FCC TEST REPORT

for

Smart phone

MODEL:I-SM1

Market name: **Imcosys**

Test Report Number:
KS060911A02-RPW

Issued for

ImCoSys Ltd.

ImCoSys AG Bundesstrasse 5 CH-6300 Zug

Issued by:

Compliance Certification Services Inc.
Kun shan Laboratory

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Issued Date: October 25, 2006

Lab. Code: 200581-0

Testing Laboratory
0363

Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		October 25, 2006		Initial Issue	ALL	

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1 TEST CERTIFICATION

Product:	Smart phone
Model:	I-SM1
Market name:	Imcosys
Brand:	Imcosys
Tested:	September 16~October 25, 2006
Applicant:	**ImCoSys Ltd.**
Manufacturer:	ImCoSys AG Bundesstrasse 5 CH-6300 Zug

APPLICABLE STANDARDS			
Standard	**Test Type**	**Standard**	**Test Type**
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

DEVIATION FROM APPLICABLE STANDARD
None

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4: 2003** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

Approved by:

Tony Houng
General Manager
Compliance Certification Service Inc.

Reviewed by:

Miro Chueh
Section Manger
Compliance Certification Service Inc.

2 TEST RESULT SUMMARY

APPLICABLE STANDARDS			
Standard	**Test Type**	**Result**	**Remark**
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

Note: 1. The test result judgment is decided by the limit of test standard
2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	Smart phone
Trade Name	Imcosys
Model Number	I-SM1
Market name	Imcosys
Model Discrepancy	All the above models are identical except the model designation for different market.
WiFi module Model Number	BGW200
WiFi module Brand name	Philips
Received Date	September 11, 2006
Power Supply	Powered from Power Adapter
Power Adapter Power Rating	1. AC to DC charger Trade Name :DVE Model Number : DSA-5P-05 FUS Input: AC 100-240V, 50/60Hz, 0.2A Output: DC 5V,1A DC Power Cord: DC Power Cable 2m Non-shielding, Non-detachable, without Core 2. Battery: Imcosys/ ISM1B Lithium-Ion 3.7V/ 1240mAh
AC Power Cord Type	Unshielded, 1.8m (Detachable) to Power Adapter
DC Power Cable Type	Unshielded, 1.8m (Non-Detachable) at Power Adapter without a core
Frequency Range	2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b: 17.18 dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
Transmit Data Rate	IEEE 802.11b: 11, 5.5, 2, 1 Mbps
Number of Channels	11 Channels
Antenna Specification	PIFA antenna with 0.71dBi gain (Max)

Note: *1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*

*2. This submittal(s) (test report) is intended for FCC ID: **UIHI-SM1** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

4 TEST METHODOLOGY

4.1. DESCRIPTION OF TEST MODES

The EUT (model: I-SM1) had been tested under operating condition.

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with preliminary test 11, 5.5, 2, and 1, After the preliminary scan , the following test mode 11Mbps highest data rate (the worst case) are chosen for the final testing.

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Notebook	M285	1824064-1B	DoC	LEO	Line cable: Un-Shielded 16m LAN cable: Un-Shielded 16m	Shielded, 1.8m

Note:

1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ **No.10Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, P.R.O.C**

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC,NVLAP
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA,
Taiwan	TAF, BSMI, DGT

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsemc.com.

6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETR 028:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	+/- 2.15dB
Radiated emissions	30MHz ~ 200MHz	+/- 2.50dB
	200MHz ~1000MHz	+/- 2.50dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

7 LIMITS AND RESULTS

7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

NOTE:

(1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

TEST INSTRUMENTS

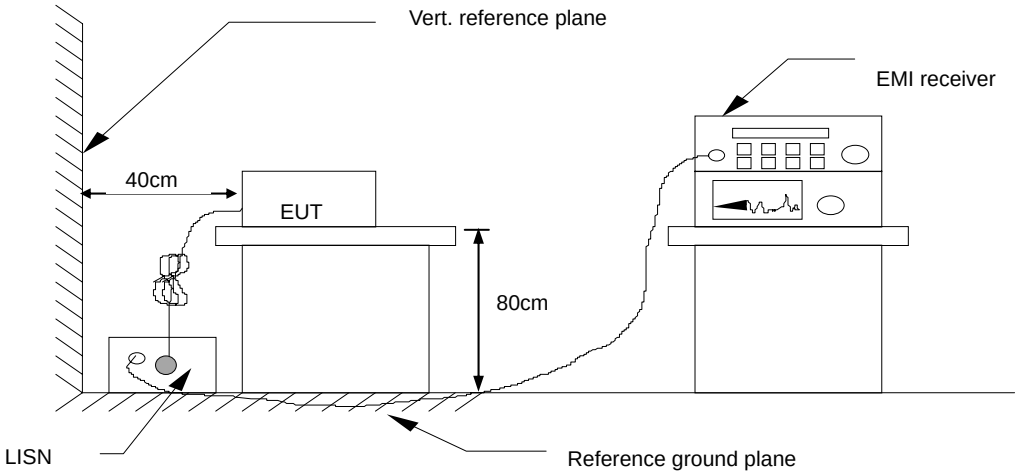
Conducted Emission Test Site A (10m chamber)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESI26	100068	02/11/2007
EMC Analyzer	Agilent	E7402A	US41160329	02/11/2007
LISN	FCC	FCC-LISN-50-50-2-M	01067	02/11/2007
LISN (EUT)	FCC	FCC-LISN-50-50-2-M	01068	02/11/2007
FOUR BALANCED TELECOM PAIRS ISN	FCC	FCC-TLISN-T8-02	20165	07/30/2007
4-WIRE ISN	R&S	ENY41	830663/024	04/08/2007
Double 2-Wire ISN	R&S	ENY22	830661/027	04/08/2007
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	03/15/2007
EMI Monitor control box	FCC	0-SVDC	N/A	05/11/2007

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

7.1.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

7.1.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4. Data Sample:

Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Correction factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.20	37.58	35.11	0.10	37.68	35.21	63.49	53.49	-25.81	-18.28	L1

Frequency (MHz) = Emission frequency in MHz
Reading (dBuV) = Uncorrected Analyzer/Receiver reading
Correction factor (dB) = Insertion loss of LISN
Limit (dBuV) = Limit stated in standard
Margin (dB) = Reading (dBuV) – Limit (dBuV)
Note = Current carrying line of reading

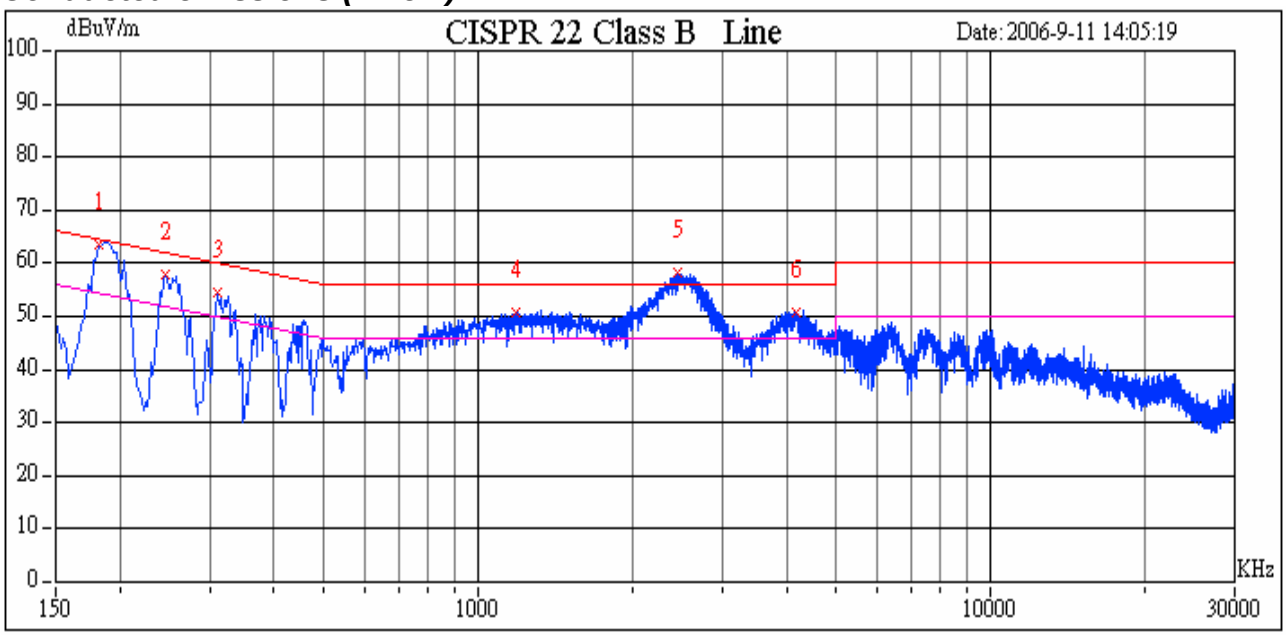
7.1.5. TEST RESULTS

Model No.	I-SM1	Test Mode	Normal Link
Environmental Conditions	23deg.C, 55% RH, 991 hPa	6dB BANDWIDTH	9 kHz
Tested by:	jeff	FOR DVE	

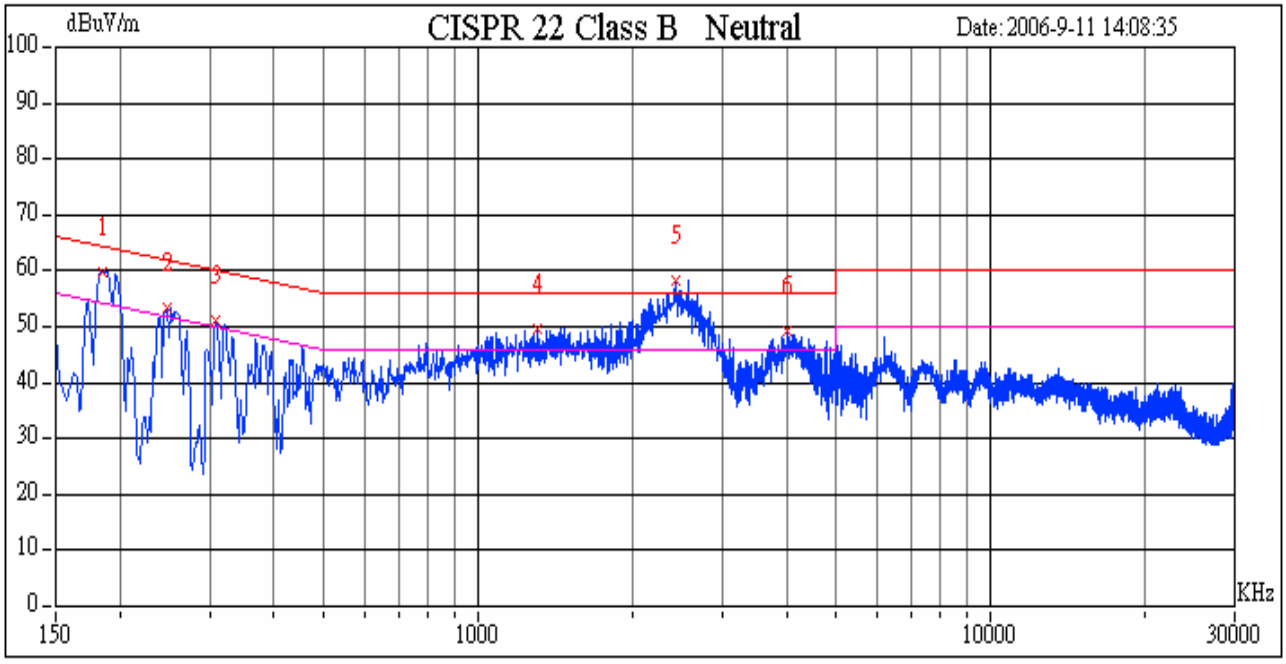
Frequency (KHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
191.5	24.15	25.88	10.36	34.51	36.24	64.81	54.81	-30.30	-18.57	L1
256.2	17.84	18.38	10.38	28.22	28.76	62.97	52.97	-34.75	-24.21	L1
309.1	15	17.13	10.4	25.4	27.53	61.45	51.45	-36.05	-23.92	L1
1214.7	16.48	17.73	10.45	26.93	28.18	56.00	46.00	-29.07	-17.82	L1
2432.1	28.06	26.84	10.54	38.6	37.38	56.00	46.00	-17.40	-8.62	L1
4173.5	19.33	18.18	10.65	29.98	28.83	56.00	46.00	-26.02	-17.17	L1
195.2	17.3	17.75	10.39	27.69	28.14	64.71	54.71	-37.02	-26.57	L2
243.1	11.81	14.25	10.39	22.2	24.64	63.34	53.34	-41.14	-28.70	L2
302.3	9.5	8.59	10.4	19.9	18.99	61.65	51.65	-41.75	-32.66	L2
1310	16.71	16.63	10.44	27.15	27.07	56.00	46.00	-28.85	-18.93	L2
2422.1	24.82	22.69	10.53	35.35	33.22	56.00	46.00	-20.65	-12.78	L2
4037.5	17.01	16.47	10.65	27.66	27.12	56.00	46.00	-28.34	-18.88	L2

Test Plots(FOR DVE)

Conducted emissions (Line 1)



Conducted emissions (Line 2)



7.2. SPURIOUS EMISSIONS MEASUREMENT

7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

7.2.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007

7.2.3. TEST PROCEDURE (please refer to measurement standard)

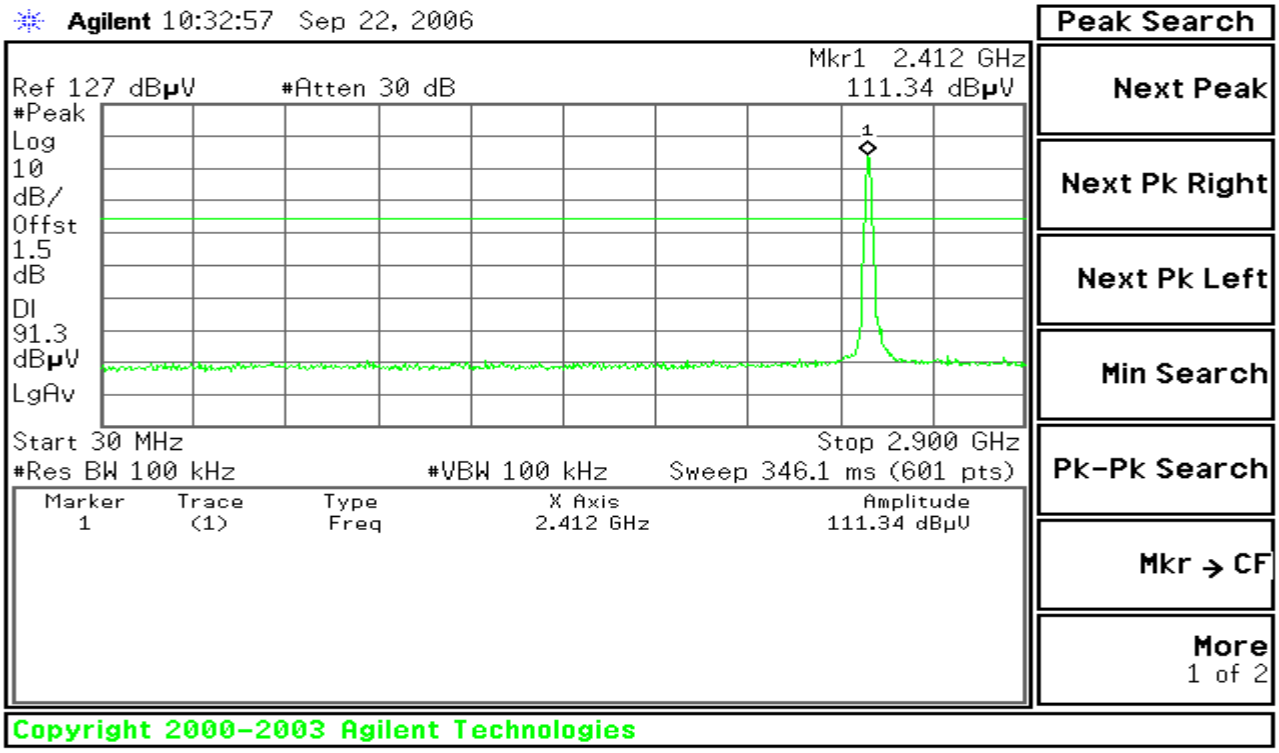
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.
Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

7.2.4. TEST RESULTS

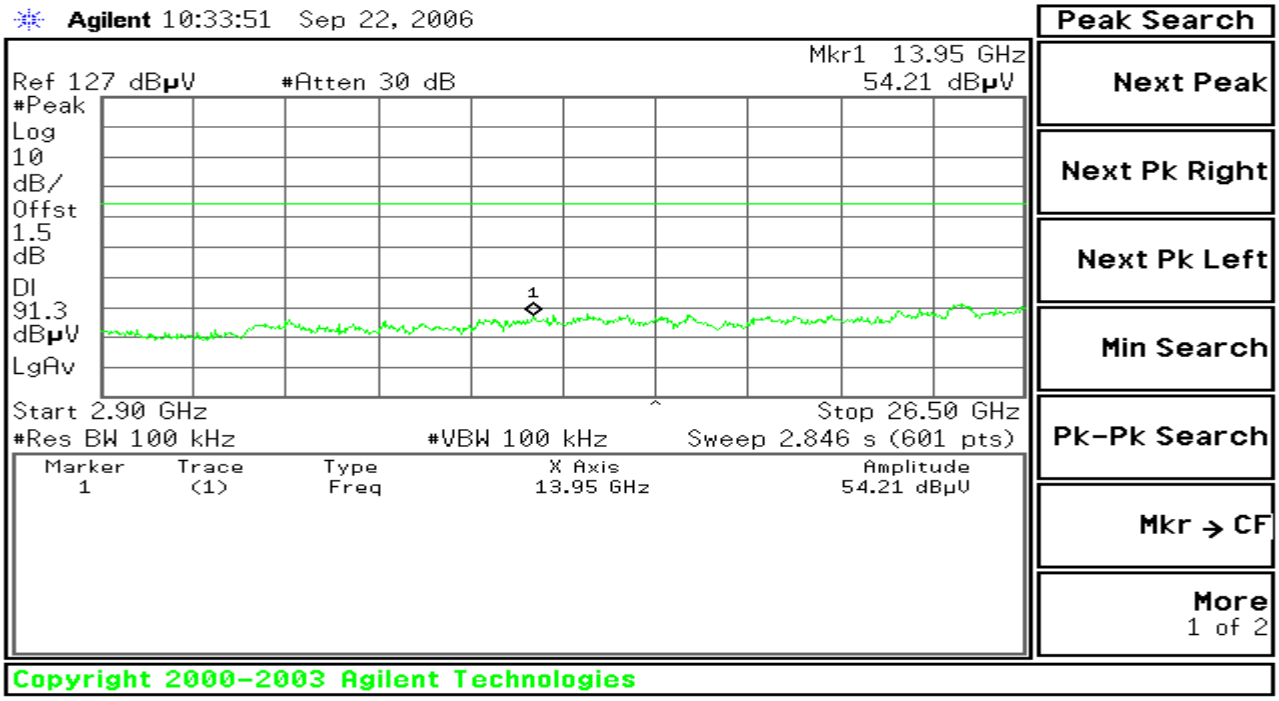
Test Plot (IEEE 802.11b mode)

CH Low

30MHz ~ 2.9GHz

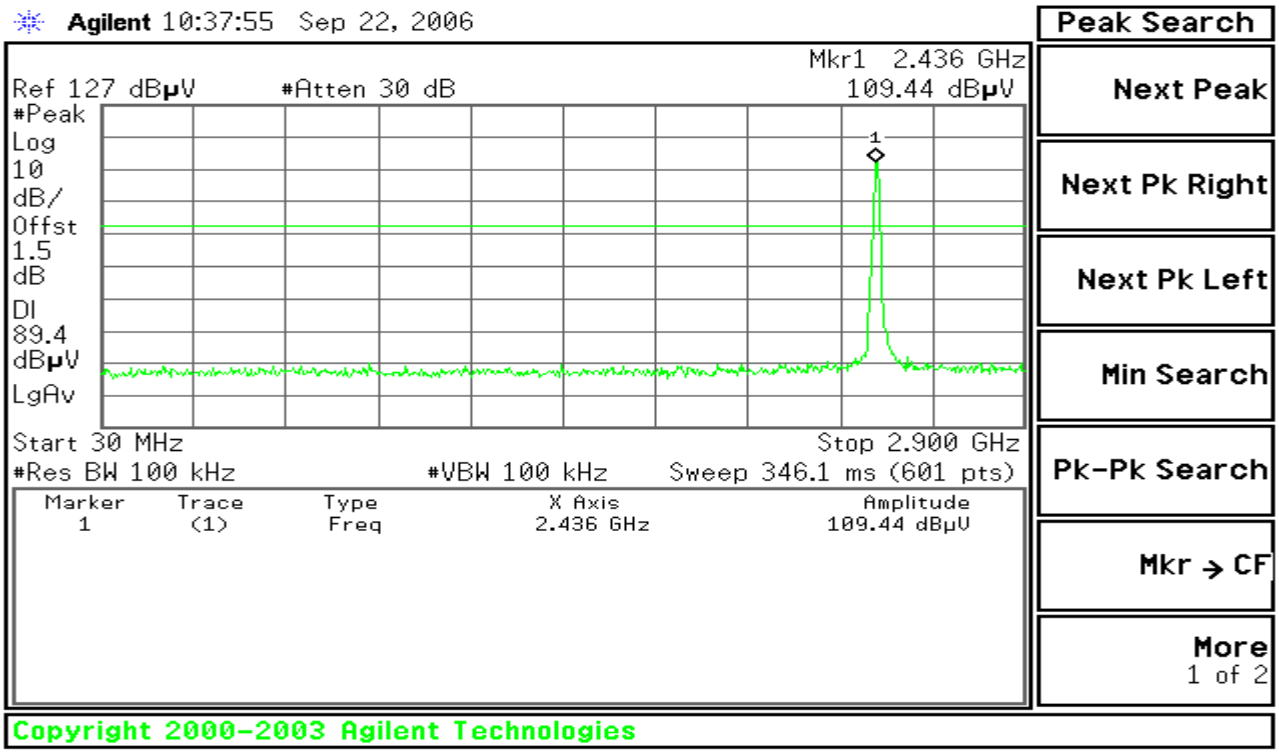


2.9GHz ~ 26.5GHz

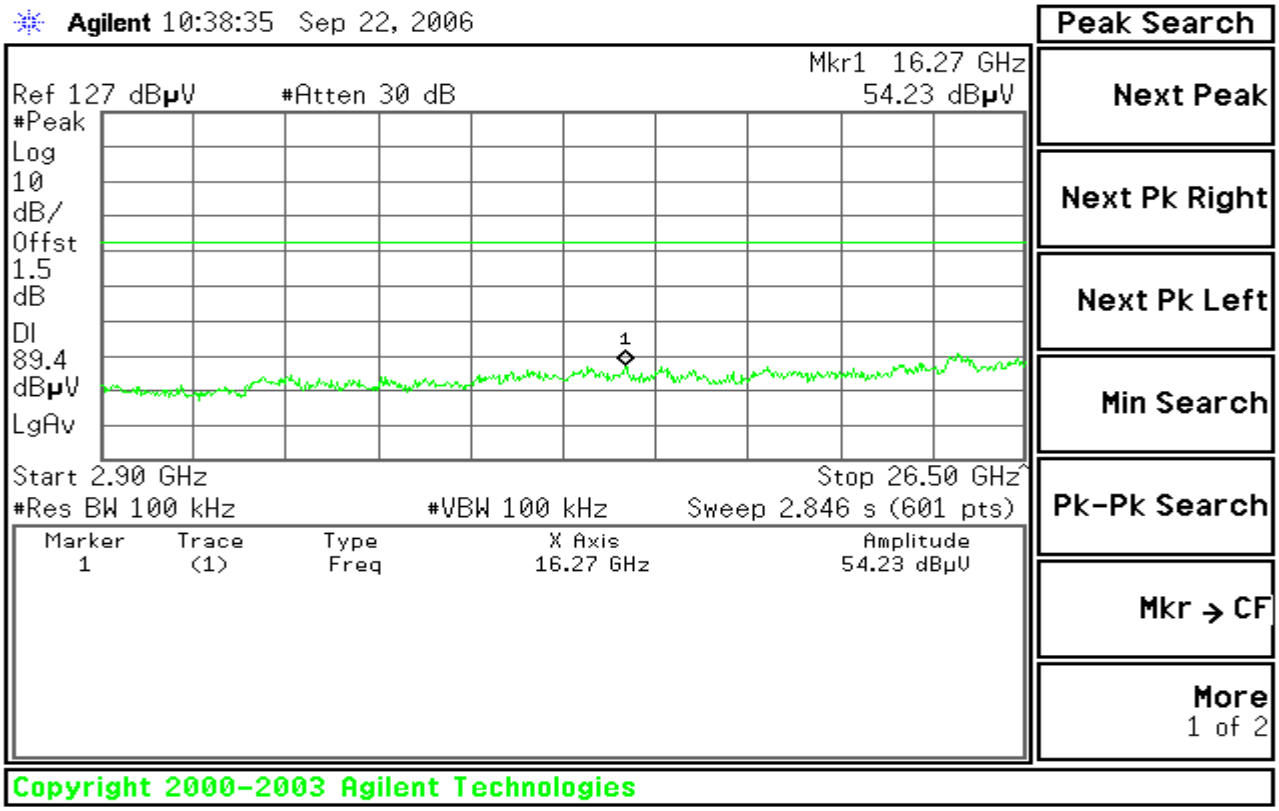


CH Mid

30MHz ~ 2.9GHz

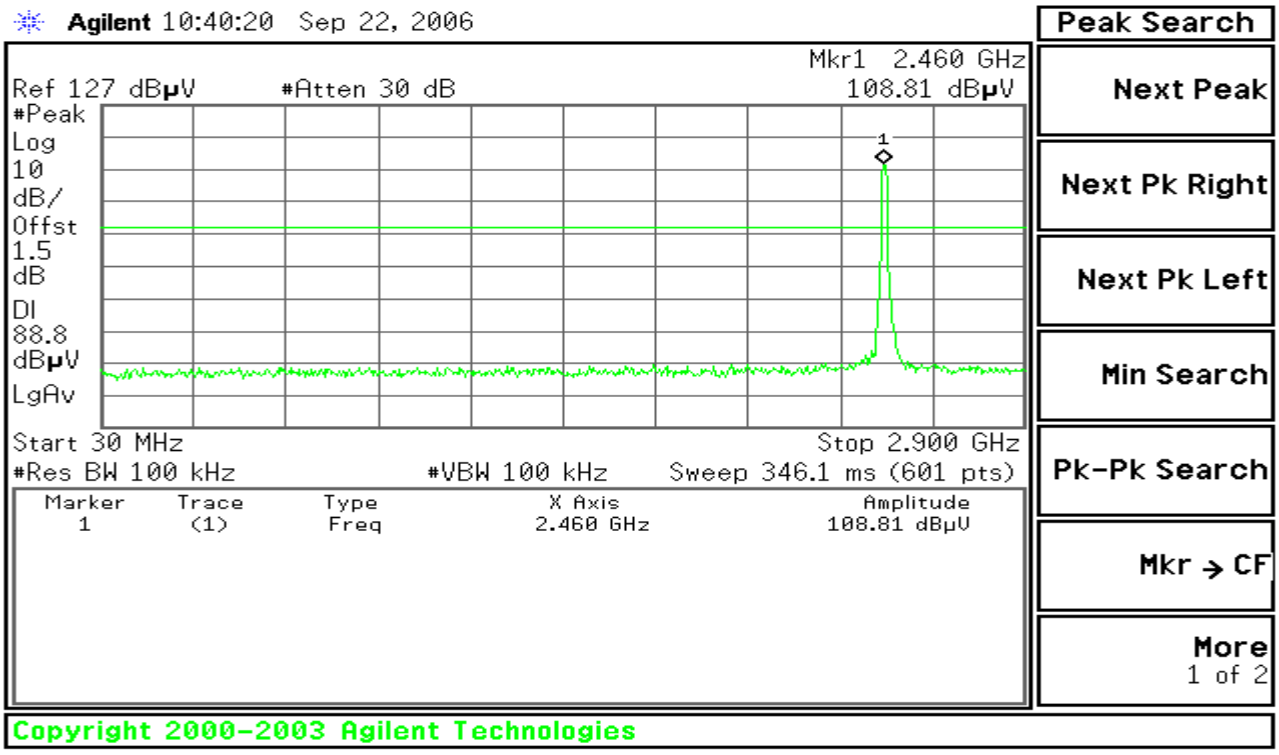


2.9GHz ~ 26.5GHz

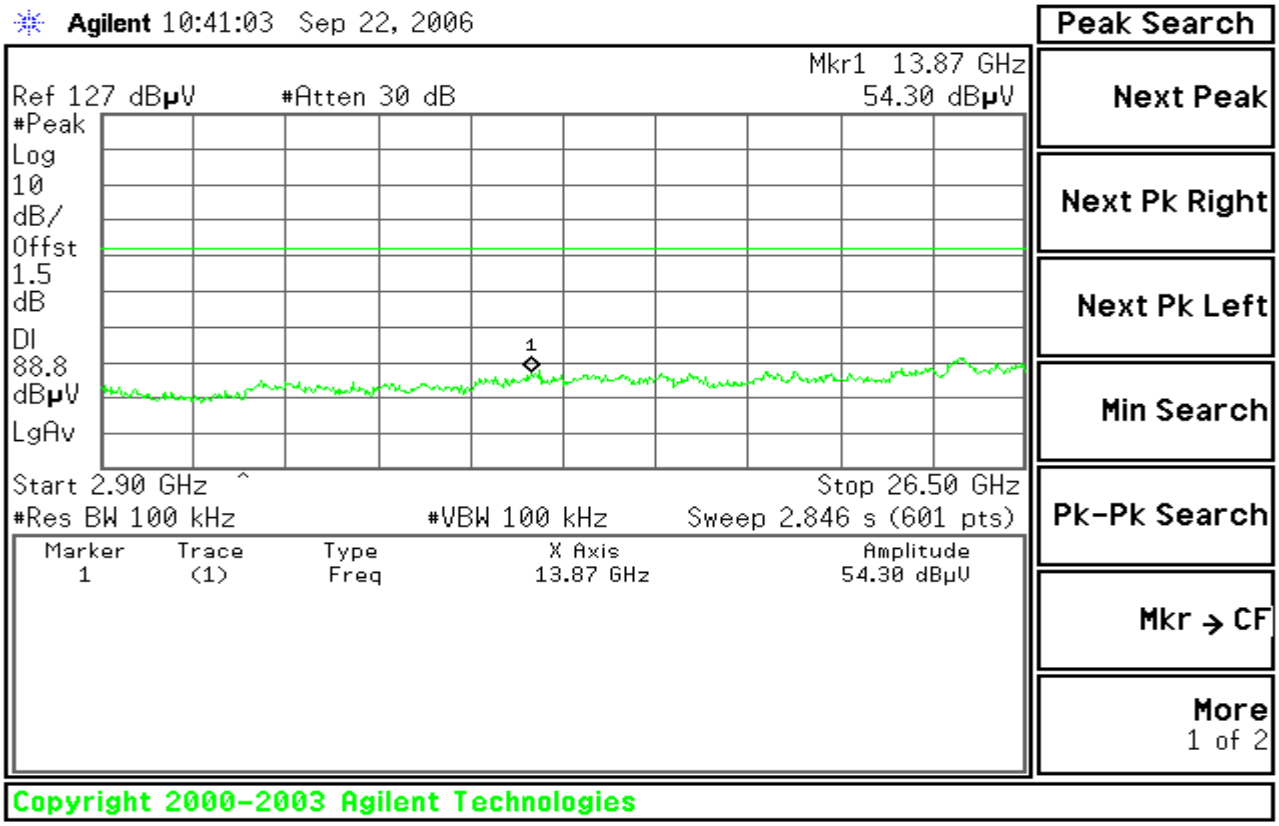


CH High

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz



7.2.5. Radiated Emissions

7.2.5.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

7.2.5.2. TEST INSTRUMENTS

3M Semi Anechoic Chamber (977)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007
EMI Test Receiver	R&S	ESPI3	101026	11/11/2006
Pre-Amplfier	MINI	ZFL-1000VH2	d041703	12/13/2006
Pre-Amplfier	Miteq	NSP4000-NF	870731	01/28/2007
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2006
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	02/01/2007
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2006
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT1OO	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2007

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 93105,90471.

3. N.C.R = No Calibration Required.

7.2.5.3. TEST PROCEDURE (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

   RBW=100kHz / VBW=300kHz / Sweep=AUTO

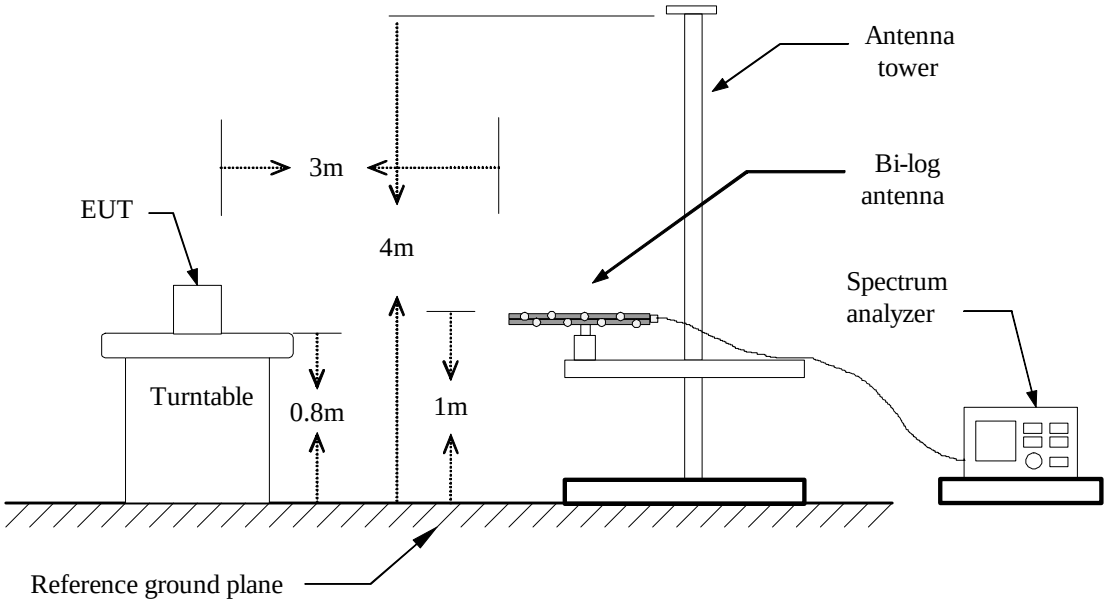
   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

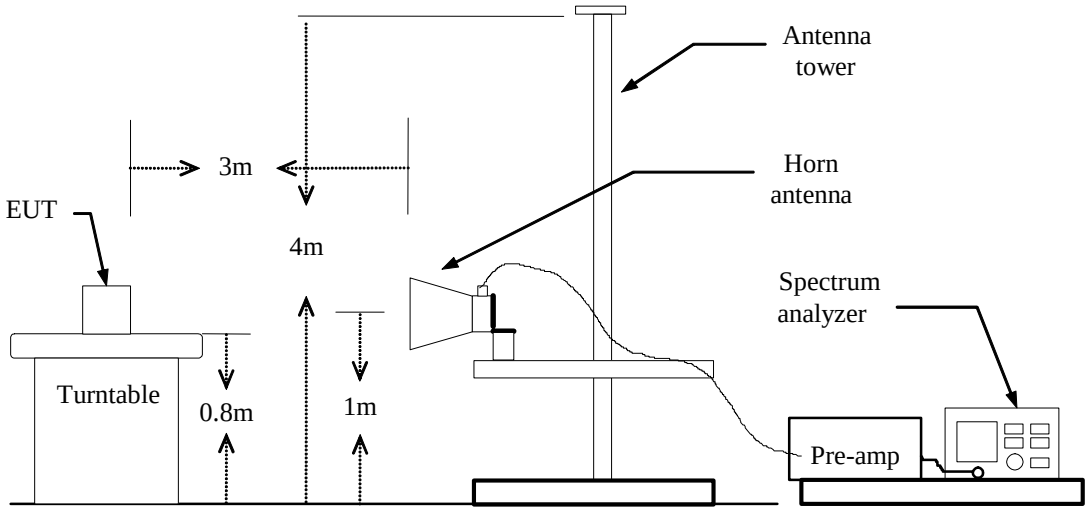
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

7.2.5.4. TEST SETUP

Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5.5. Data Sample:

Below 1 GHz

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (QP) (dBuV/m)	Margin (dB)	Remark
	V						Peak

Above 1 GHz

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1603.00	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

Frequency (MHz) = Emission frequency in MHz
Ant.Pol. (H/V) = Antenna polarization
Reading (dBuV) = Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)
Peak = Peak Reading
QP = Quasi-peak Reading
AVG = Average Reading

7.2.5.6. TEST RESULTS

Below 1 GHz

Operation Mode:	Normal Link	**Test Date:**	September 23, 2006
Temperature:	25°C	**Tested by:**	jeff
Humidity:	56 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (QP) (dBuV/m)	Margin (dB)	Remark
36.49	V	32.72	1.44	34.16	40.00	-5.84	Peak
41.90	V	28.55	-2.52	26.03	40.00	-13.97	Peak
119.28	V	25.39	-1.17	24.22	43.50	-19.28	Peak
202.61	V	25.37	-2.23	23.14	43.50	-20.36	Peak
503.41	V	24.45	5.19	29.64	46.00	-16.36	Peak
828.86	V	23.25	10.15	33.40	46.00	-12.60	Peak
33.24	H	25.06	3.72	28.78	40.00	-11.22	Peak
126.31	H	24.97	-0.87	24.10	43.50	-19.40	Peak
154.99	H	26.02	-2.21	23.81	43.50	-19.69	Peak
754.51	H	24.92	8.73	33.65	46.00	-12.35	Peak
859.72	H	23.76	10.72	34.48	46.00	-11.52	Peak
950.90	H	23.88	11.75	35.63	46.00	-10.37	Peak

REMARKS:

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

Above 1 GHz

Operation Mode:	TX / IEEE 802.11b / CH Low	**Test Date:**	September 23, 2006
Temperature:	25°C	**Tested by:**	jeff
Humidity:	56 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1456.67	V	50.58	---	0.13	50.71	---	74.00	54.00	-23.29	Peak
4616.67	V	38.1	---	10.18	48.28	---	74.00	54.00	-25.72	Peak
7241.67	V	25.48	---	15.39	40.87	---	74.00	54.00	-33.13	Peak
N/A										Peak
N/A										Peak
N/A										Peak
1460.00	H	45.96	---	0.15	46.11	---	74.00	54.00	-27.89	Peak
4700.00	H	37.01	---	10.13	47.14	---	74.00	54.00	-26.86	Peak
7200.00	H	24.87	---	15.17	40.04	---	74.00	54.00	-33.96	Peak
N/A										Peak
N/A										Peak
N/A										Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / IEEE 802.11b / CH Mid	**Test Date:**	September 23, 2006
Temperature:	25°C	**Tested by:**	jeff
Humidity:	56 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1596.67	V	43.33	---	0.76	44.09	---	74.00	54.00	-29.91	Peak
4884.67	V	38.61	---	10.61	49.22	---	74.00	54.00	-24.78	Peak
7244.33	V	28.74	---	15.44	44.18	---	74.00	54.00	-29.82	Peak
N/A										Peak
N/A										Peak
N/A										Peak
1723.33	H	41.53	---	0.3	41.83	---	74.00	54.00	-32.17	Peak
4882.67	H	36.94	---	10.48	47.42	---	74.00	54.00	-26.58	Peak
7400.00	H	27.4	---	16.24	43.64	---	74.00	54.00	-30.36	Peak
N/A										Peak
N/A										Peak
N/A										Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode:	TX / IEEE 802.11b / CH High	**Test Date:**	September 23, 2006
Temperature:	25°C	**Tested by:**	jeff
Humidity:	56 % RH	**Polarity:**	Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1366.67	V	44.55	---	8.03	52.58	---	74.00	54.00	-21.42	Peak
4923.33	V	35.89	---	11.46	47.35	---	74.00	54.00	-26.65	Peak
7467.67	V	24.38	---	26.84	51.22	---	74.00	54.00	-22.78	Peak
N/A										Peak
N/A										Peak
N/A										Peak
1193.33	H	46.25	---	7.85	54.1	---	74.00	54.00	-19.9	Peak
4920.67	H	33.64	---	11.5	45.14	---	74.00	54.00	-28.86	Peak
7334.33	H	25.76	---	15.72	41.48	---	74.00	54.00	-32.52	Peak
N/A										Peak
N/A										Peak
N/A										Peak

REMARKS:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

7.3. 6dB BANDWIDTH MEASUREMENT

7.3.1. LIMITS

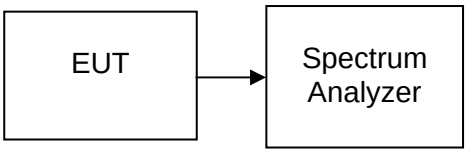
According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007

7.3.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.



7.3.4. TEST SETUP

7.3.5. TEST RESULTS

No non-compliance noted

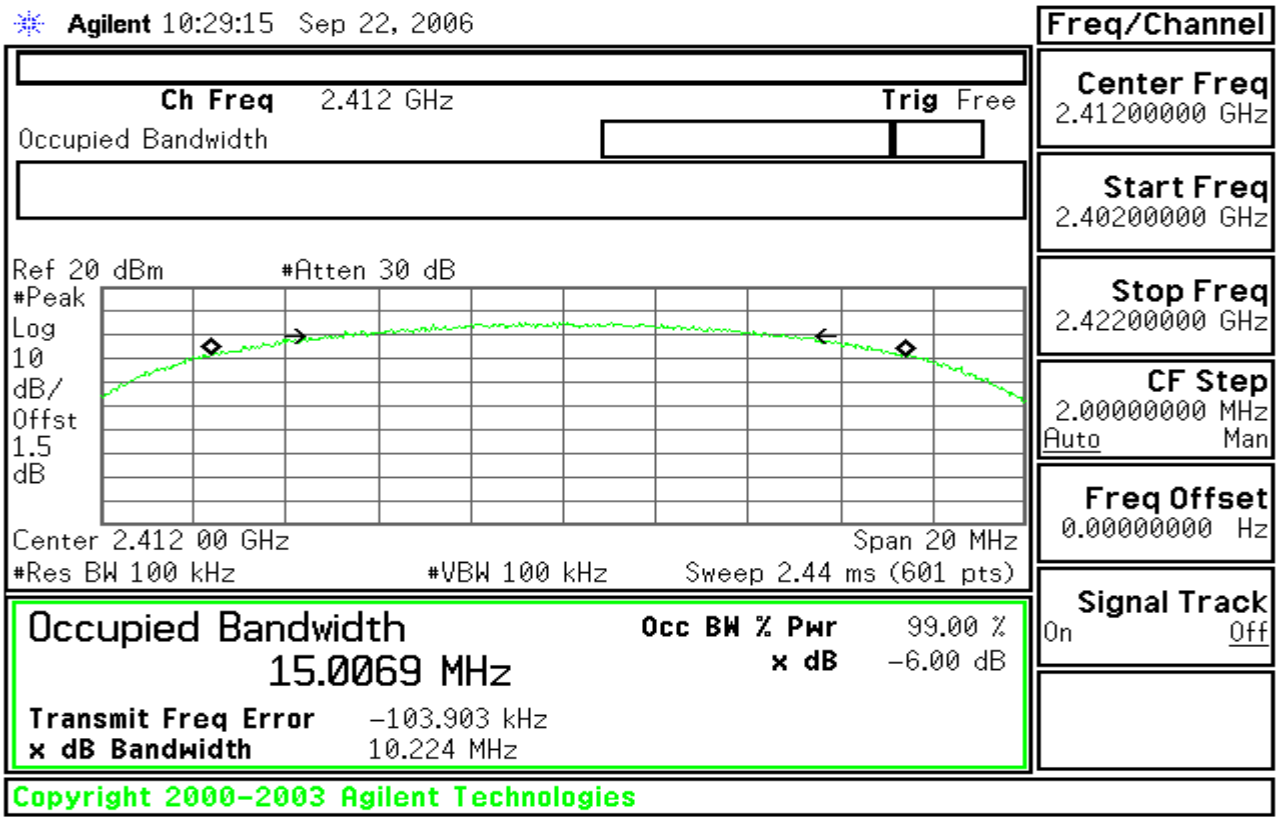
Test Data

Test mode: IEEE 802.11b

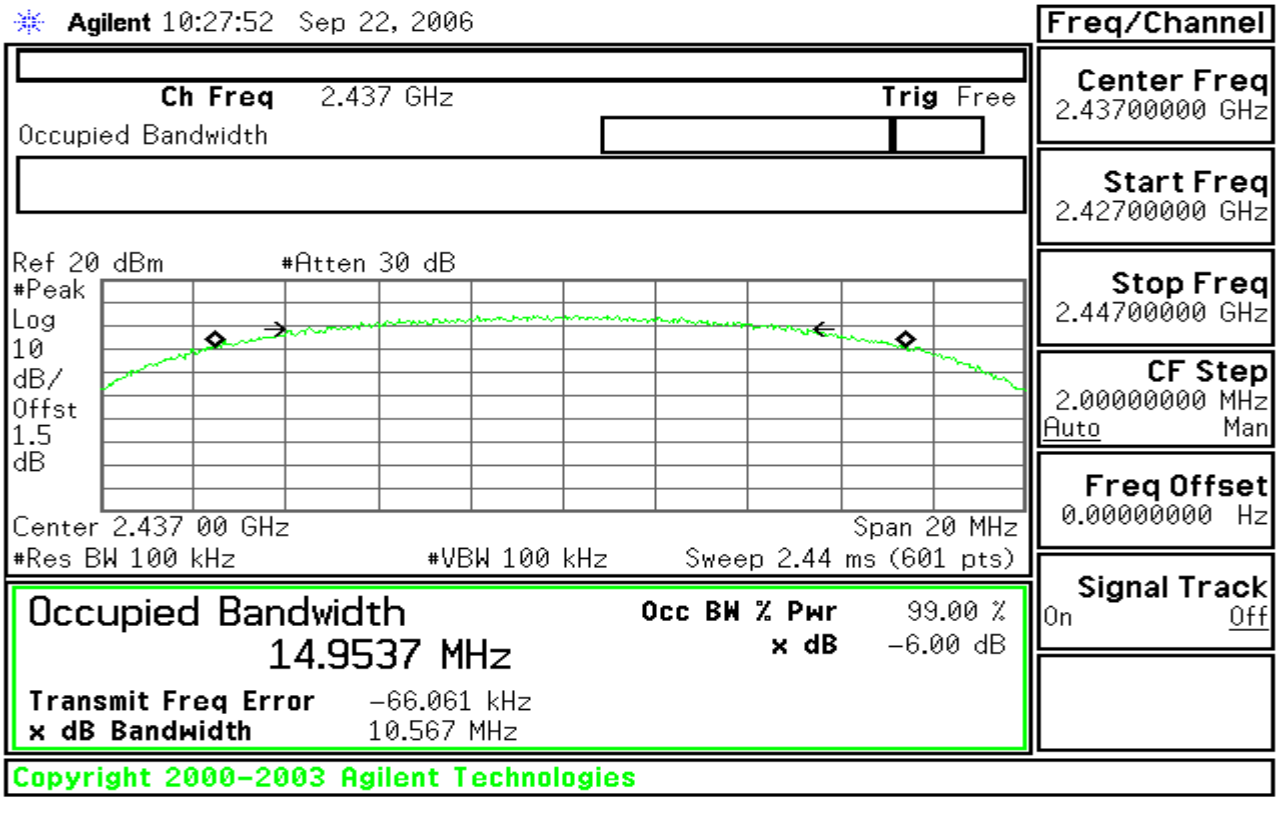
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	10224	>500	PASS
Mid	2437	10567		PASS
High	2462	10052		PASS

Test Plot (IEEE 802.11b mode)

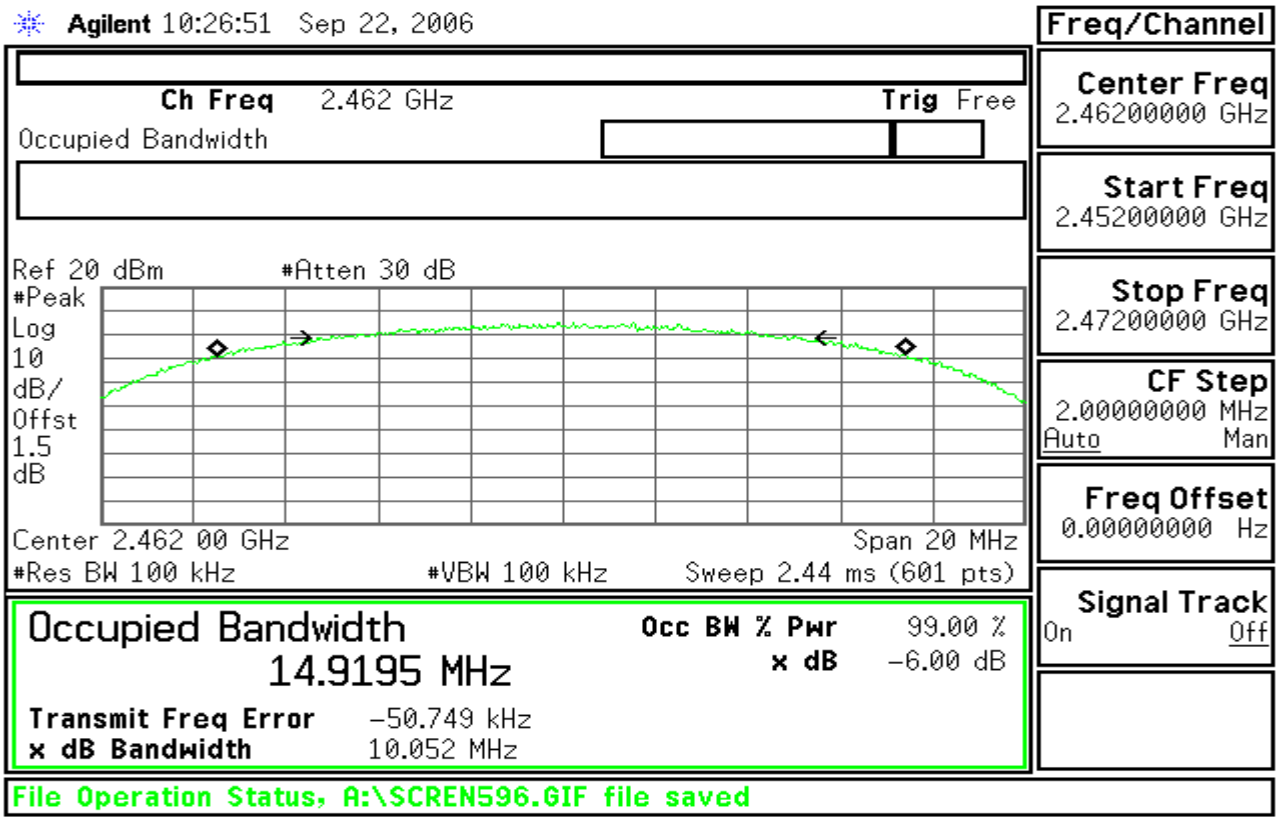
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



7.4. PEAK OUTPUT POWER

7.4.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

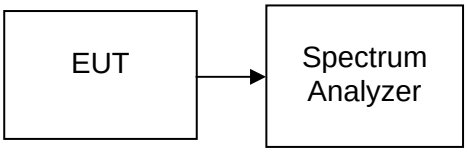
1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007

7.4.3. TEST PROCEDURES (please refer to measurement standard)

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.



7.4.4. TEST SETUP

7.4.5. TEST RESULTS

No non-compliance noted

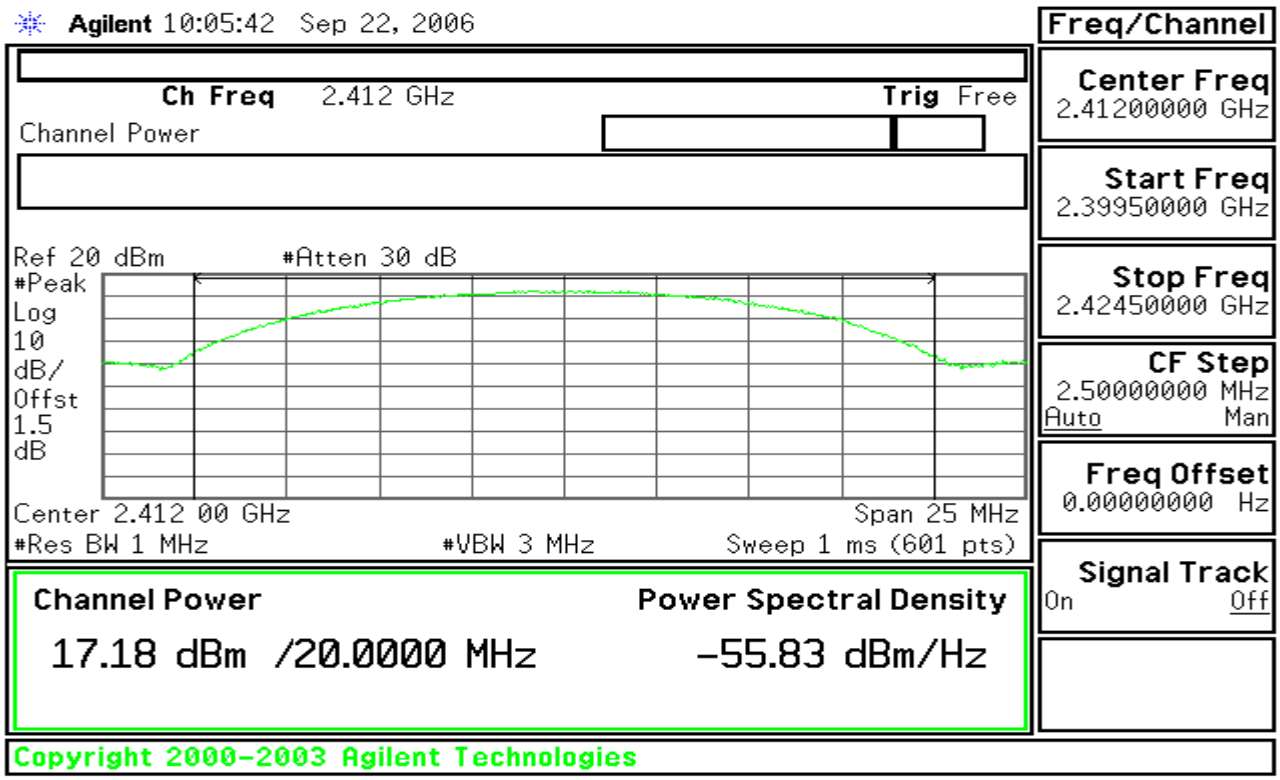
Test Data

Test mode: IEEE 802.11b

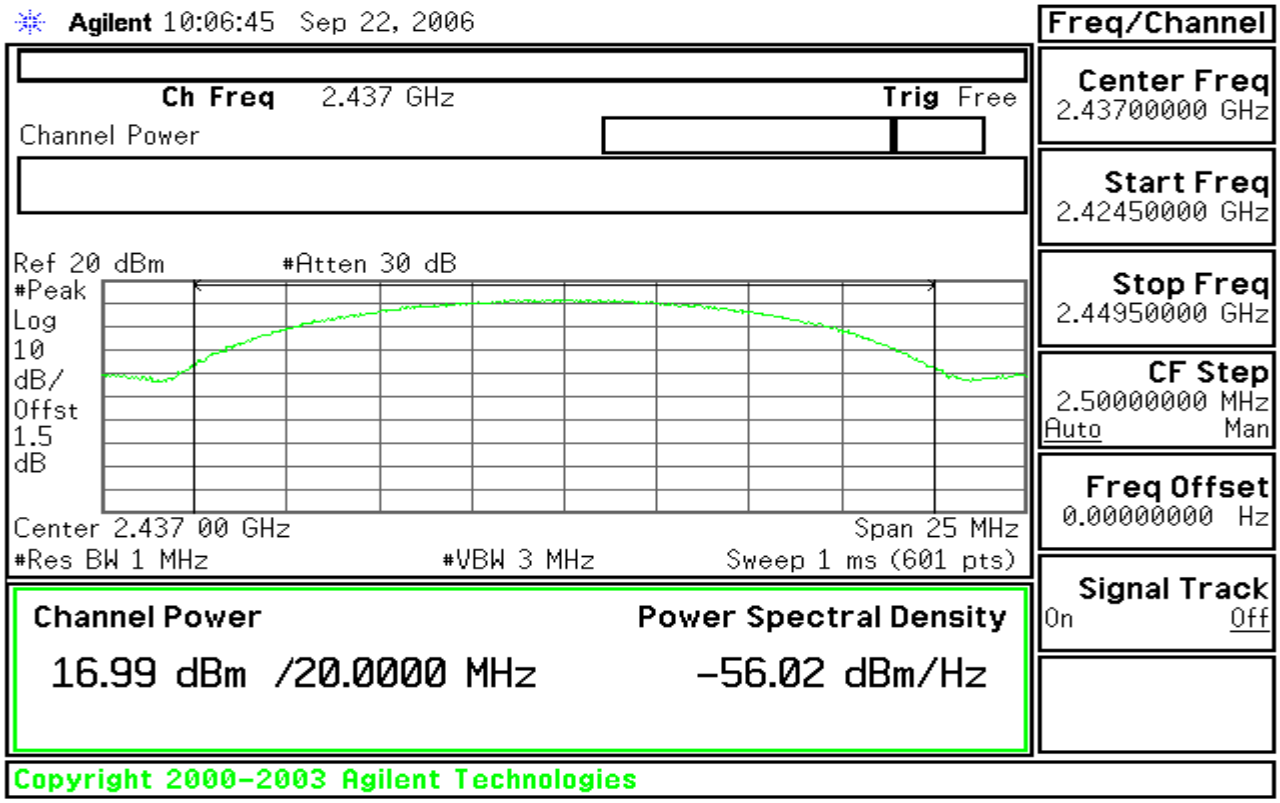
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.18	0.05224	1	PASS
Mid	2437	16.99	0.05000		PASS
High	2462	16.83	0.04819		PASS

Test Plot (IEEE 802.11b mode)

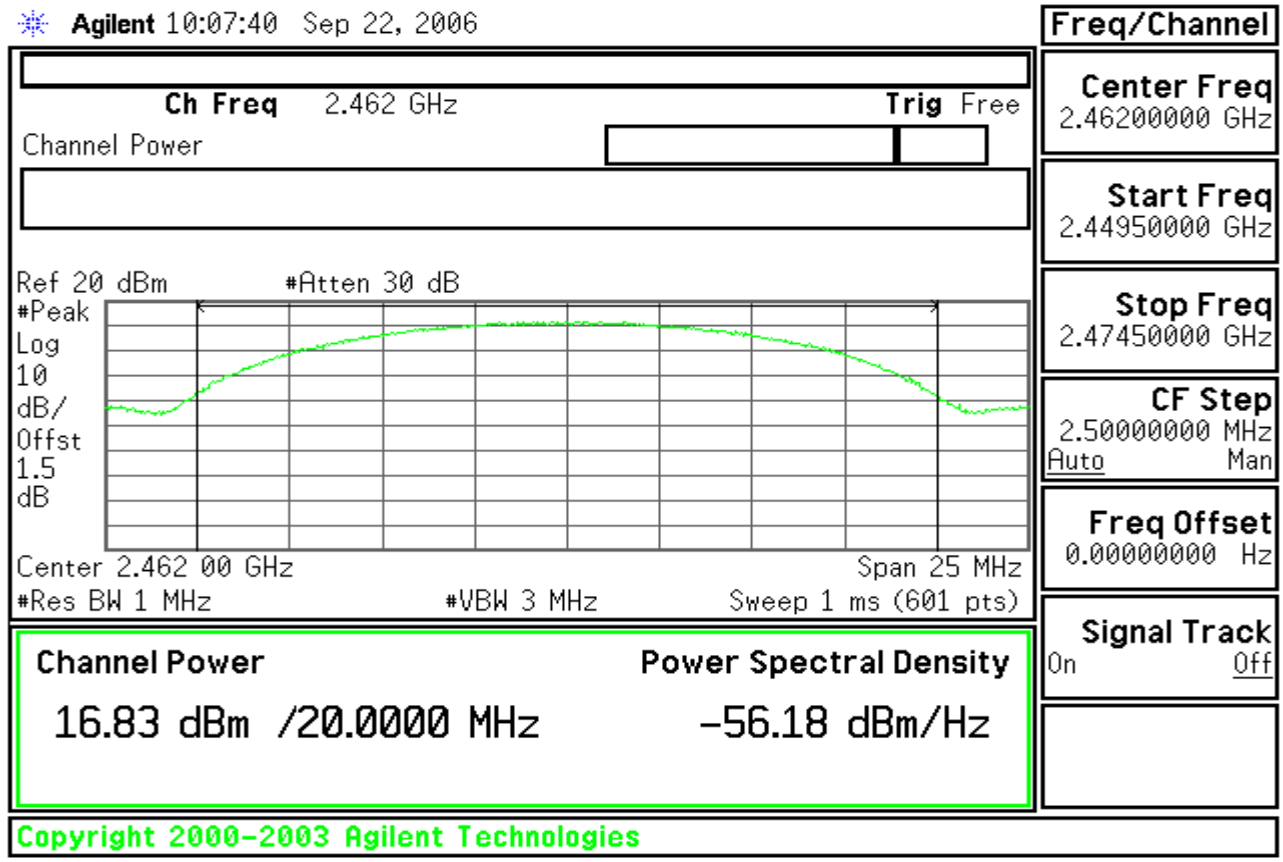
Peak Power (CH Low)



Peak Power (CH Mid)



Peak Power (CH High)



7.5. AVERAGE OUTPUT POWER

7.5.1. LIMITS

None; for reporting purposes only.

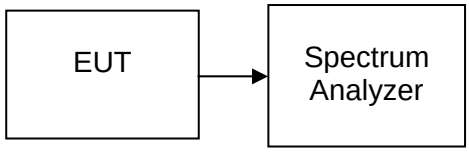
7.5.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007

7.5.3. TEST PROCEDURES (please refer to measurement standard)

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the average power detection.

7.5.4. TEST SETUP



7.5.5. TEST RESULTS

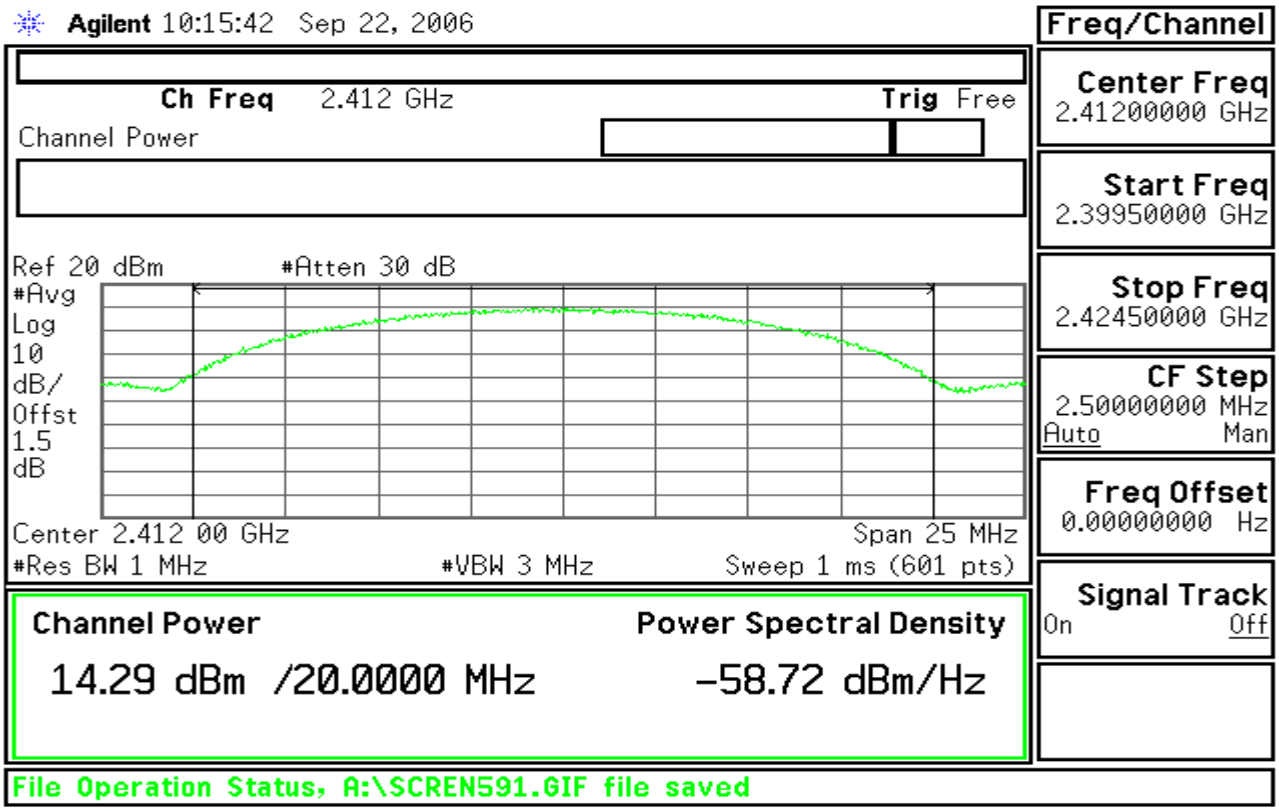
Test Data

Test mode: IEEE 802.11b

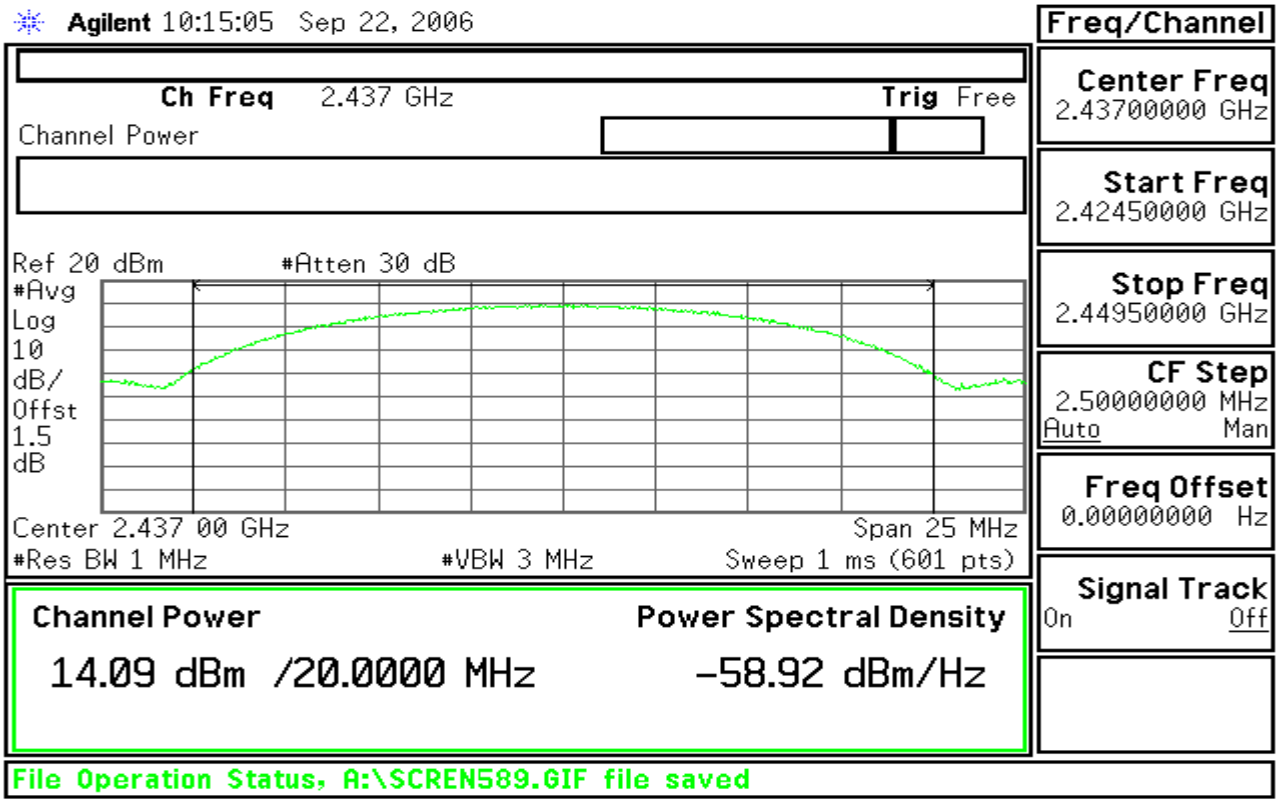
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	14.29	0.02685
Mid	2437	14.09	0.02564
High	2462	14.00	0.02512

Test Plot (IEEE 802.11b mode)

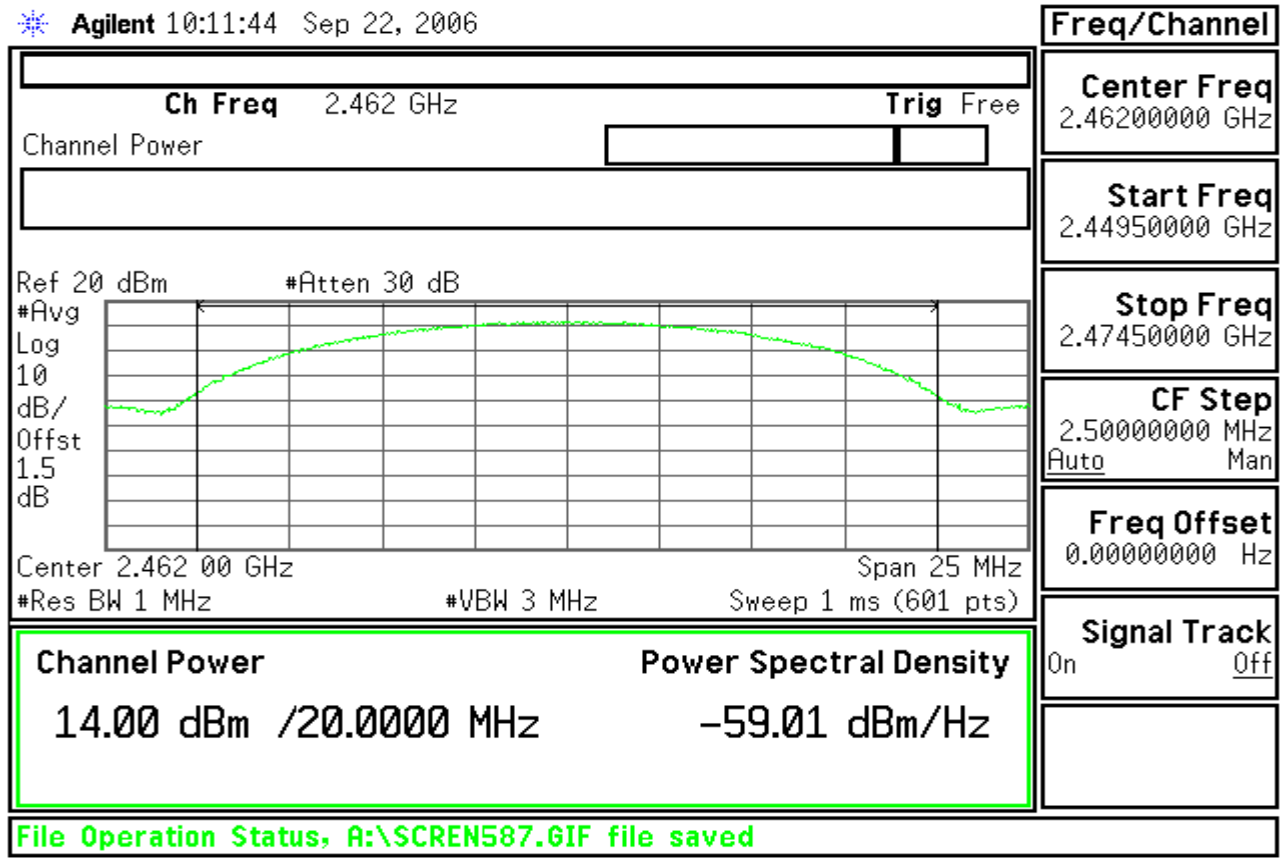
Average Power (CH Low)



Average Power (CH Mid)



Average Power (CH High)



7.6. BAND EDGES MEASUREMENT:

7.6.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

7.6.2. TEST INSTRUMENTS

7.6.2.1.

3M Semi Anechoic Chamber (977)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007
EMI Test Receiver	R&S	ESPI3	101026	11/11/2006
Pre-Amplfier	MINI	ZFL-1000VH2	d041703	12/13/2006
Pre-Amplfier	Miteq	NSP4000-NF	870731	01/28/2007
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2006
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	02/01/2007
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2006
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT1OO	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2007

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

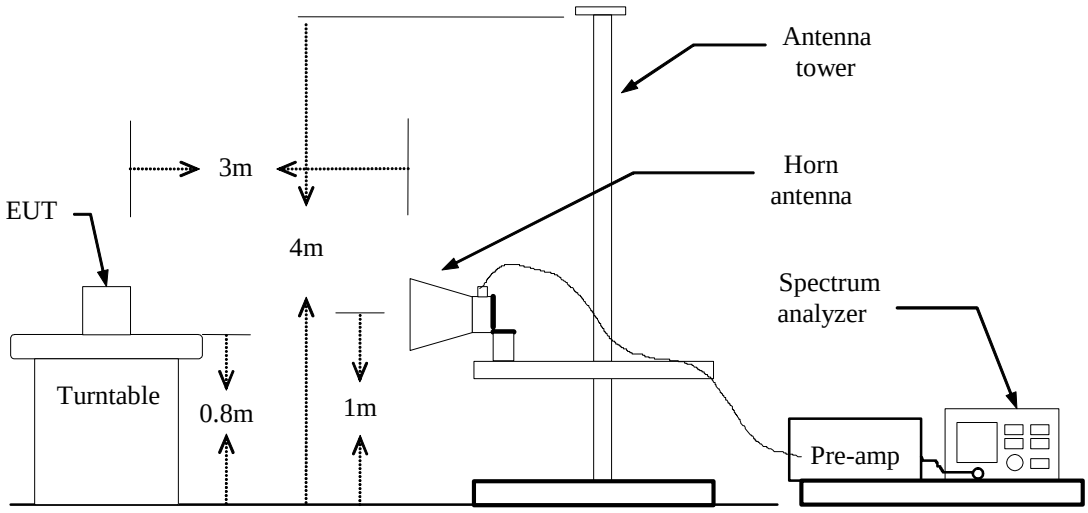
2. The FCC Site Registration number is 93105,90471.

3. N.C.R = No Calibration Required.

7.6.3. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are

7.6.4. TEST SETUP

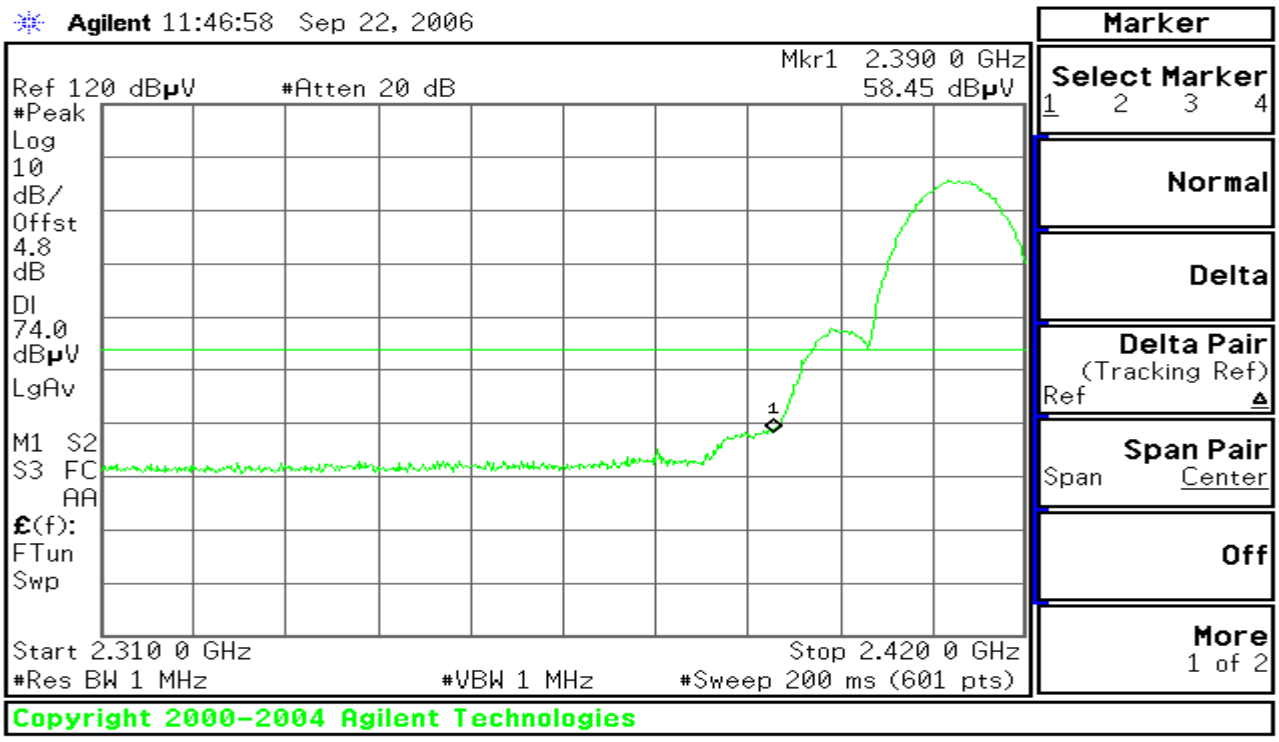


7.6.5. TEST RESULTS

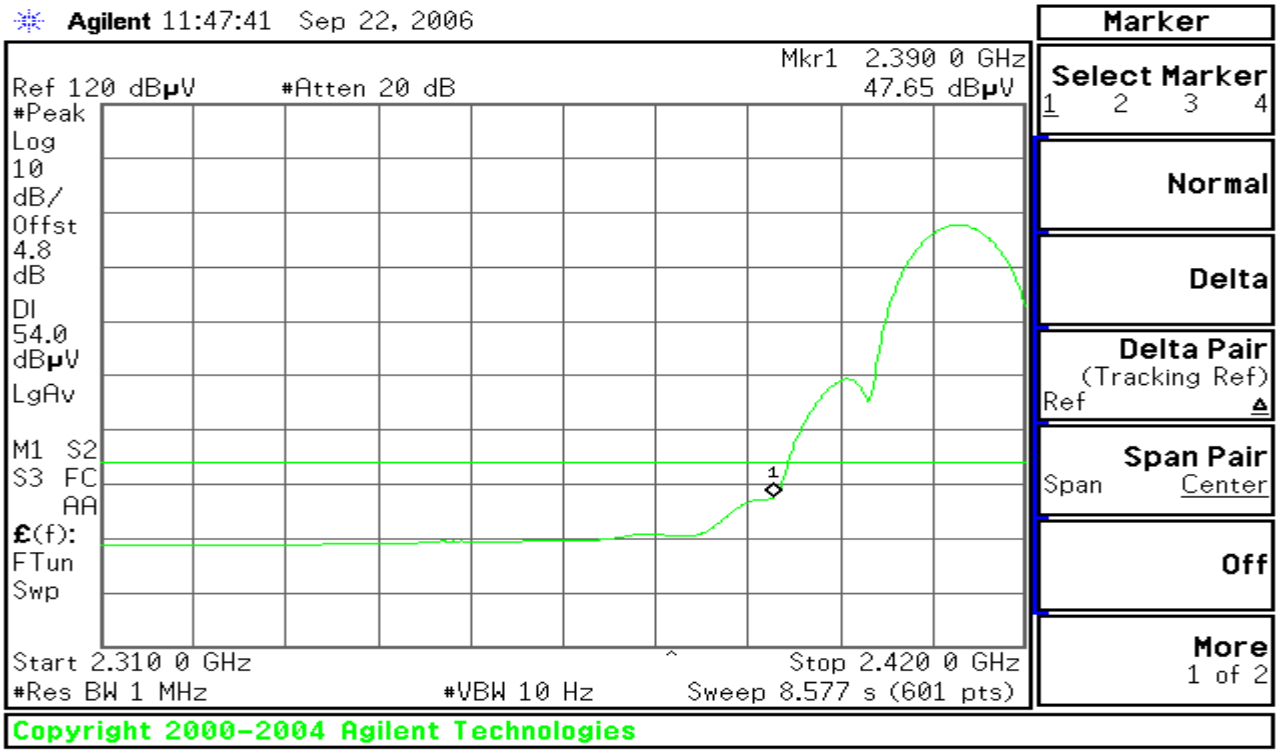
Test Plot (IEEE 802.11b mode)

Band Edges (CH Low)

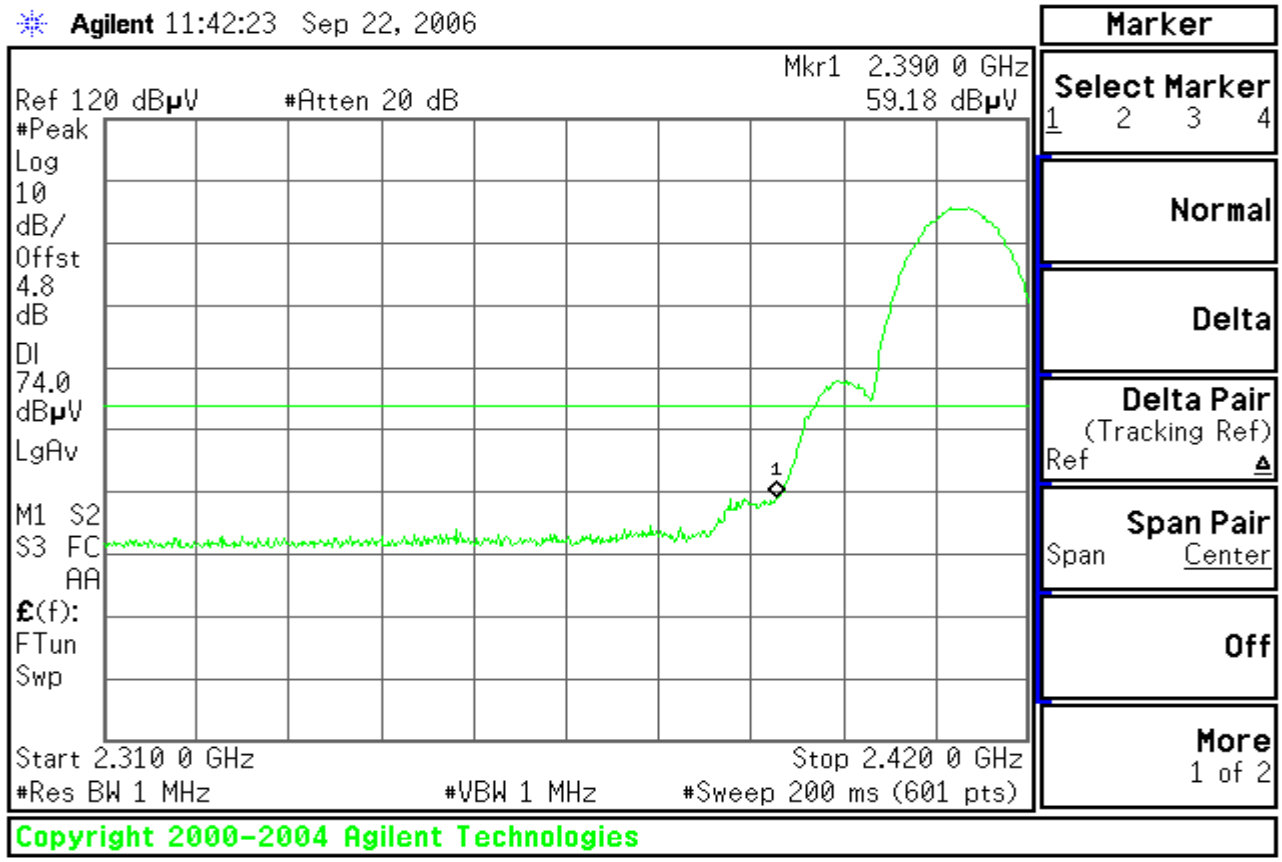
Detector mode: Peak **Polarity: Vertical**



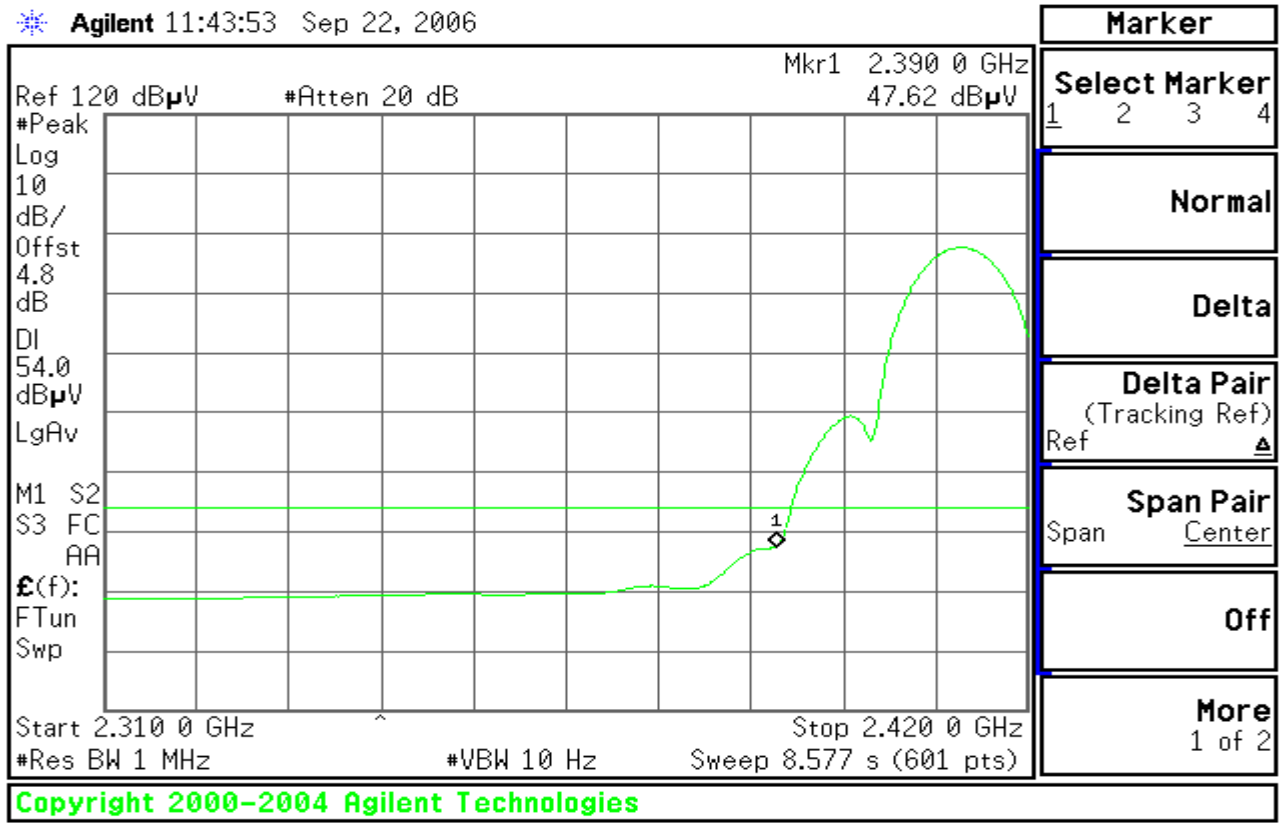
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

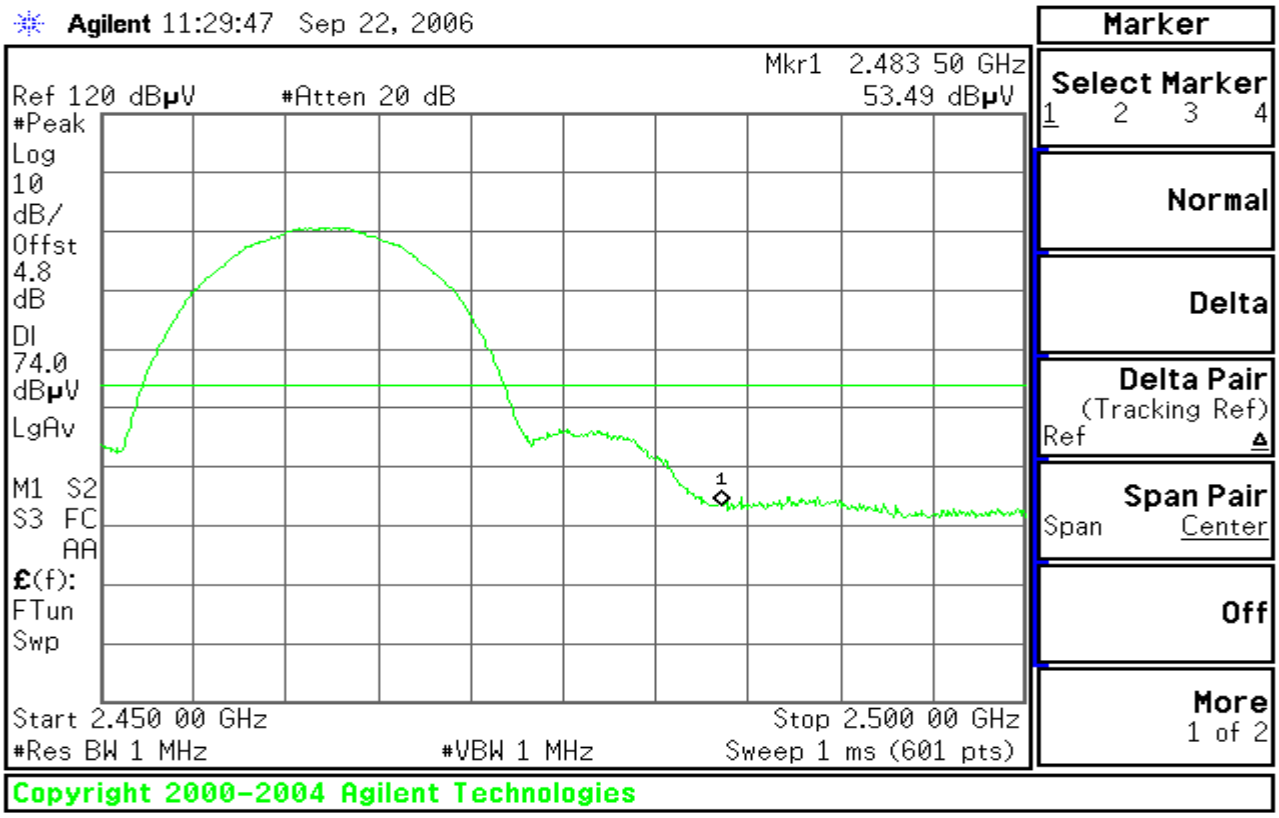


Detector mode: Average **Polarity: Horizontal**

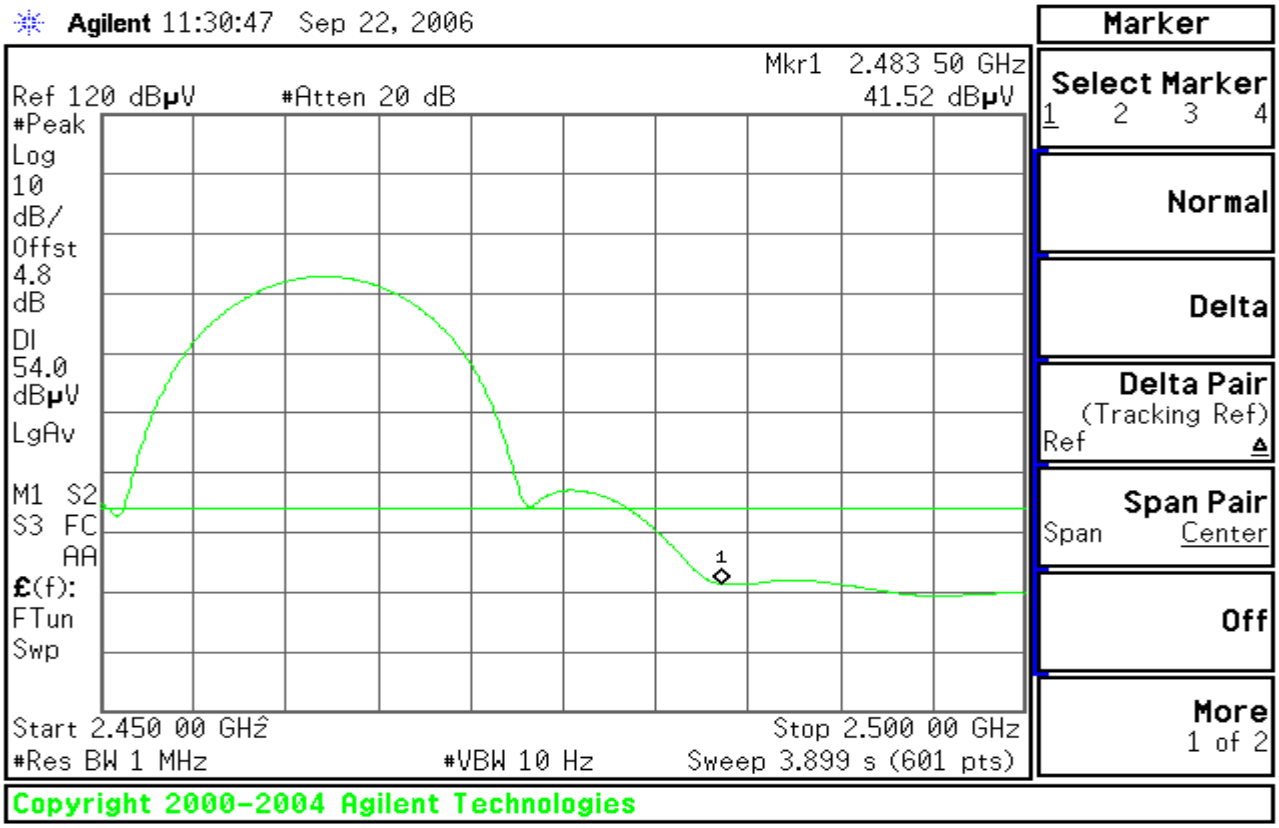


Band Edges (CH High)

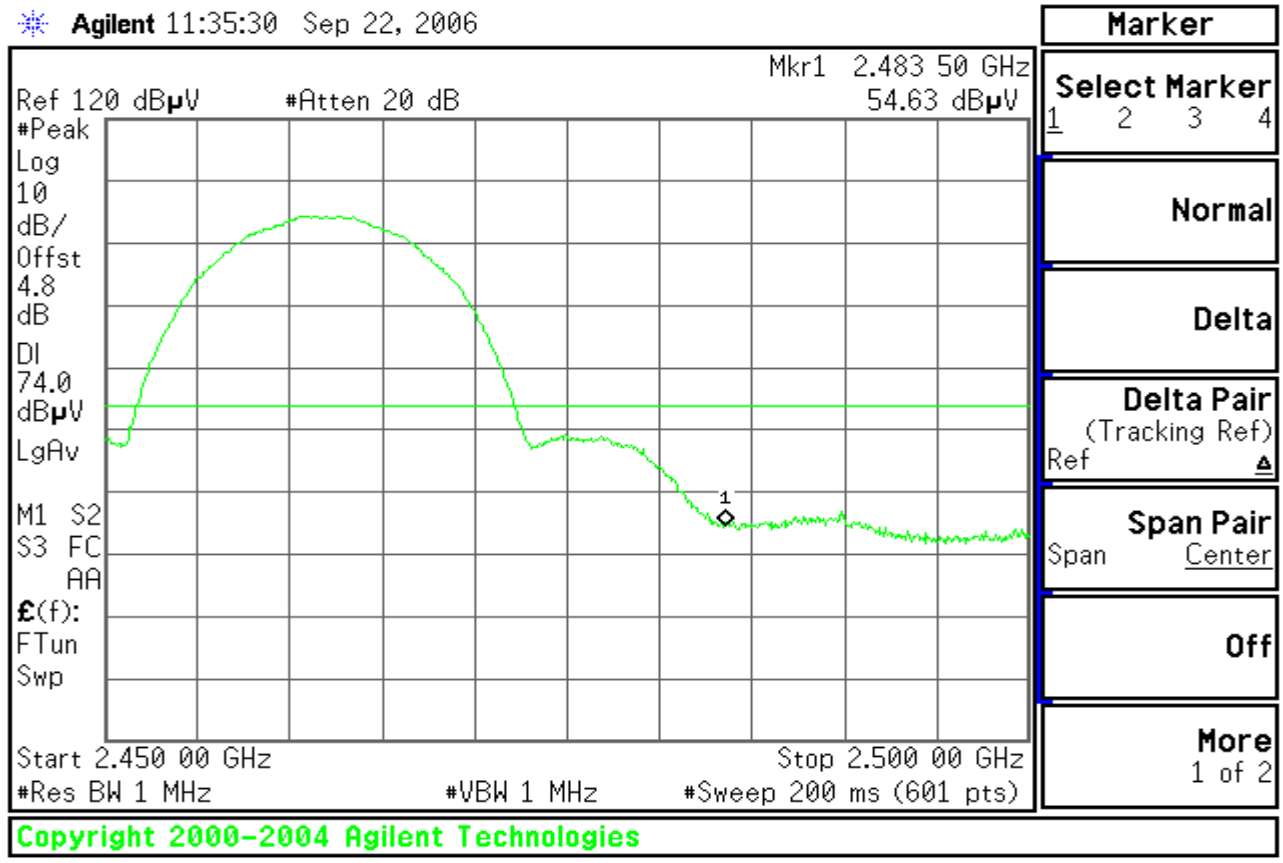
Detector mode: Peak **Polarity: Vertical**



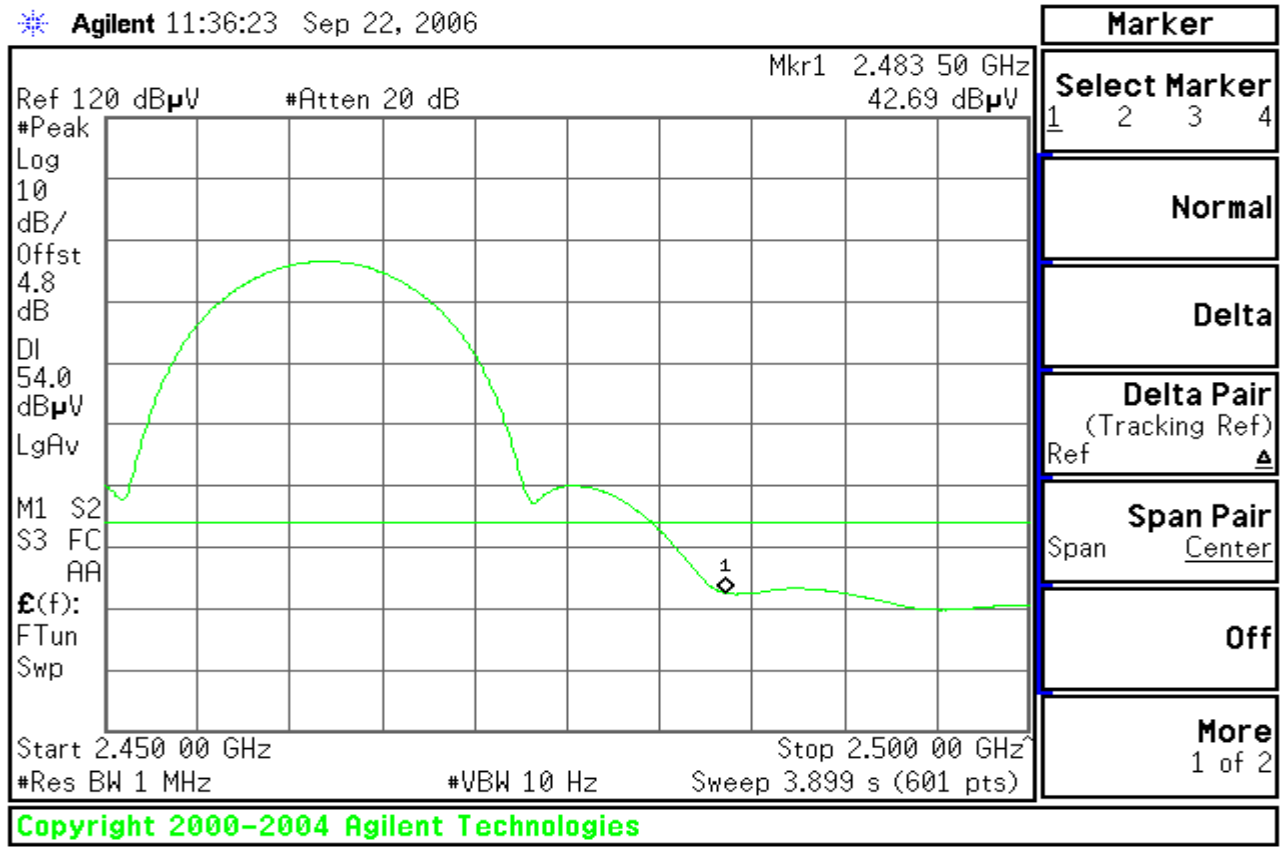
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



7.7. PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.7.1. LIMITS

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

7.7.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2007
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2007

7.7.3. TEST PROCEDURES (please refer to measurement standard)

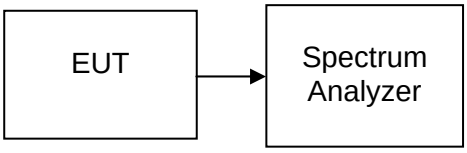
1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s

3. Record the max. reading.

4. Repeat the above procedure until the measurements for all frequencies are completed.

7.7.4. TEST SETUP



7.7.5. TEST RESULTS

No non-compliance noted

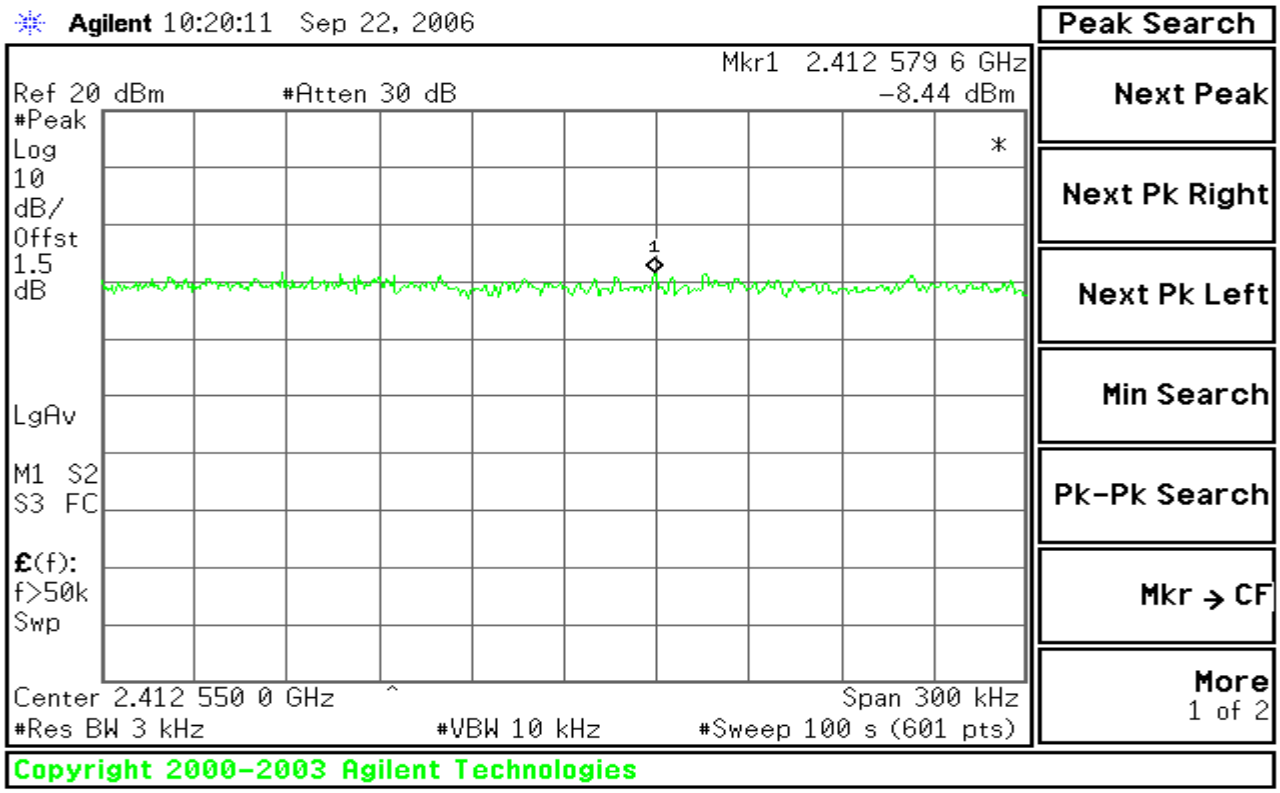
Test Data

Test mode: IEEE 802.11b

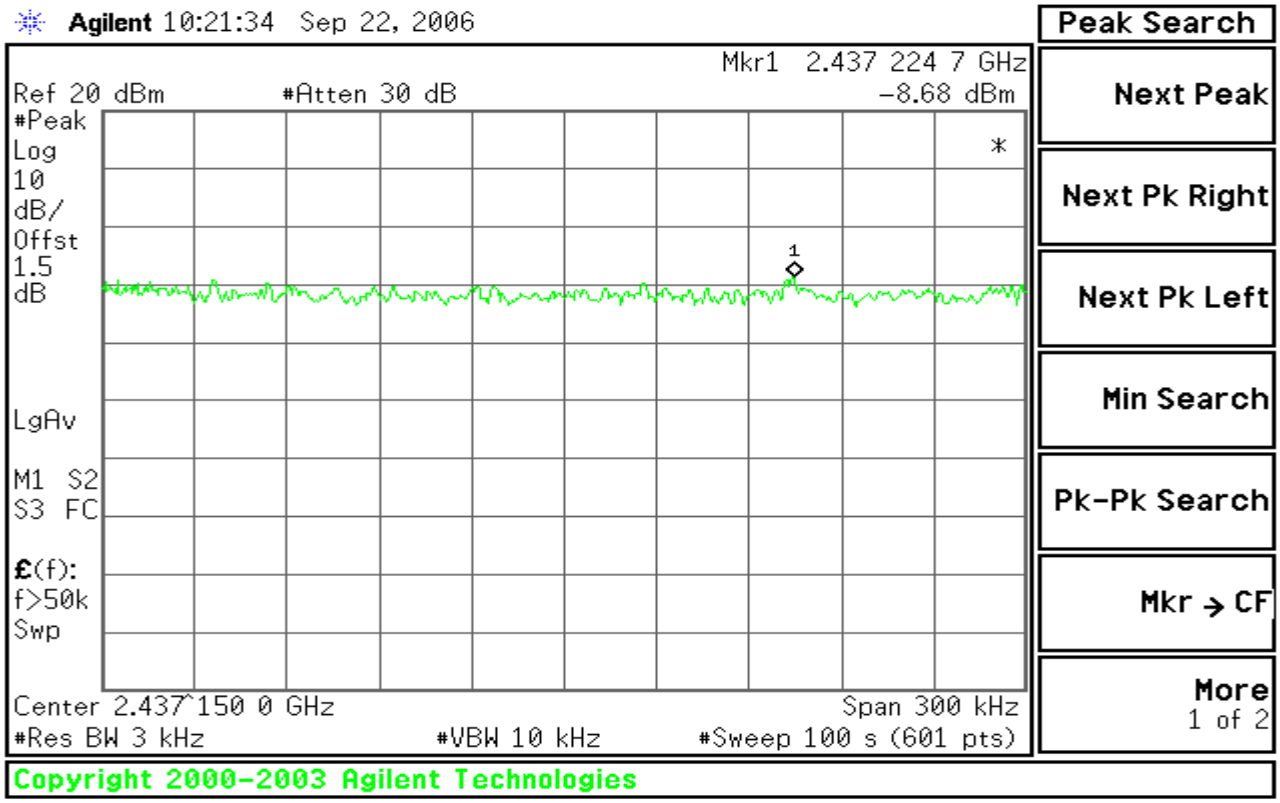
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-8.44	8.00	PASS
Mid	2437	-8.68		PASS
High	2462	-9.63		PASS

Test Plot (IEEE 802.11b mode)

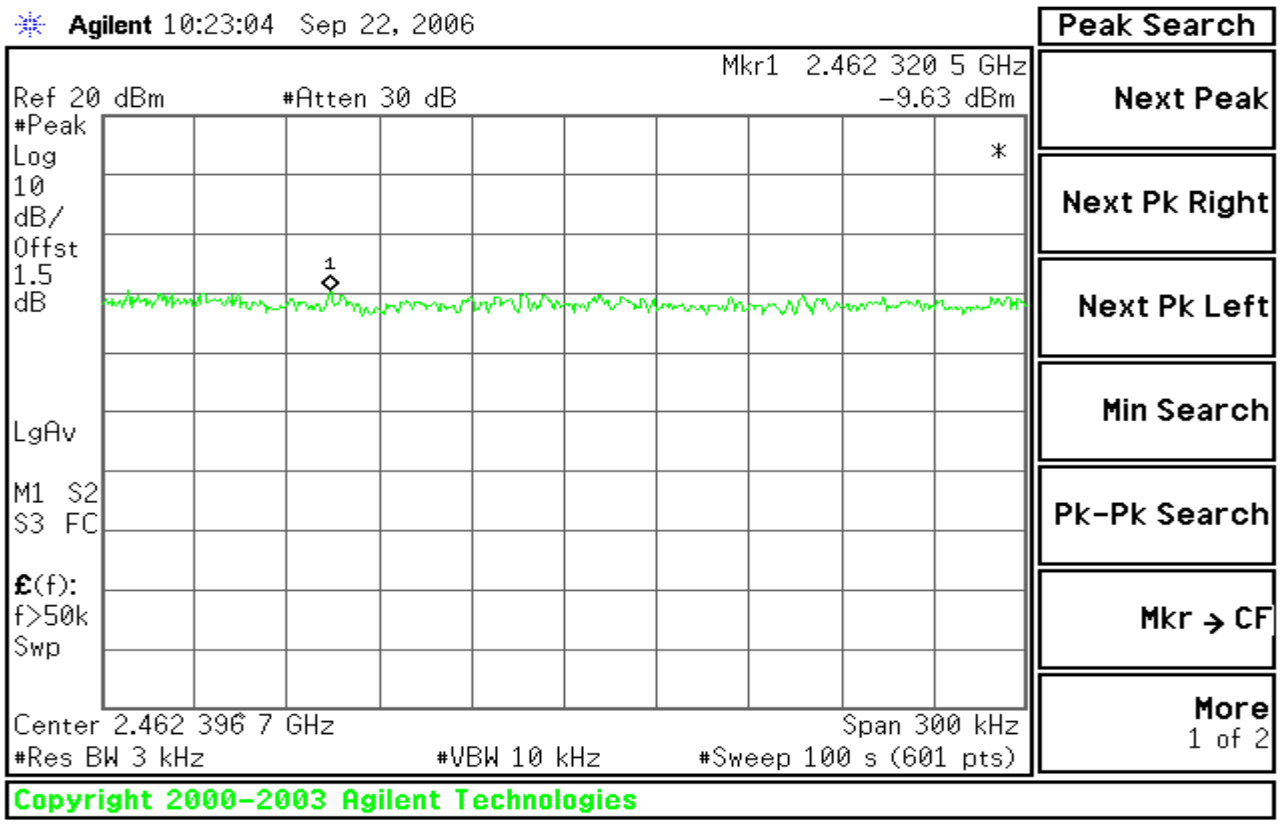
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



APPENDIX I RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

EUT Specification

EUT	Smart phone
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☐ Bluetooth: 2.402GHz ~ 2.480 GHz
Device category	☒ Portable (<20cm separation) ☐ Mobile (>20cm separation)
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Max. output power	IEEE 802.11b: 17.18 dBm (52.24mW)
Antenna gain (Max)	0.71 dBi (Numeric gain: 1.18)
Evaluation applied	☐ MPE Evaluation* ☒ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 17.18dBm (52.24mW) at 2412MHz (with 1.18 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

EUT output power =52.24mW
Numeric Antenna gain = 1.18
Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

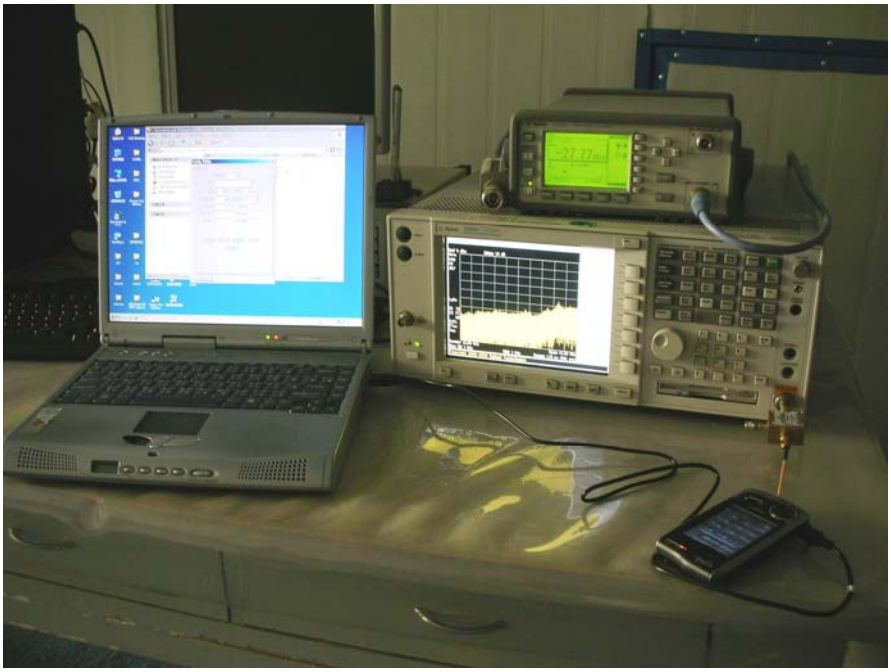
Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

→ Power density =0.0123mW / cm^2

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)

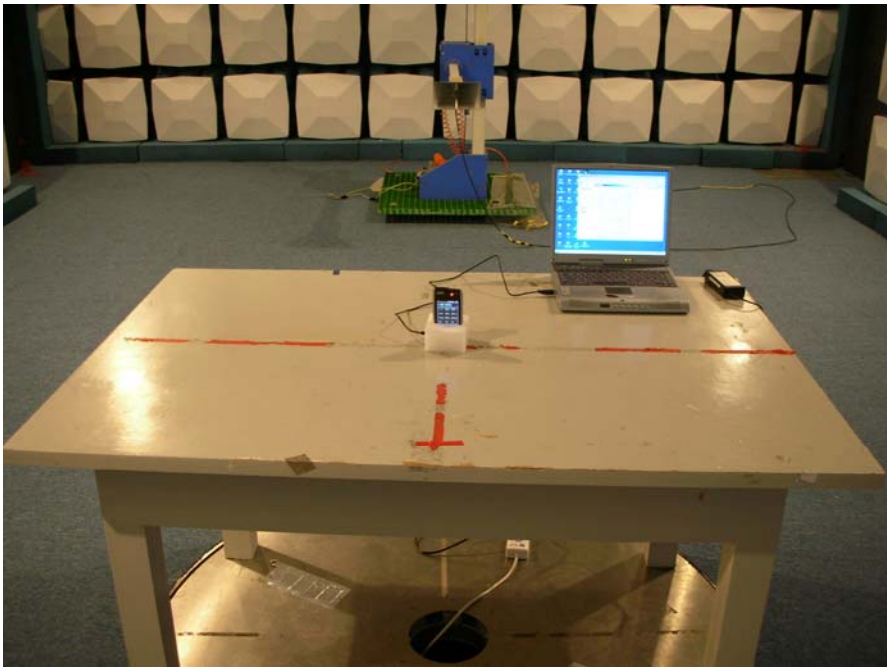
APPENDIX II PHOTOGRAPHS OF THE TEST CONFIGURATION

Conducted Emissions Setup Photo

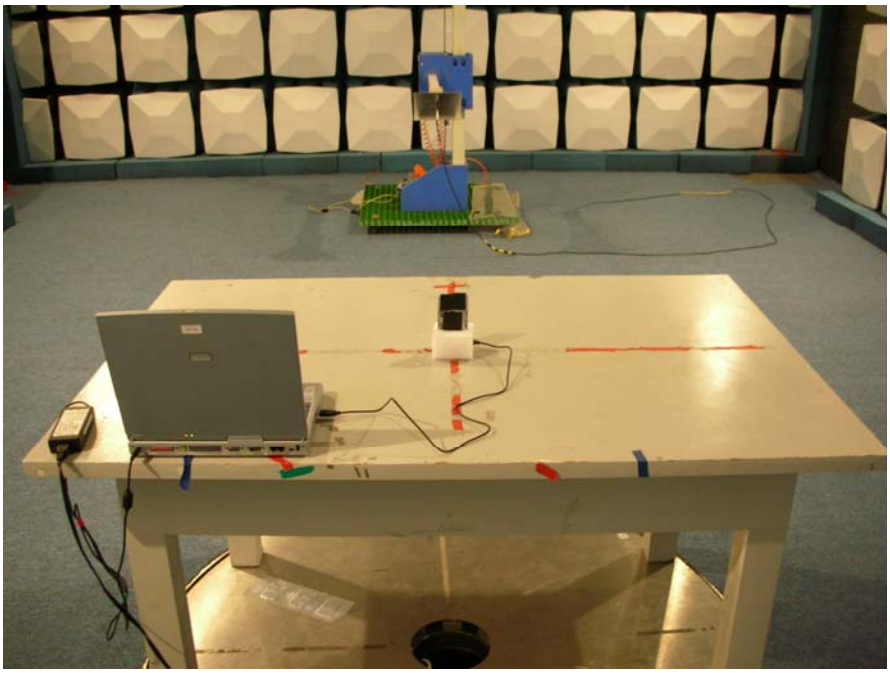


Radiated Emissions Setup Photos

Front of view

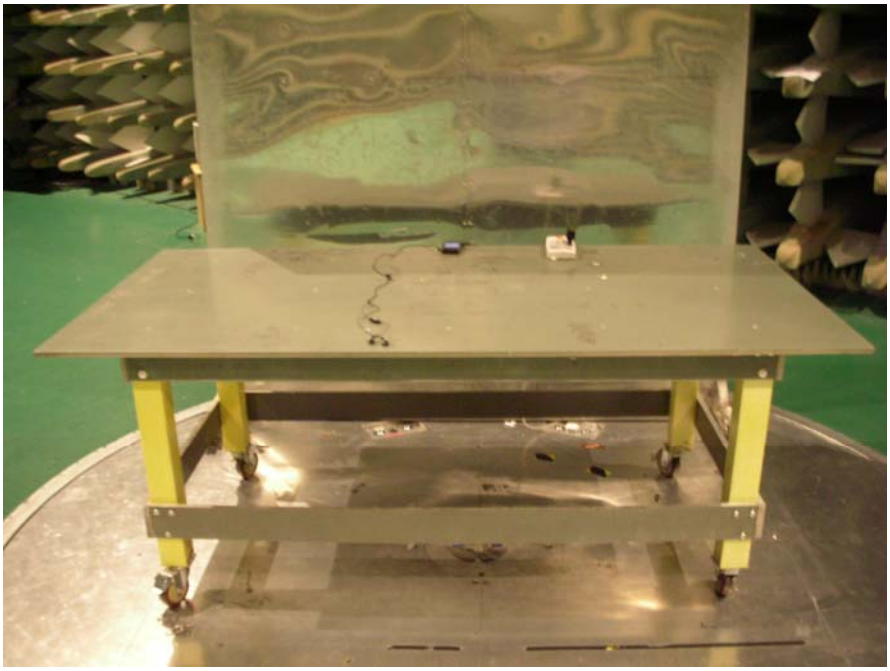


Back of view



Power Line Conducted Emissions Setup Photos

Front of view



Right of view