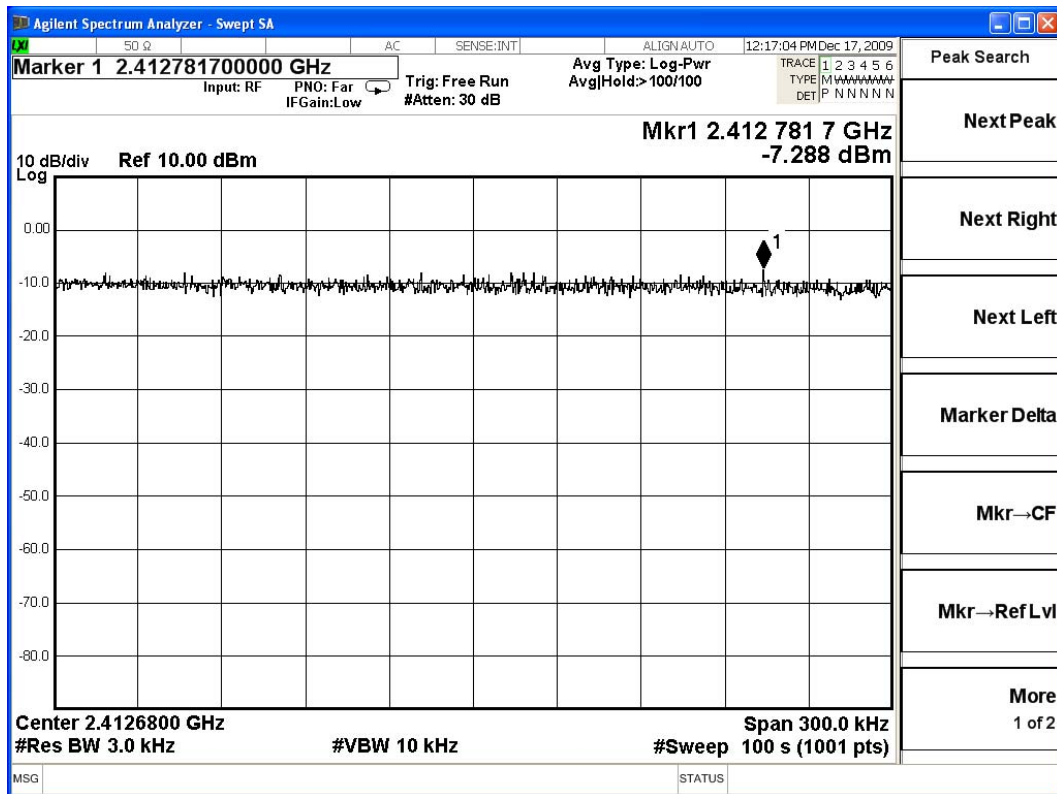
± 1.27 dB

8.6. Test Result of Power Density

Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412.00	-7.288	< 8dBm	Pass

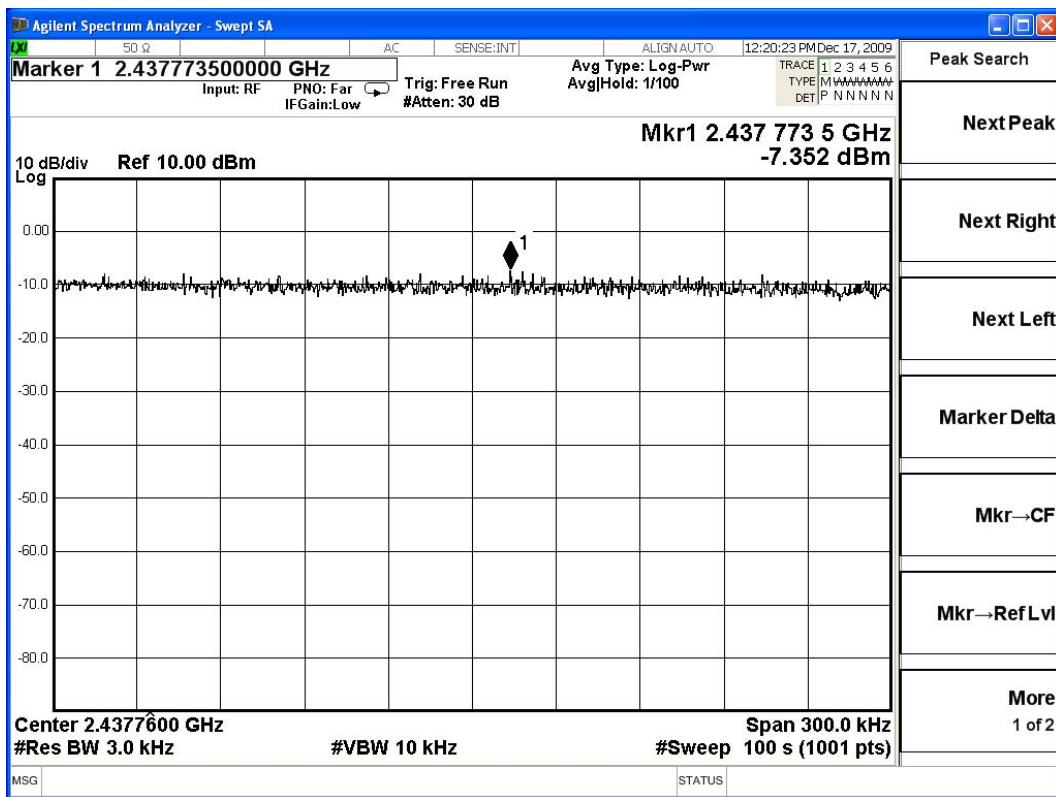
Figure Channel 1:



Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6	2437.000	-7.352	< 8dBm	Pass

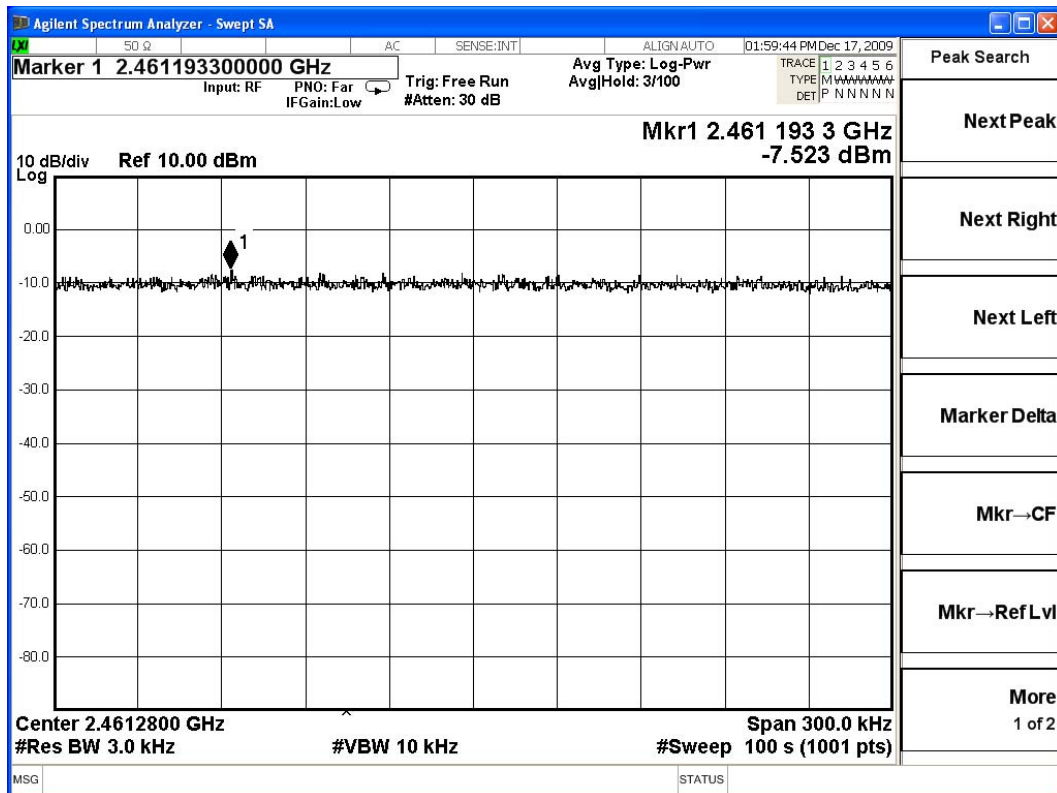
Figure Channel 6:



Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11	2462.00	-7.523	< 8dBm	Pass

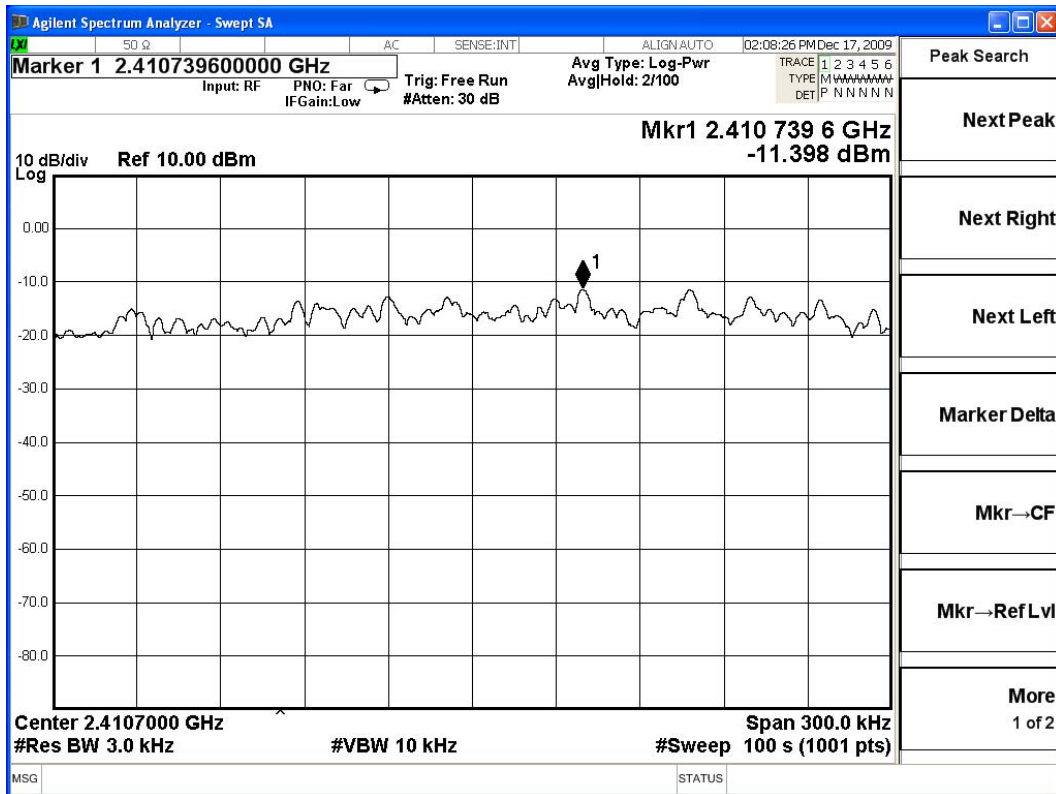
Figure Channel 11:



Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412.00	-11.398	< 8dBm	Pass

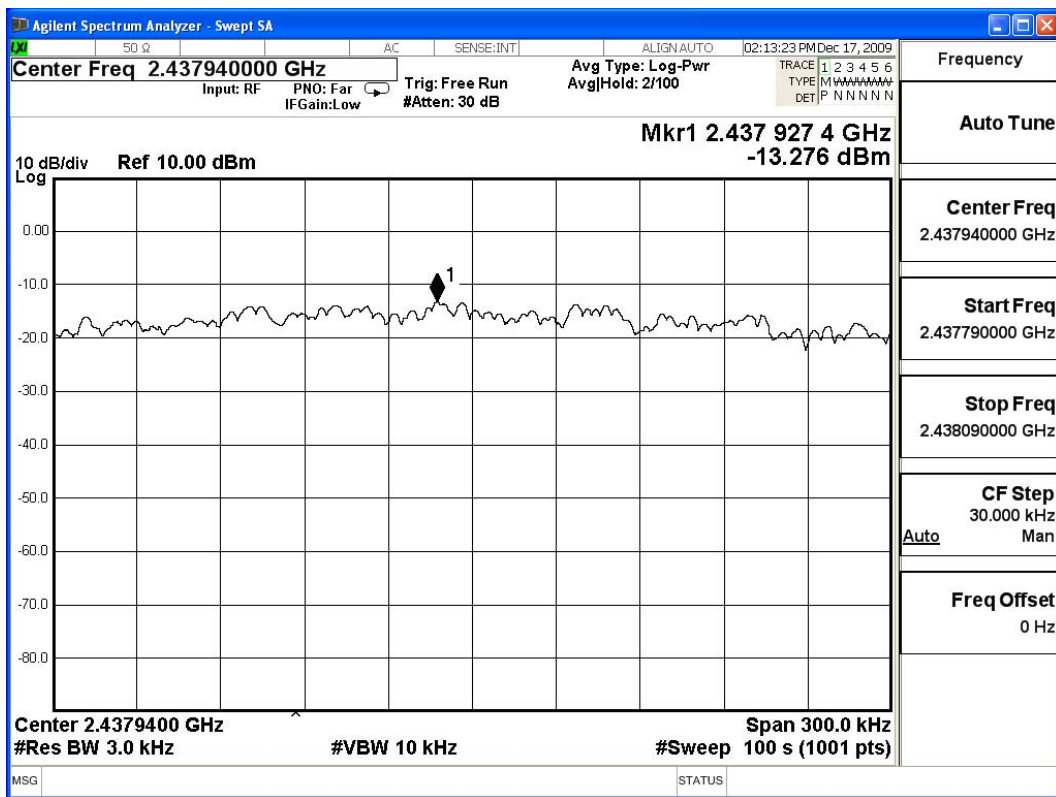
Figure Channel 1:



Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
6	2437.000	-13.276	< 8dBm	Pass

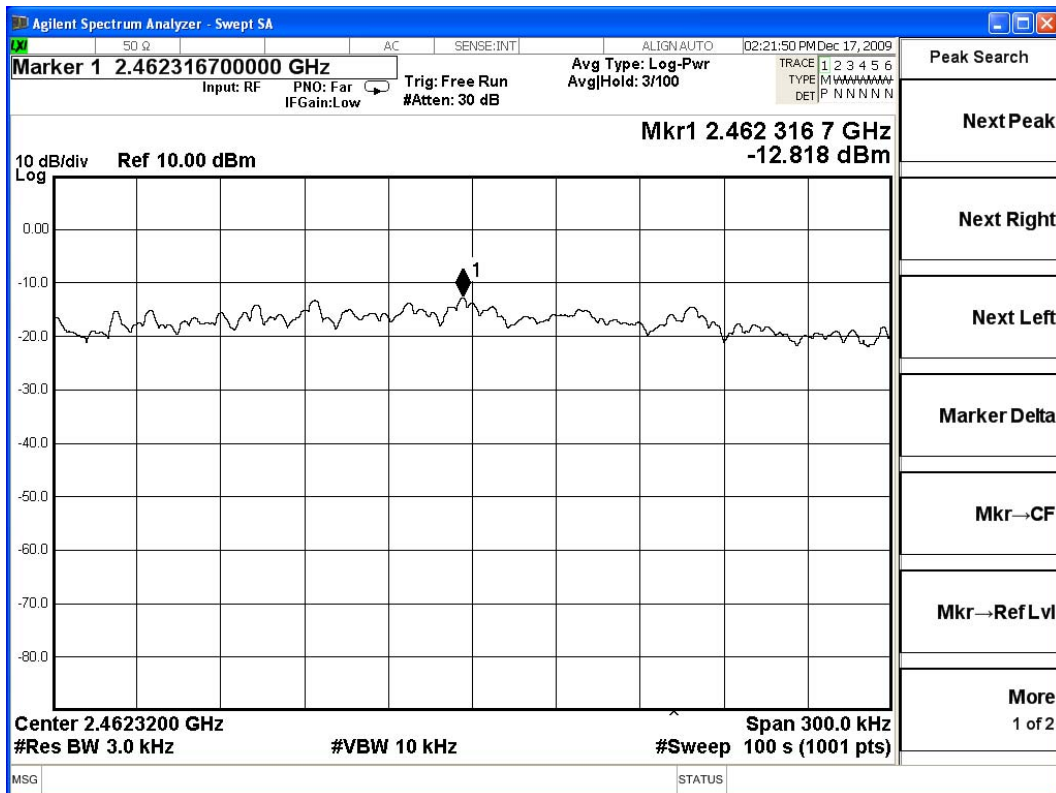
Figure Channel 6:



Product : Smart Handheld
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
11	2462.00	-12.818	< 8dBm	Pass

Figure Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.