



FCC TEST REPORT

for

HSDPA/WCDMA/EDGE/GPRS/GSM 850/900/1800/1900/2100MHz

Mobile Phone

MODEL: i-mobile i858

Test Report Number:

KS100409B01-RP

Issued for

YuHua TelTech (Shanghai) Co.,Ltd.

4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai, P.R. China

Issued by:

Compliance Certification Services Inc.

Kun shan Laboratory

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

TEL: 86-512-57355888

FAX: 86-512-57370818

Issued Date: April 16, 2010



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 16, 2010	Initial Issue	ALL	Miro chueh



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1 TEST CERTIFICATION

Product: HSDPA/WCDMA/EDGE/GPRS/GSM 850/900/1800/1900/2100MHz
Mobile Phone

Model: i-mobile i858

Brand: i-mobile

Tested: April 16, 2010

Applicant: YuHua TelTech (Shanghai) Co.,Ltd.
4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai,
P.R. China

Manufacturer: YuHua TelTech (Shanghai) Co.,Ltd.
4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai,
P.R. China

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:

Miro Chueh
EMC Manager
Compliance Certification Service Inc.

Reviewed by:

Lin Zhang
EMC Section Manager
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	HSDPA/WCDMA/EDGE/GPRS/GSM850/900/1800/1900/2100MHz Mobile Phone
Trade Name	i-mobile
Model Number	i-mobile i858
Model Discrepancy	N/A
Wireless LAN module Model Number	SWB-M12
Wireless LAN module Brand name	SAMSUNG
DC Power Cable Type	Unshielded, 1.8m (Non-Detachable) at Power Adapter with a core
Frequency Range	2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b:16.29dBm IEEE 802.11g:12.95dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	IEEE 802.11b: 11, 5.5, 2, 1 Mbps IEEE 802.11g: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps
Number of Channels	IEEE 802.11b , IEEE 802.11g :11 Channels
Antenna Specification	1 dBi 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: S2VTN100 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 had been tested under operating condition.

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

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 low(2412MHz), Channel middle(2437MHz) and Channel high(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.

IEEE802.11g: Channel low(2412MHz), Channel middle(2437MHz) and Channel high(2462MHz) with preliminary test 54/48/36/24/18/12/9/6, After the preliminary scan , the following test mode 6Mbps 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	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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, China.

The sites are constructed in conformance with the requirements of ANSI C63.4:2003 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,A2LA
Japan	VCCI
Canada	INDUSTRY CANADA,
Taiwan	TAF
China	CNAS

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.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		+/- 3.43dB
Radiated emissions	H	30MHz ~ 200MHz	+/- 4.72dB
		200MHz ~1000MHz	+/- 4.72dB
	V	30MHz ~ 200MHz	+/- 4.83dB
		200MHz ~1000MHz	+/- 4.70dB

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 μ H/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 (dB μ V)	
	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				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC Analyzer	R&S	ESCI3	100781	04/24/2010
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	04/24/2010
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	04/24/2010
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	04/24/2010

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

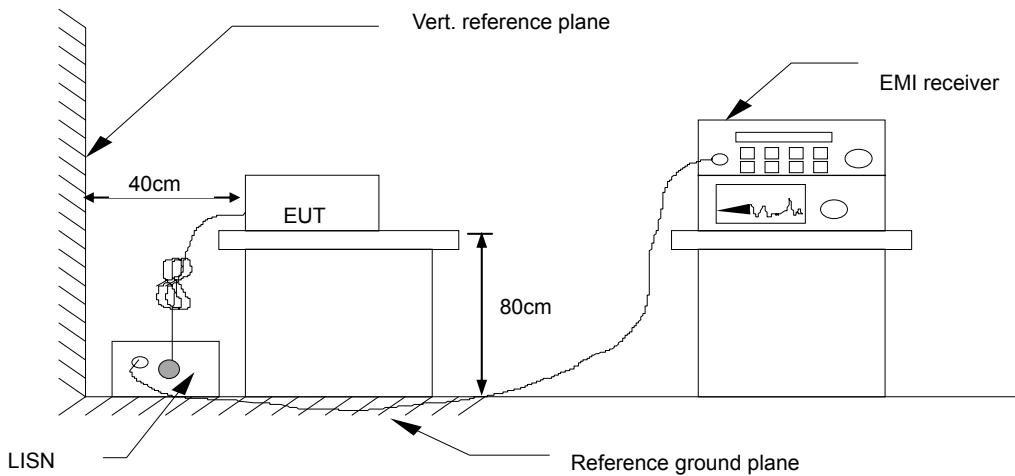
2. N.C.R = No Calibration Request.



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
XXX	37.58	35.11	10.10	47.68	45.21	63.49	53.49	-15.81	-8.28	L1

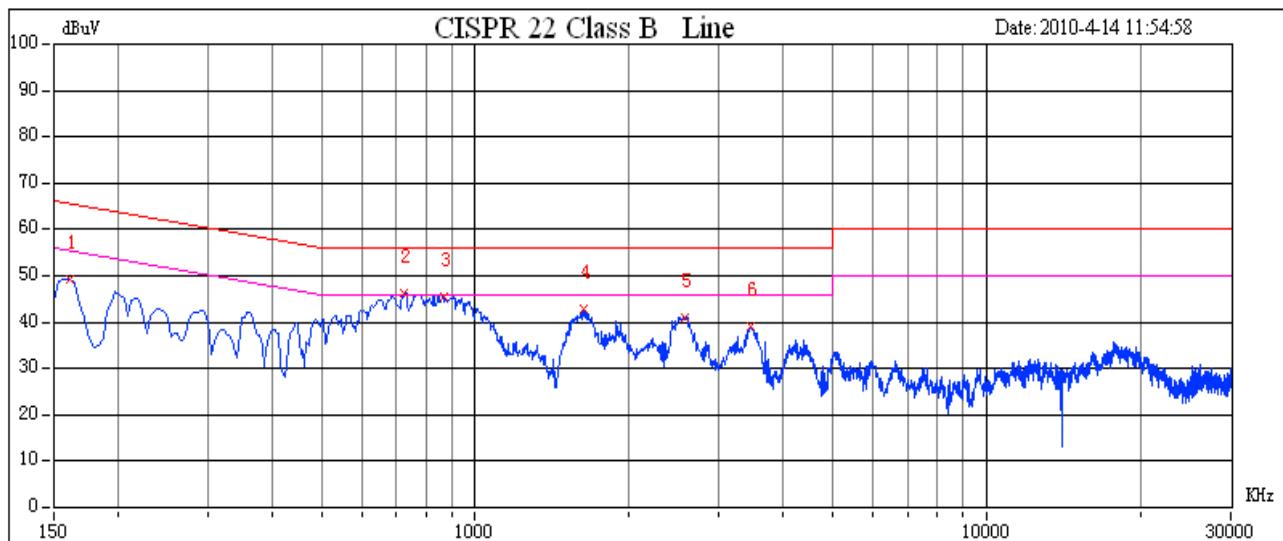
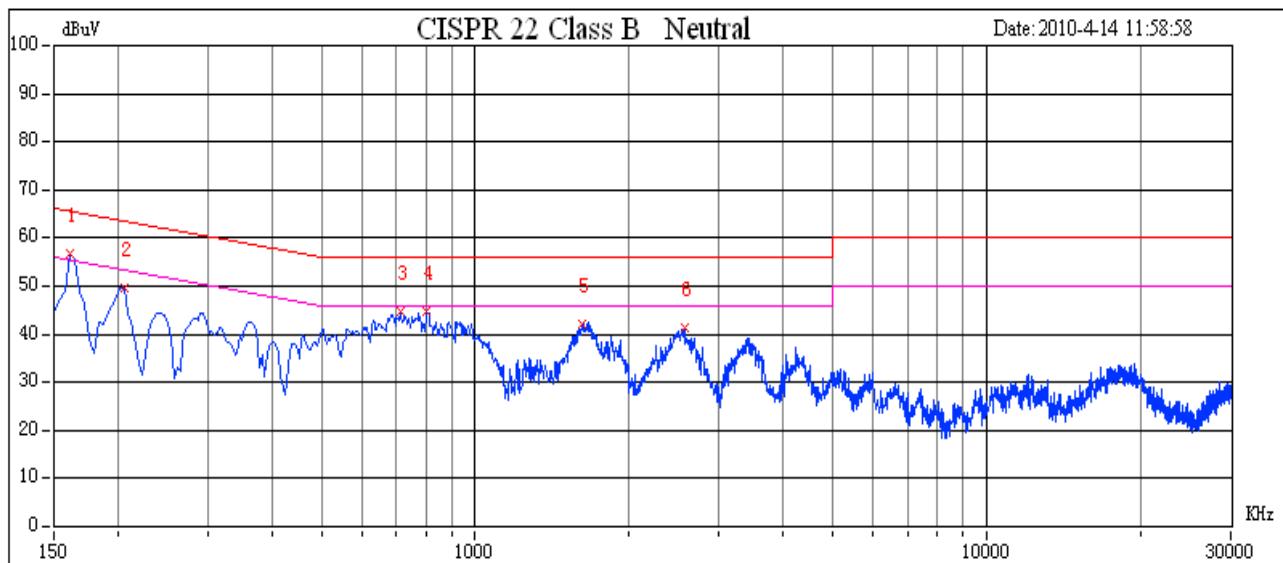
Frequency (MHz) = Emission frequency in MHz
Reading (dBuV) = Uncorrected Analyzer/Receiver reading
Correction factor (dB) = Insertion loss of LISN
Limit (dBuV) = Limit stated in standard
Margin (dB) = Reading (dBuV) – Limit (dBuV)
Note = Current carrying line of reading

**7.1.5. TEST RESULTS**

Model No.	i-mobile 3G 8500			Test Mode	Normal Link		
Environmental Conditions	23deg.C,50% RH, 991 hPa			6dB BANDWIDTH	9 kHz		
Tested by:	Jeff						

Freq. (MHz)	PEAK. Raw (dBuV)	Q.P. Raw (dBuV)	AVG Raw (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Margin (dB)	Factor (dB)	Remark
0.161	49.27	46.84	34.81	65.68	55.68	-20.87	10.06	L1
0.723	46.37	40.71	31.53	56.00	46.00	-14.47	10.95	L1
0.871	45.67	39.56	29.52	56.00	46.00	-16.48	11.00	L1
1.626	42.81	35.47	25.93	56.00	46.00	-20.07	11.06	L1
2.576	40.97	33.22	24.29	56.00	46.00	-21.71	11.12	L1
3.456	39.04	31.55	22.26	56.00	46.00	-23.74	11.16	L1
<hr/>								
0.161	56.75	41.53	31.71	65.68	55.68	-23.97	10.16	L2
0.205	49.51	37.38	20.97	64.41	54.41	-33.44	10.18	L2
0.712	44.65	36.53	25.89	56.00	46.00	-20.11	10.15	L2
0.804	44.87	33.94	23.52	56.00	46.00	-9.56	10.15	L2
1.622	42.05	33.37	22.81	56.00	46.00	-23.19	10.43	L2
2.560	41.20	31.87	21.10	56.00	46.00	-24.90	10.68	L2

REMARKS: L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

Test Plots***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 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, 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	04/24/2010

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.

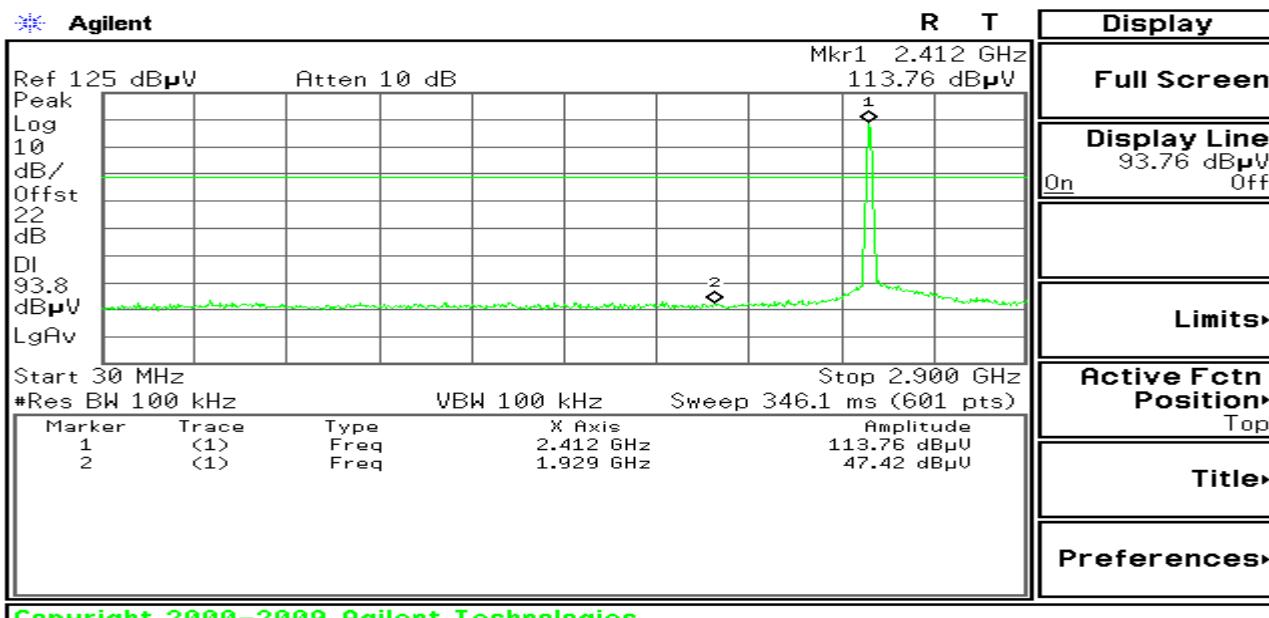
Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

7.2.4. TEST RESULTS

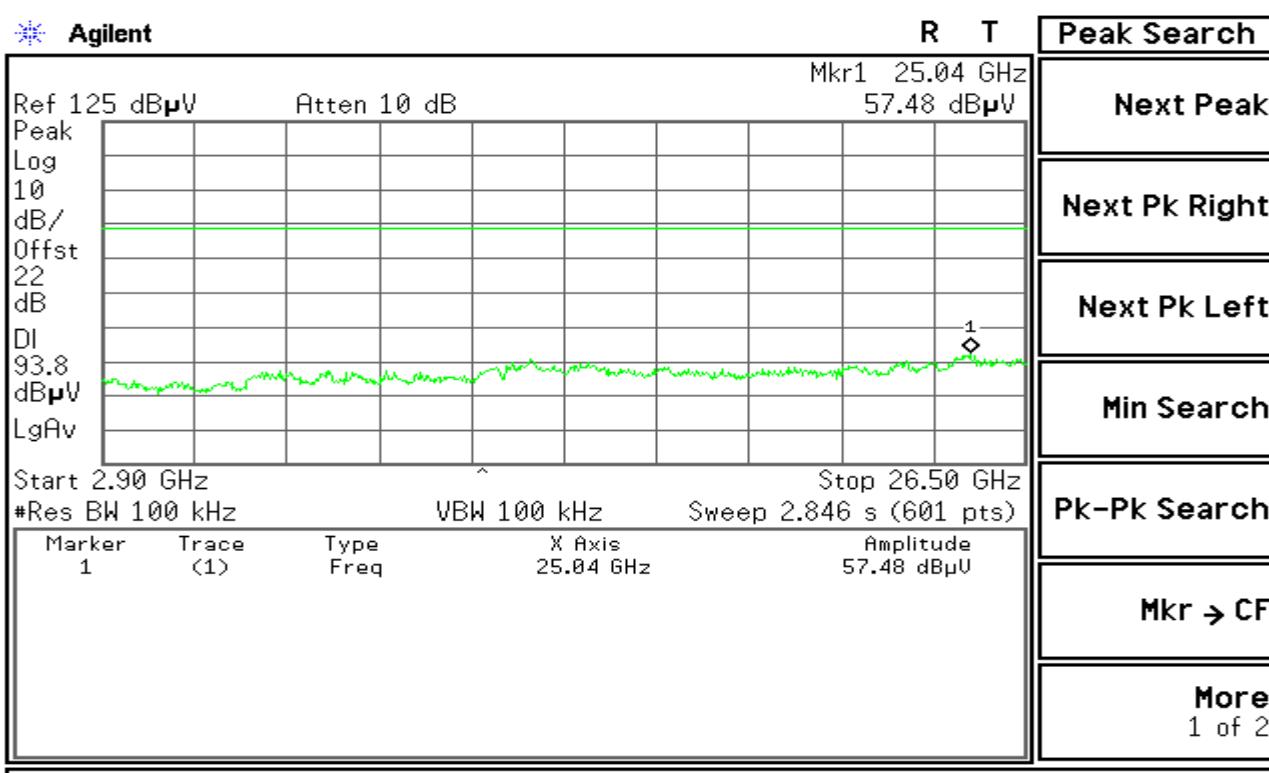
Test Plot (IEEE 802.11b mode)

CH Low

30MHz ~ 2.9GHz



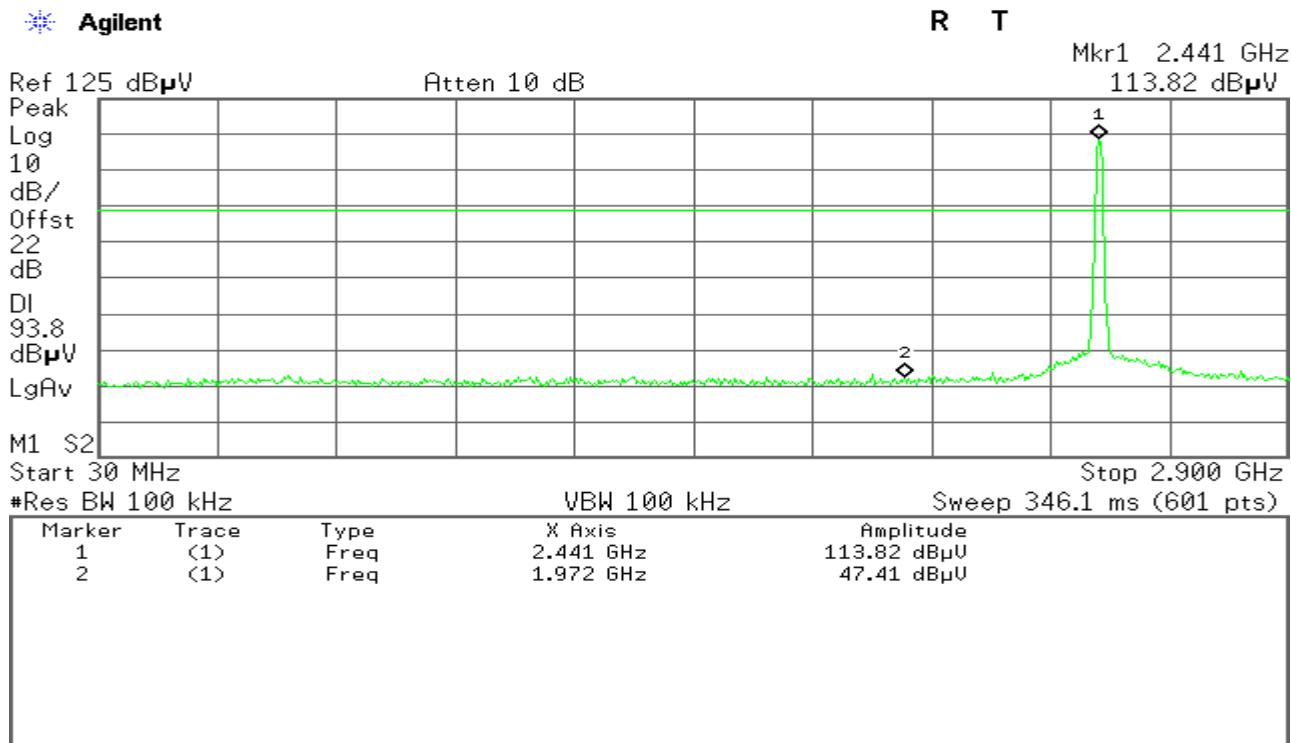
2.9GHz ~ 26.5GHz



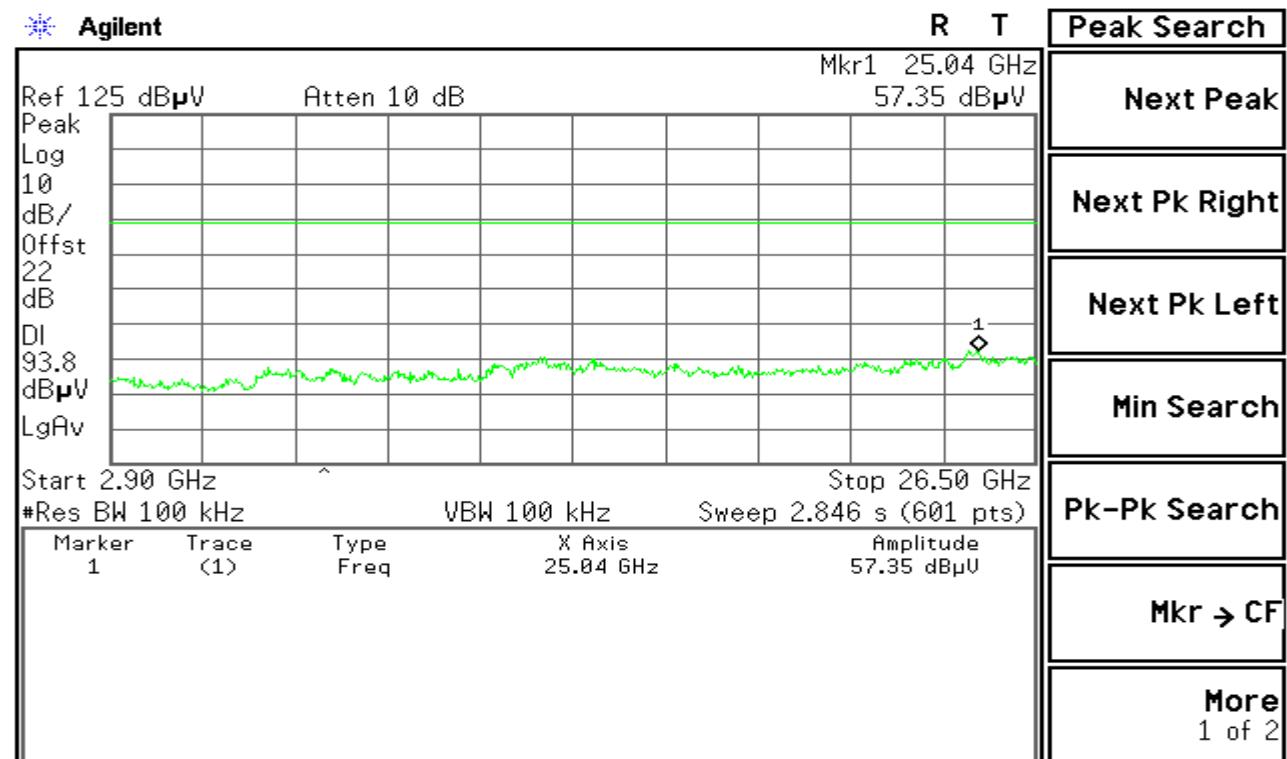


CH Mid

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz

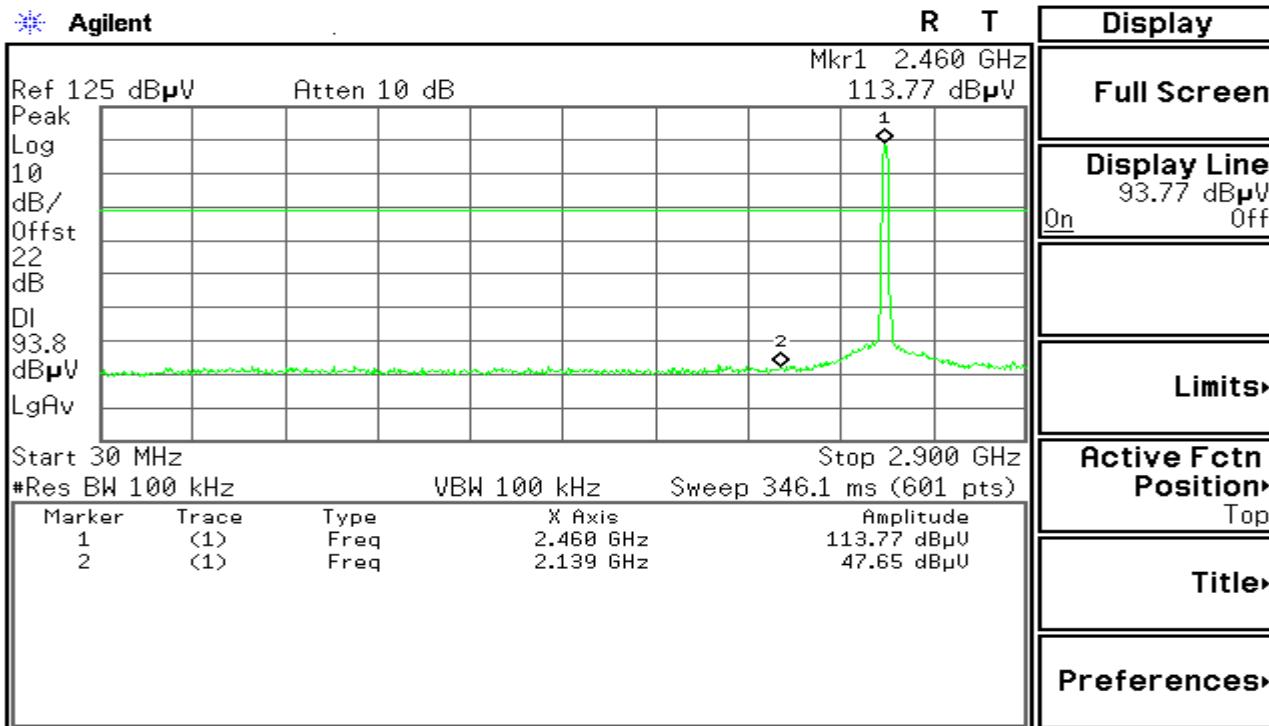


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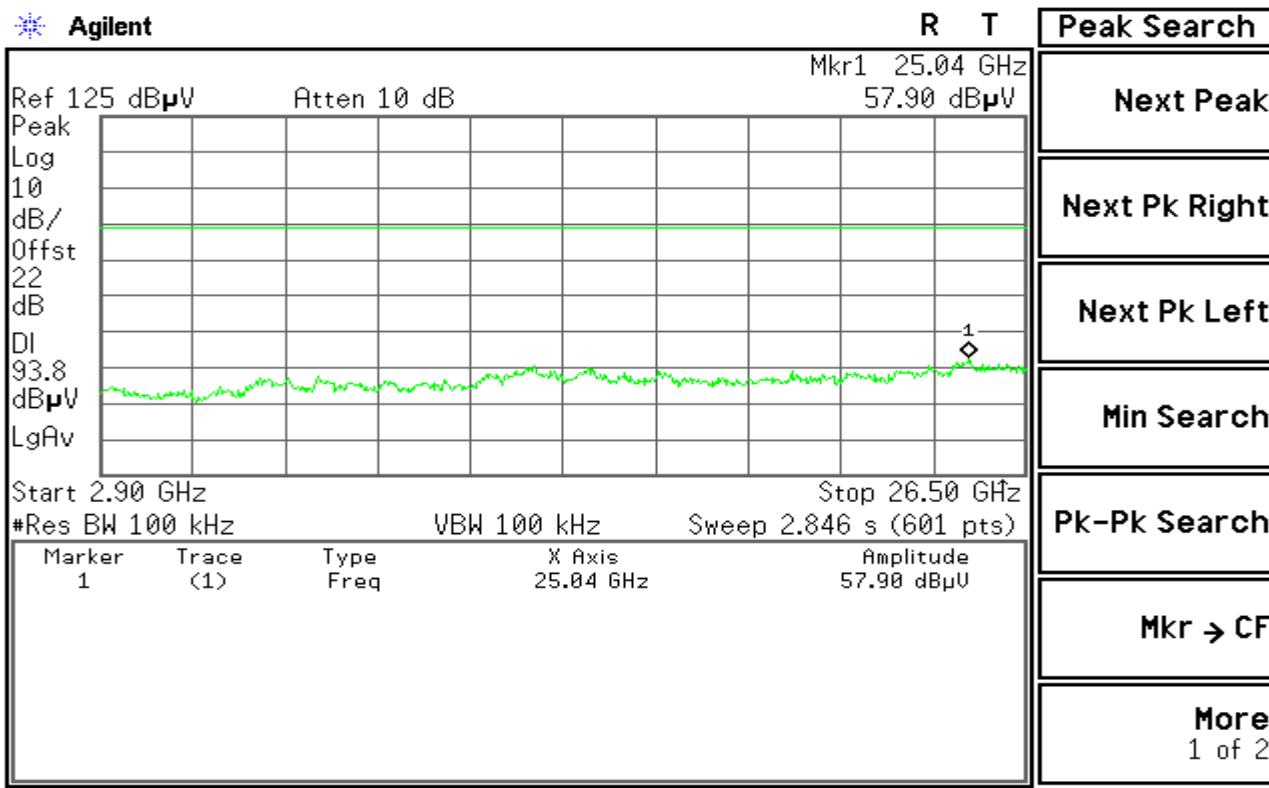
CH High

30MHz ~ 2.9GHz



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2.9GHz ~ 26.5GHz



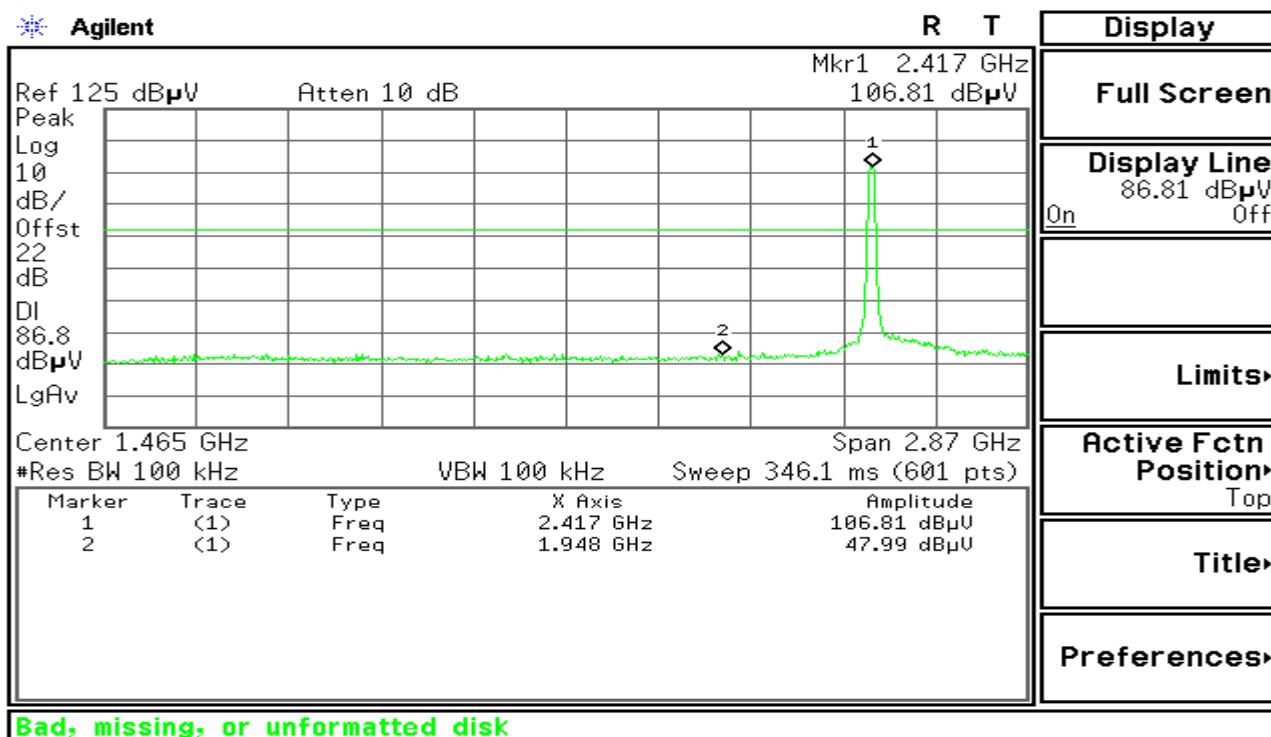
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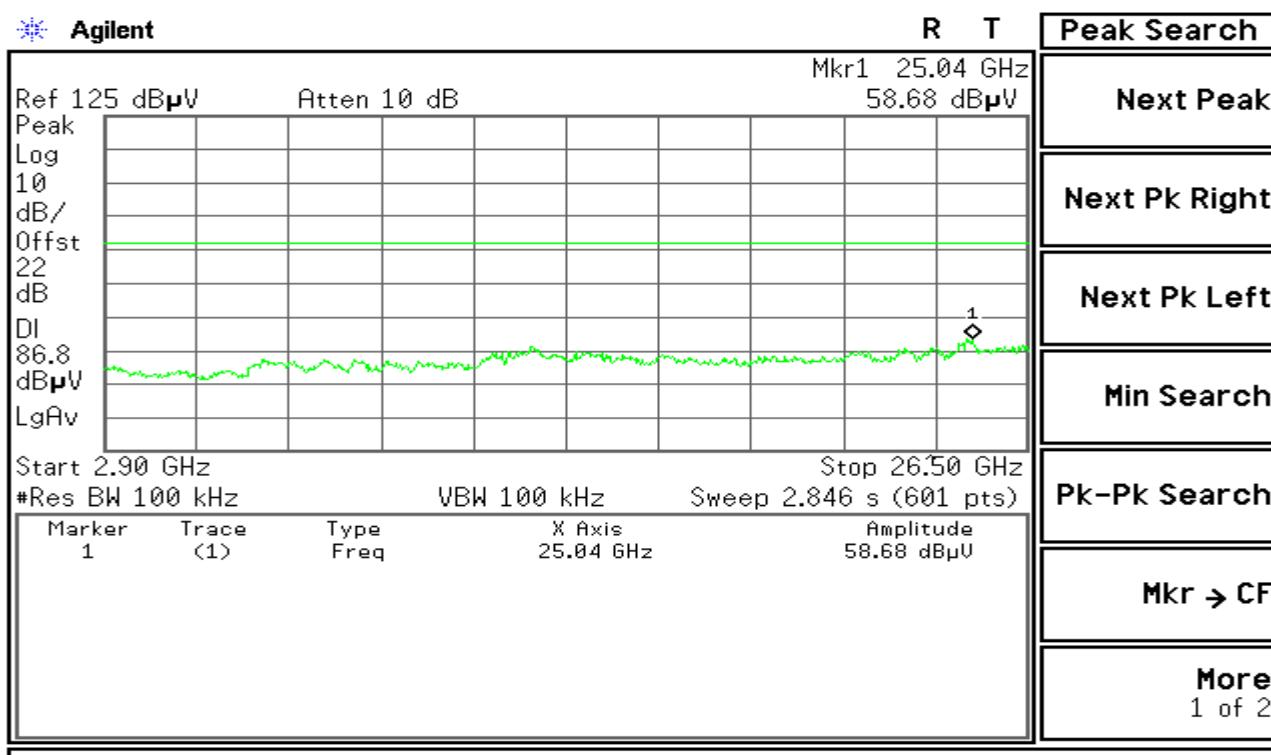
Test Plot (IEEE 802.11g mode)

CH Low

30MHz ~ 2.9GHz



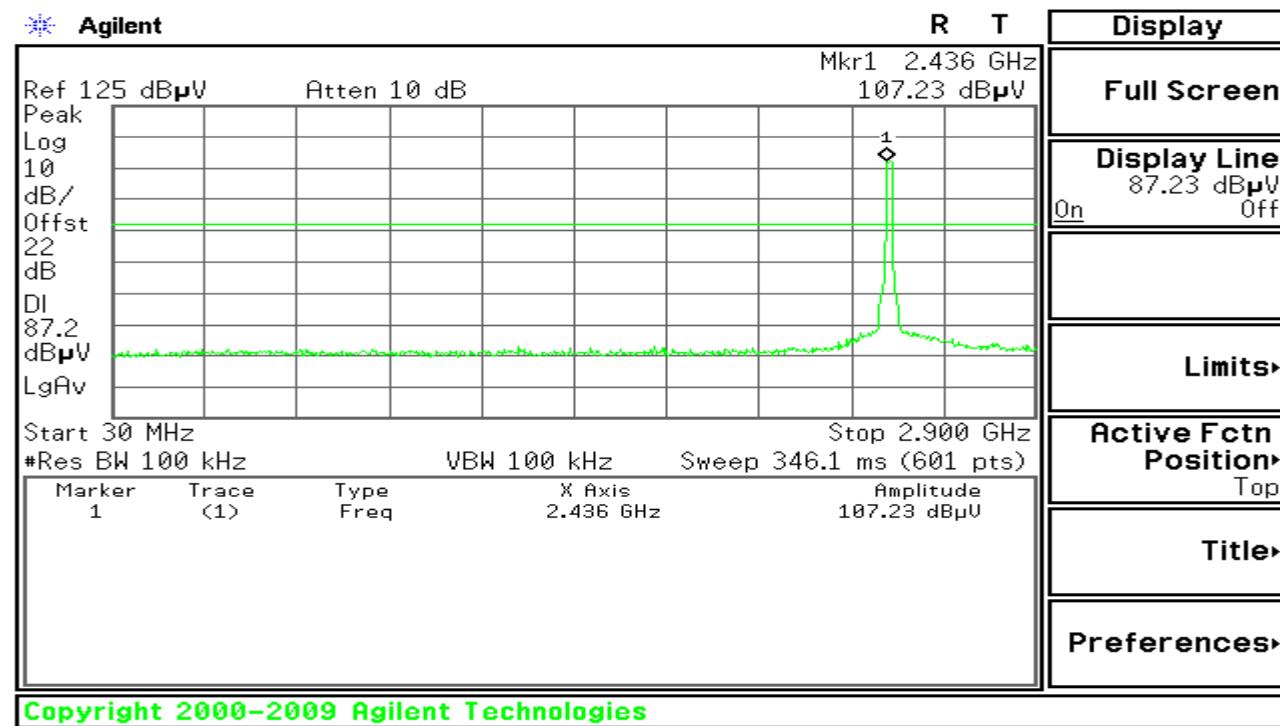
2.9GHz ~ 26.5GHz



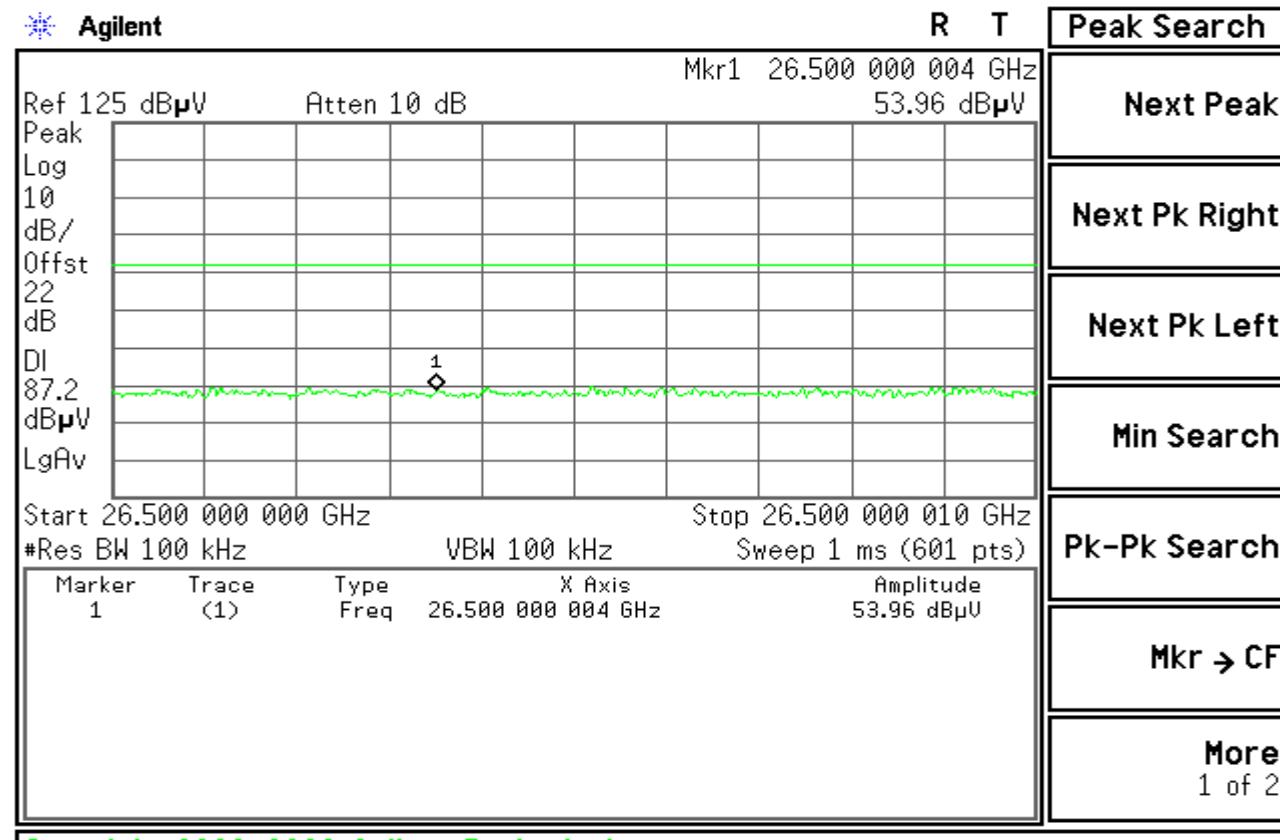


CH Mid

30MHz ~ 2.9GHz



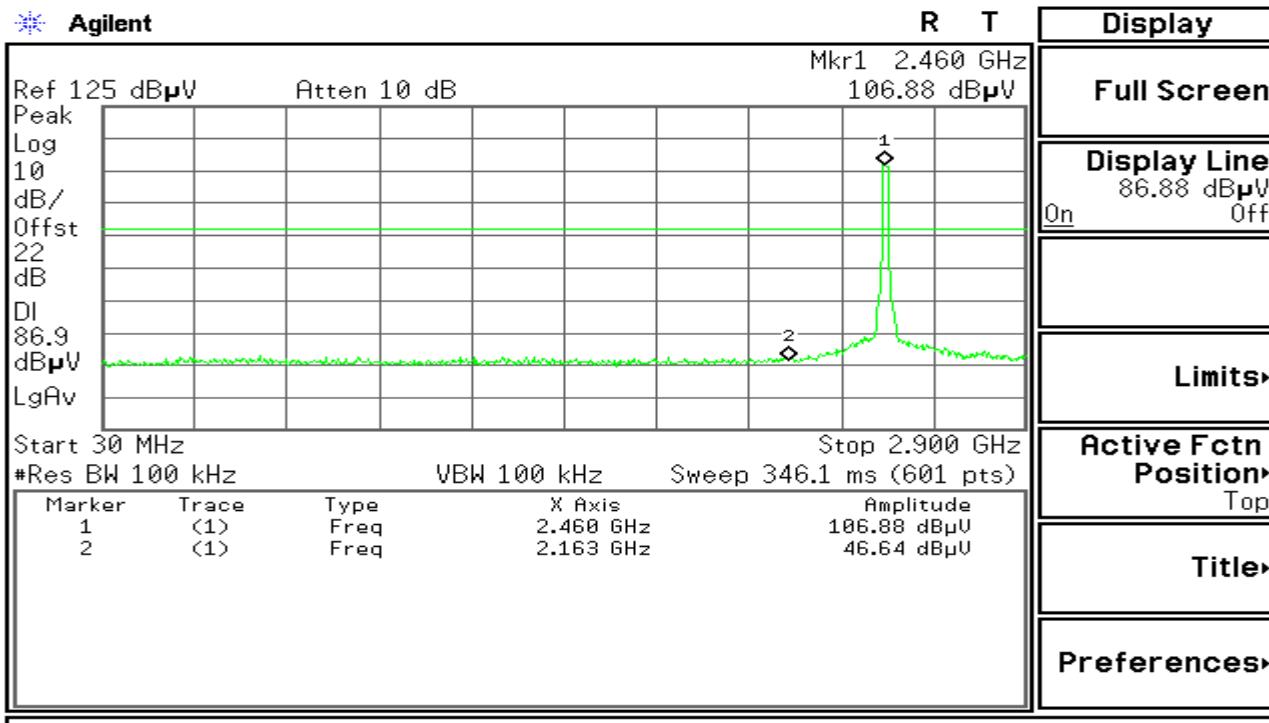
2.9GHz ~ 26.5GHz



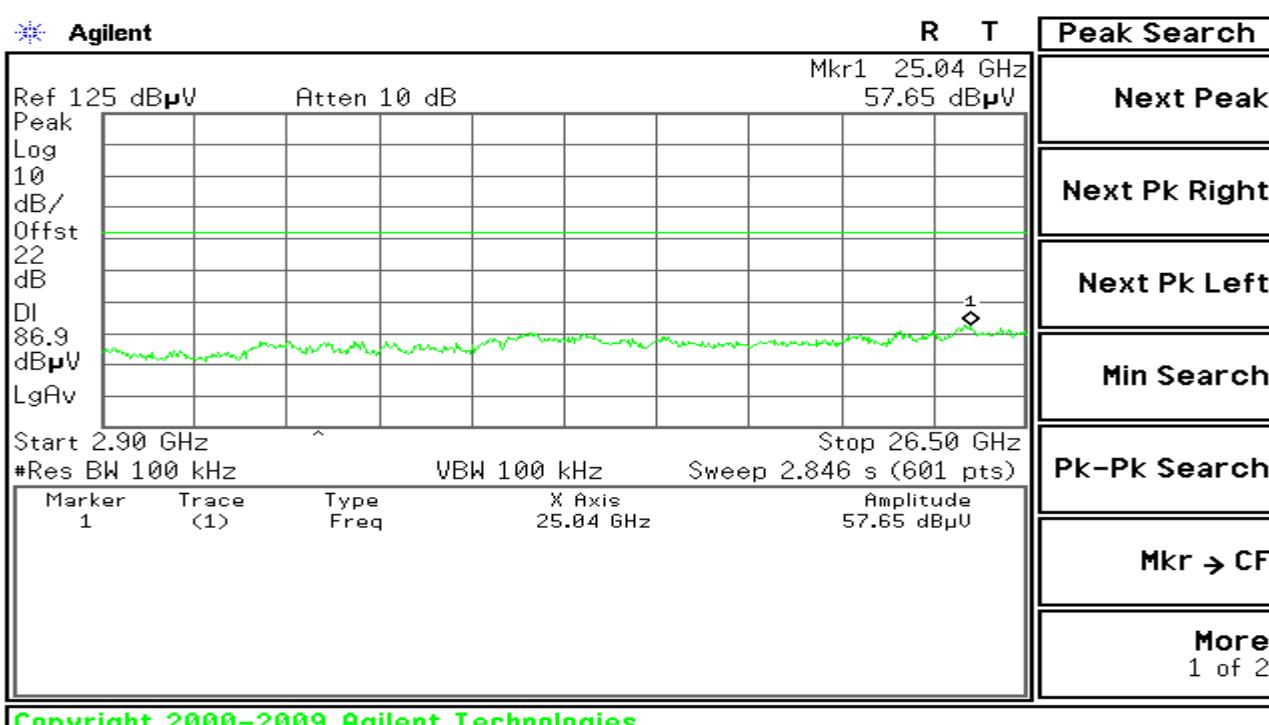


CH High

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 (μ V/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 (μ V/m at 3-meter)	Field Strength (dB μ V/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 (dB μ V/m) = 20 log Emission level (μ V/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	04/24/2010
Spectrum Analyzer	Agilent	E4446A	US44300398	04/24/2010
EMI Test Receiver	R&S	ESPI3	101026	04/24/2010
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	02/28/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2010
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2010
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	04/24/2010
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	04/06/2010
Loop Antenna	ARA	PLA-1030/B	1029	02/24/2011

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.
 4. 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:

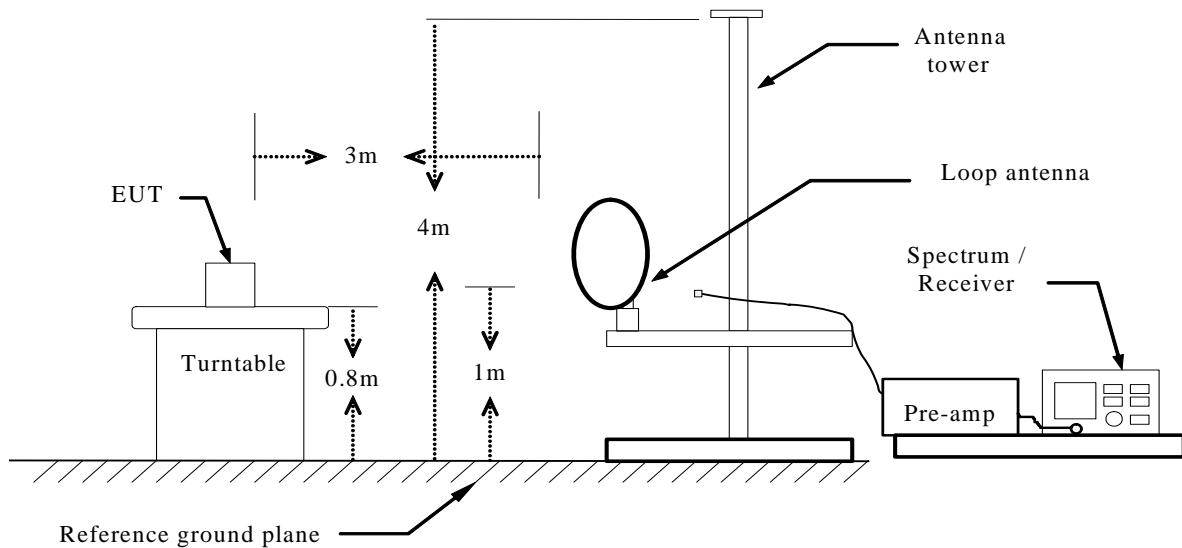
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

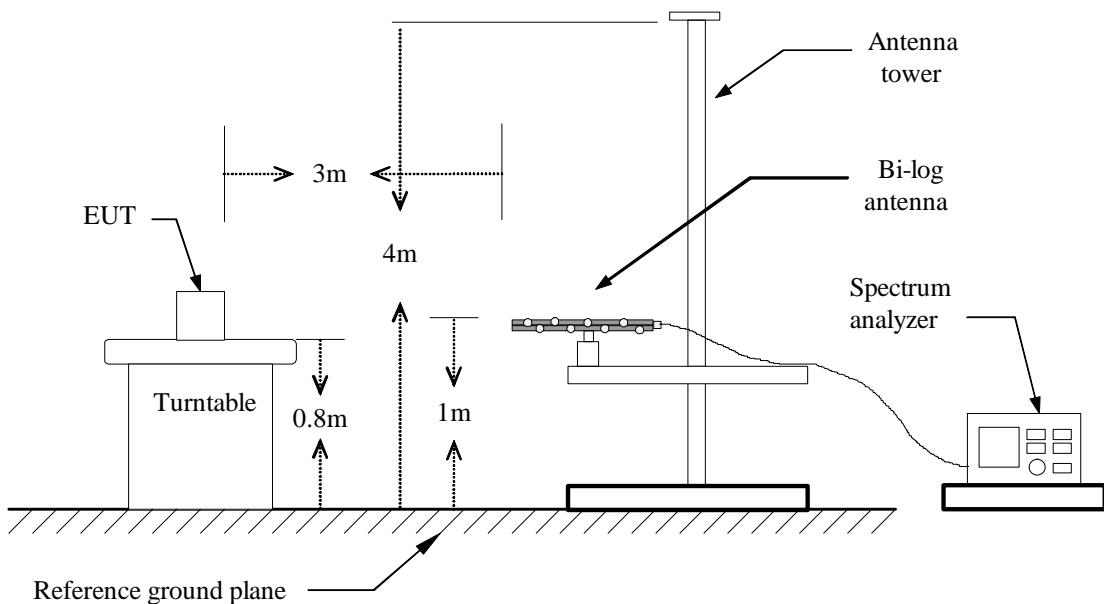
7. Repeat above procedures until the measurements for all frequencies are complete.

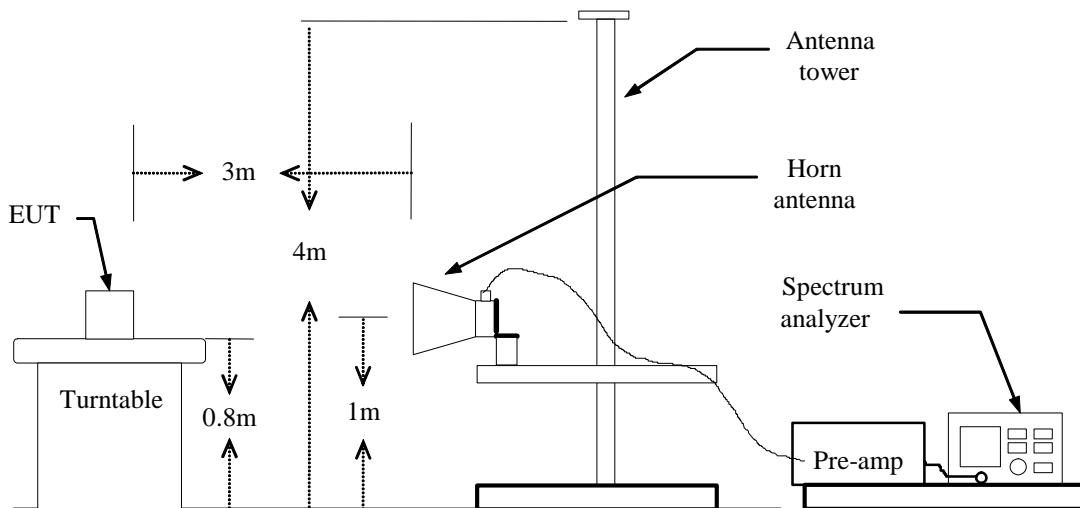
7.2.5.4. TEST SETUP

Below 30MHz



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 (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	37.00	-14.67	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
xxx	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: April 16, 2010

Temperature: 24°C

Tested by: Jeff

Humidity: 50 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol.	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
36.28	V	Peak	40.81	-6.25	34.56	40.0	-5.44
107.99	V	Peak	43.55	-10.41	33.14	43.5	-10.36
184.22	V	Peak	44.16	-10.77	33.39	43.5	-10.11
273.56	V	Peak	47.25	-8.03	39.22	46.0	-6.78
412.72	V	Peak	40.33	-4.18	36.15	46.0	-9.85
961.88	V	Peak	40.61	4.55	45.16	54.0	-8.84
<hr/>							
43.67	H	Peak	42.58	-10.78	31.8	40	-8.2
92.16	H	Peak	49.06	-14.92	34.14	43.5	-9.36
188.45	H	Peak	46.55	-10.83	35.72	43.5	-7.78
233.69	H	Peak	48.7	-9.81	38.89	46.0	-7.11
374.69	H	Peak	43.21	-5.28	37.93	46.0	-8.07
964.05	H	Peak	39.67	4.56	44.23	54.0	-9.77

REMARKS:

1. Measuring frequencies from 9 KHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9 KHz 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:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51% 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
4825.00	V	46.6	34.06	11.03	57.63	45.09	74.00	54.00	-8.91	average
7240.66	V	36.66	24.14	18.62	55.28	42.76	74.00	54.00	-11.24	average
4825.00	H	45.89	33.24	11.03	56.92	44.27	74.00	54.00	-9.73	average
7233.46	H	36.38	23.35	18.5	54.88	41.85	74.00	54.00	-12.15	average

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:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51% 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
4875.04	V	45.86	33.29	11.08	56.94	44.37	74.00	54.00	-9.63	average
7316.67	V	36.65	24.09	19.12	55.77	43.21	74.00	54.00	-10.79	average
4875.00	H	44.75	32.83	11.08	55.83	43.91	74.00	54.00	-10.09	average
7314.67	H	35.01	23.23	19.11	54.12	42.34	74.00	54.00	-11.66	average

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:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51 % 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
4924.55	V	46.51	33.57	11.15	57.66	44.72	74.00	54.00	-9.28	average
7388.34	V	37.36	24.13	19.42	56.78	43.55	74.00	54.00	-10.45	average
4925.00	H	45.91	33.05	11.15	57.06	44.2	74.00	54.00	-9.80	average
7382.46	H	36.67	24.21	19.4	56.07	43.61	74.00	54.00	-10.39	average

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 802.11g / CH Low**Test Date:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51 % 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
4825.00	V	46.4	33.98	11.03	57.43	45.01	74.00	54.00	-8.99	average
7233.46	V	37.29	23.68	18.5	55.79	42.18	74.00	54.00	-11.82	average
4825.00	H	46.01	33.60	11.03	57.04	44.63	74.00	54.00	-9.37	average
7233.46	H	37.29	23.68	18.5	56.24	42.58	74.00	54.00	-11.42	average

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 802.11g / CH Mid**Test Date:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51 % 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
4874.66	V	47.36	35.24	11.08	58.44	46.32	74.00	54.00	-7.68	average
7315.64	V	36.85	25.5	19.12	55.97	44.62	74.00	54.00	-9.38	average
4875.00	H	46.74	34.23	11.08	57.82	45.31	74.00	54.00	-8.69	average
7316.25	H	36.22	25.04	19.12	55.34	44.16	74.00	54.00	-9.84	average

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 802.11g / CH High**Test Date:** April 16, 2010**Temperature:** 23°C**Tested by:** Jeff**Humidity:** 51 % 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
4925.00	V	45.74	33.92	11.15	56.89	45.07	74.00	54.00	-8.93	average
7383.13	V	35.37	23.29	19.40	54.77	42.69	74.00	54.00	-11.31	average
4925.00	H	45.39	33.10	11.15	56.54	44.25	74.00	54.00	-9.75	average
7382.67	H	24.48	22.36	19.40	43.88	41.76	74.00	54.00	-12.24	average

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.

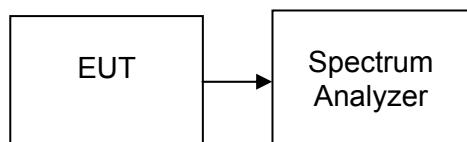
7.3.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2010

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 = 20MHz, 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	9955	>500	PASS
Mid	2437	9977		PASS
High	2462	9520		PASS

Test Data

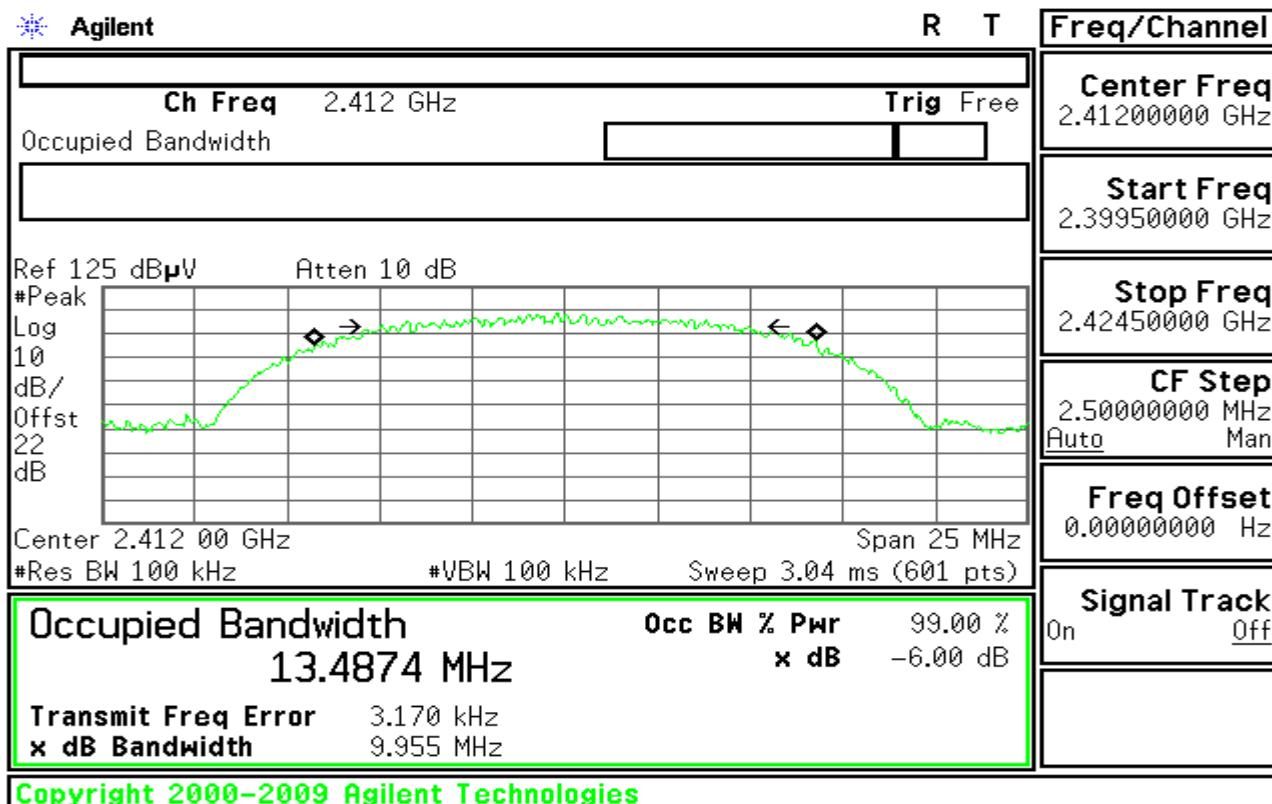
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16541	>500	PASS
Mid	2437	16538		PASS
High	2462	16532		PASS

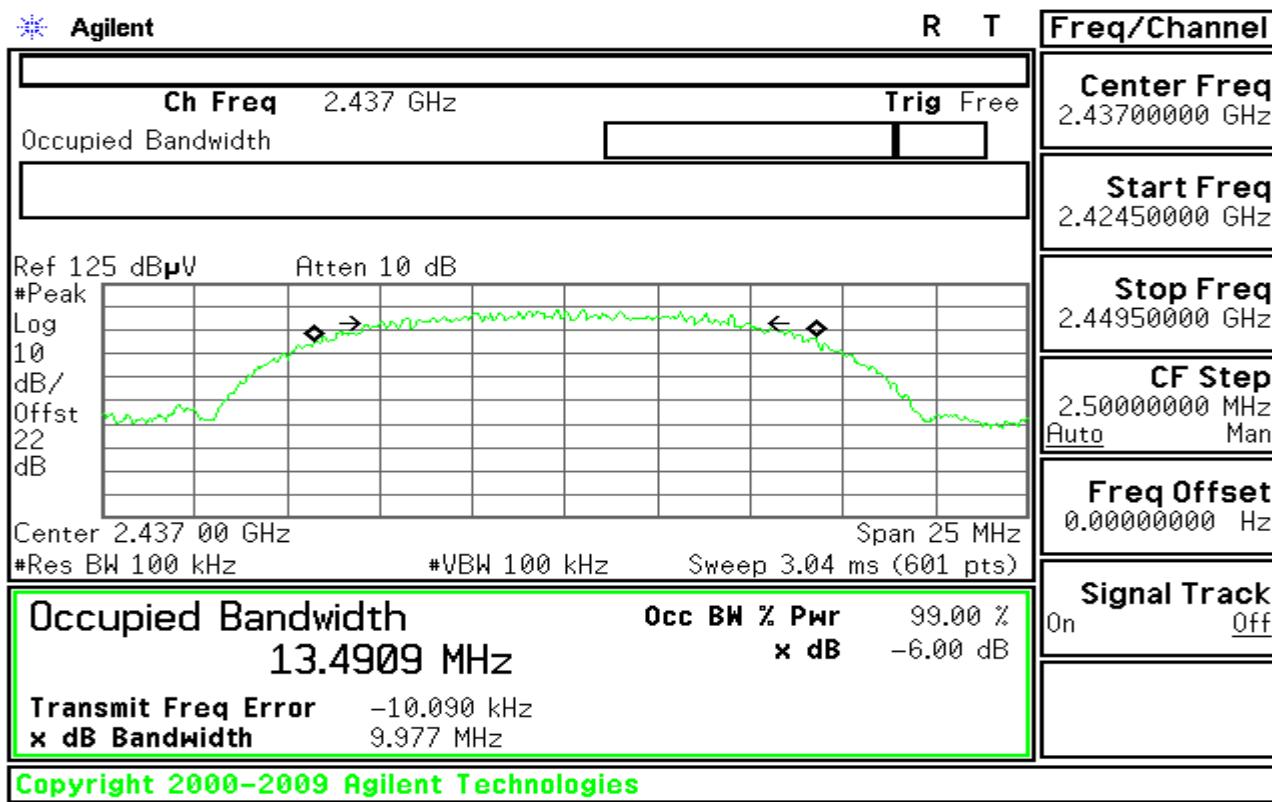


Test Plot (IEEE 802.11b mode)

6dB Bandwidth (CH Low)

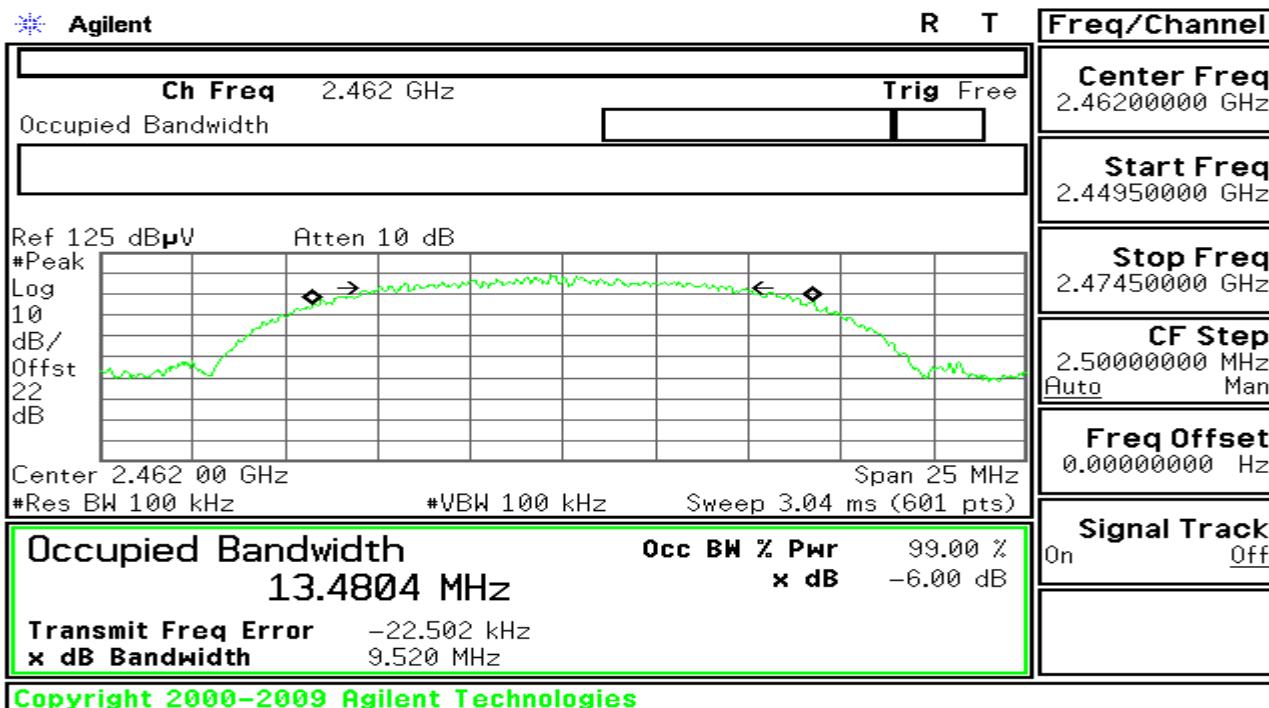


6dB Bandwidth (CH Mid)



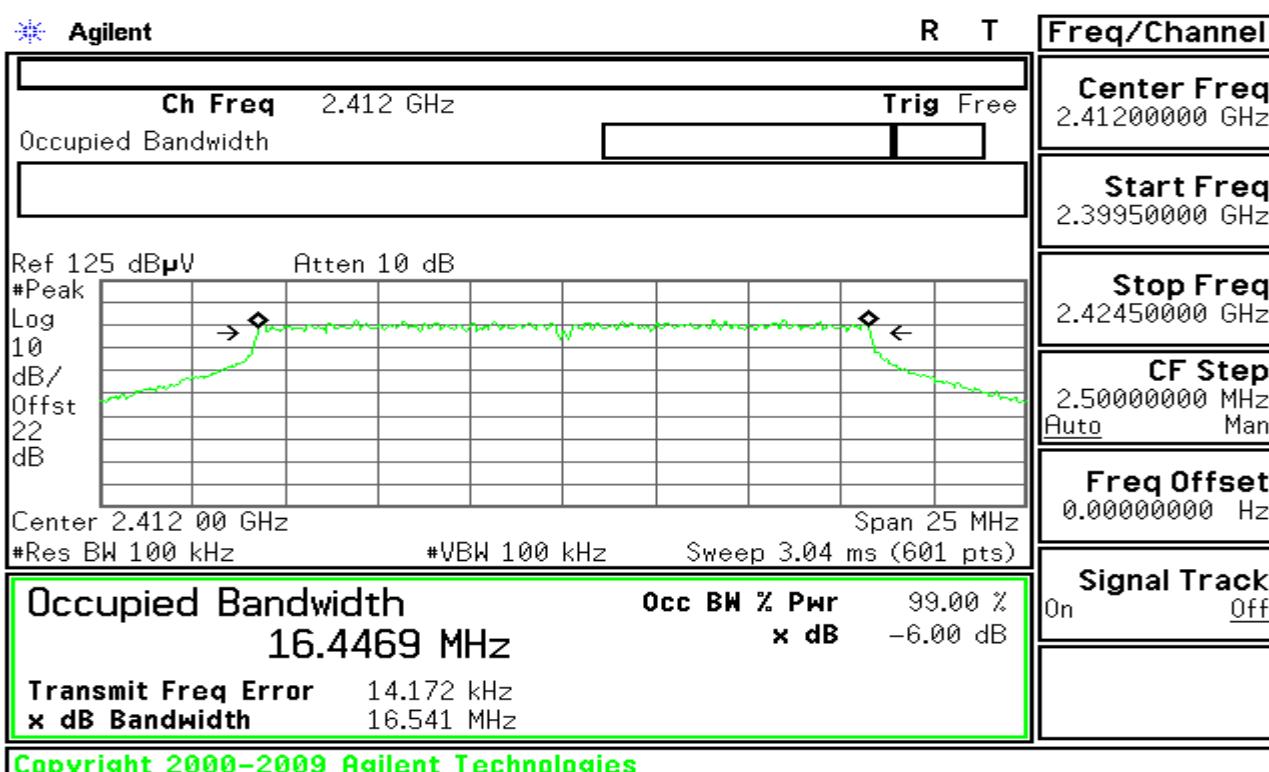


6dB Bandwidth (CH High)



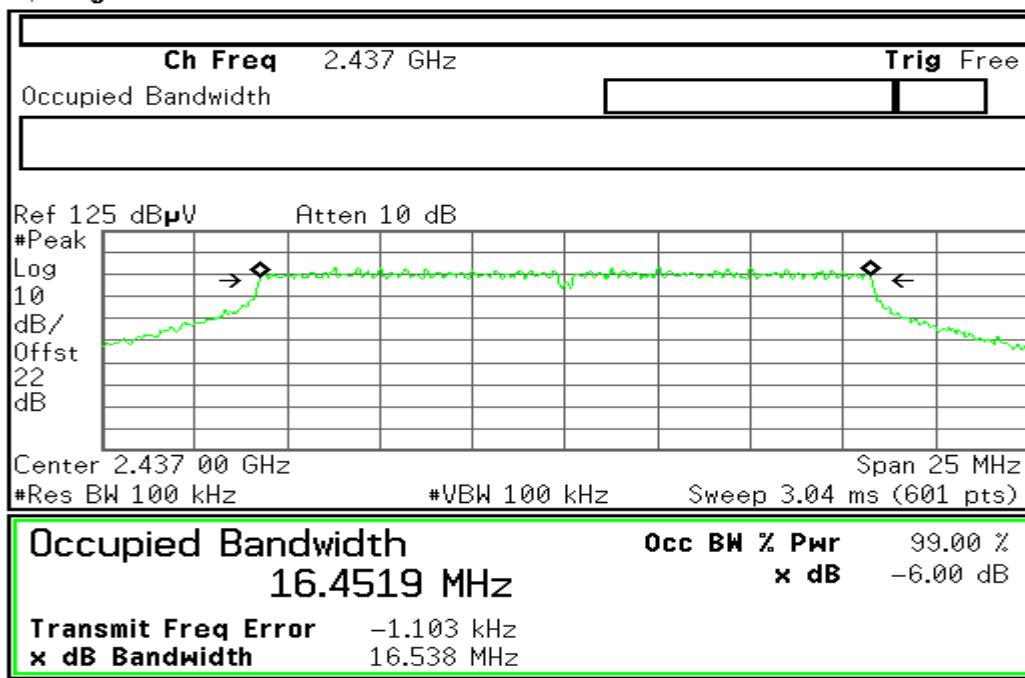
Test Plot (IEEE 802.11g mode)

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

Agilent

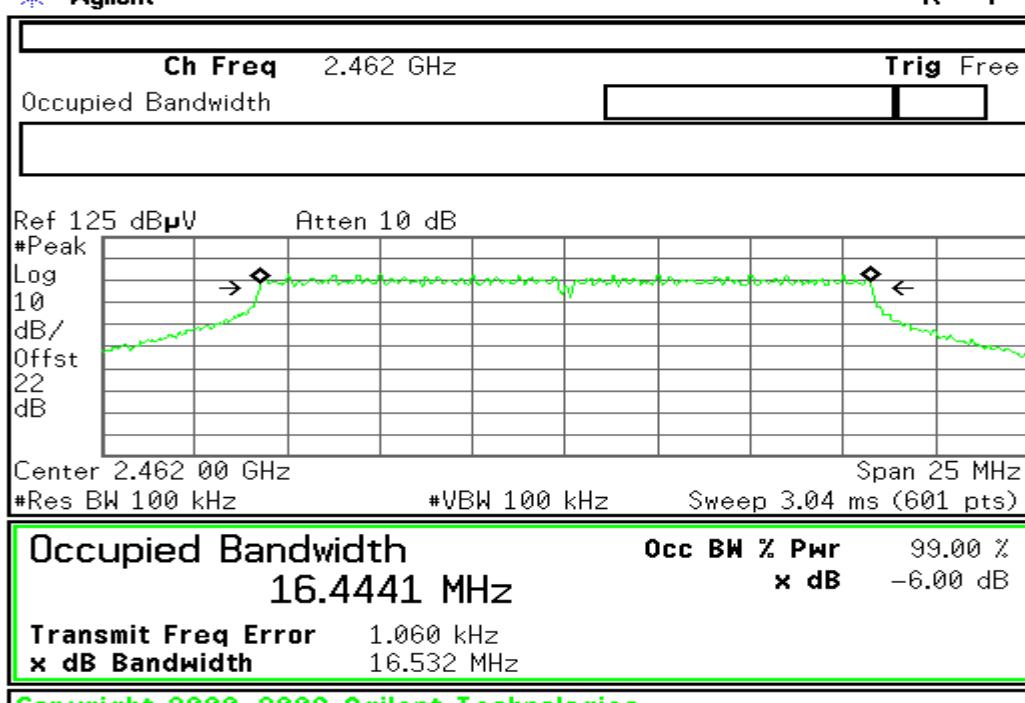


R T

Freq/Channel	
Center Freq	2.43700000 GHz
Start Freq	2.42450000 GHz
Stop Freq	2.44950000 GHz
CF Step	2.50000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

6dB Bandwidth (CH High)

Agilent



R T

Freq/Channel	
Center Freq	2.46200000 GHz
Start Freq	2.44950000 GHz
Stop Freq	2.47450000 GHz
CF Step	2.50000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off



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

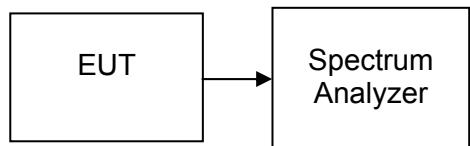
Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	04/24/2010

7.4.3. TEST PROCEDURES (please refer to measurement standard)

- 1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2 Set RBW = 1 MHz.
- 3 Set VBW \geq 3 MHz.
- 4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
- 5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "highfree run" high.
- 6 Trace average 100 traces in power averaging mode.
- 7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.



7.4.4. TEST SETUP



7.4.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

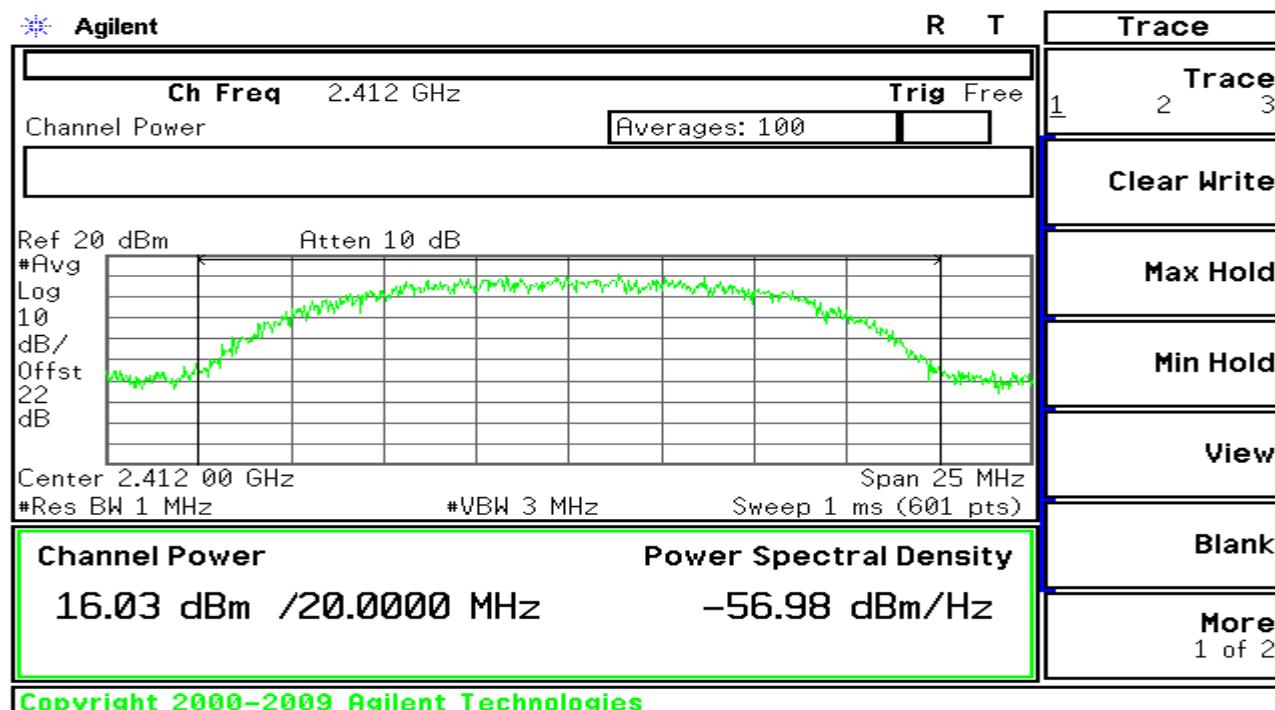
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.03	0.04009	1	PASS
Mid	2437	16.29	0.04256		PASS
High	2462	15.91	0.03899		PASS

Test mode: IEEE 802.11g

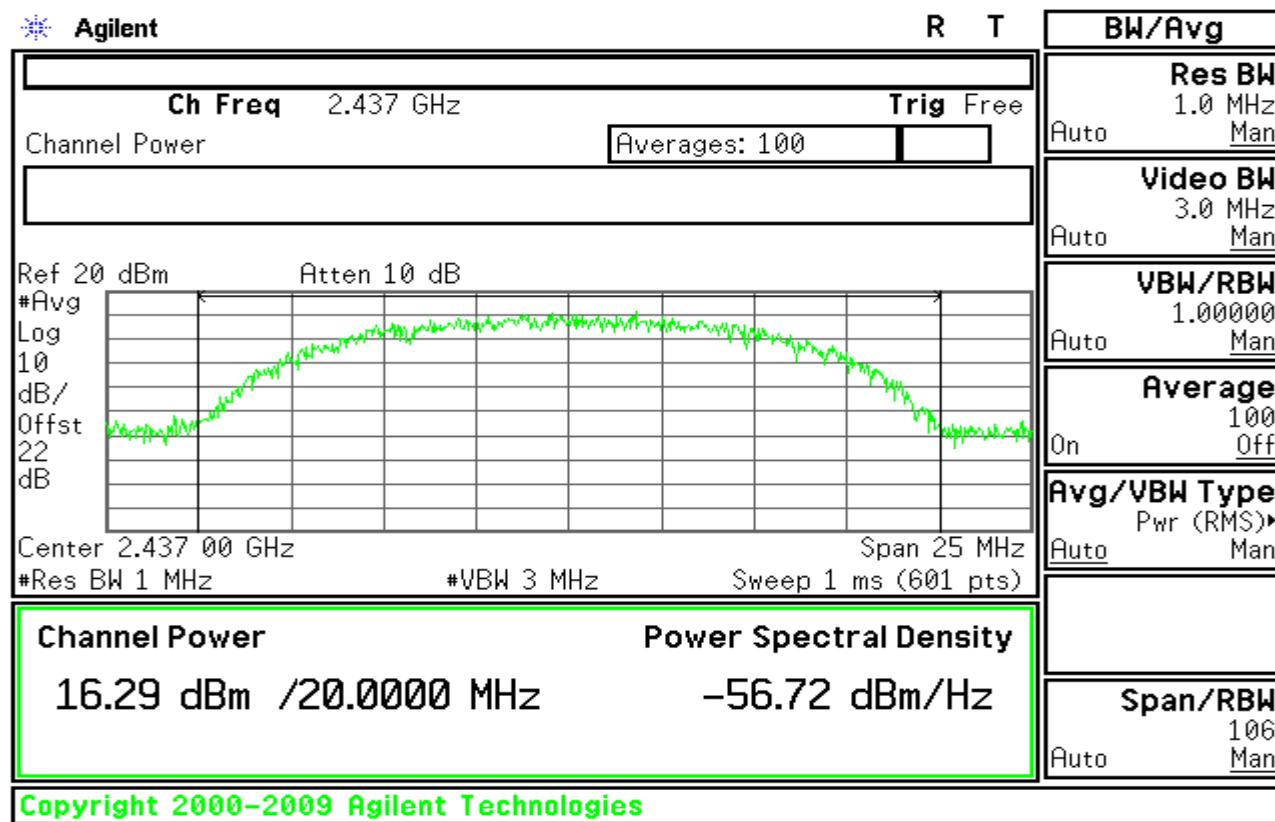
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	12.67	0.01849	1	PASS
Mid	2437	12.95	0.01972		PASS
High	2462	12.74	0.01879		PASS

Test Plot (IEEE 802.11b mode)

Peak Power (CH Low)

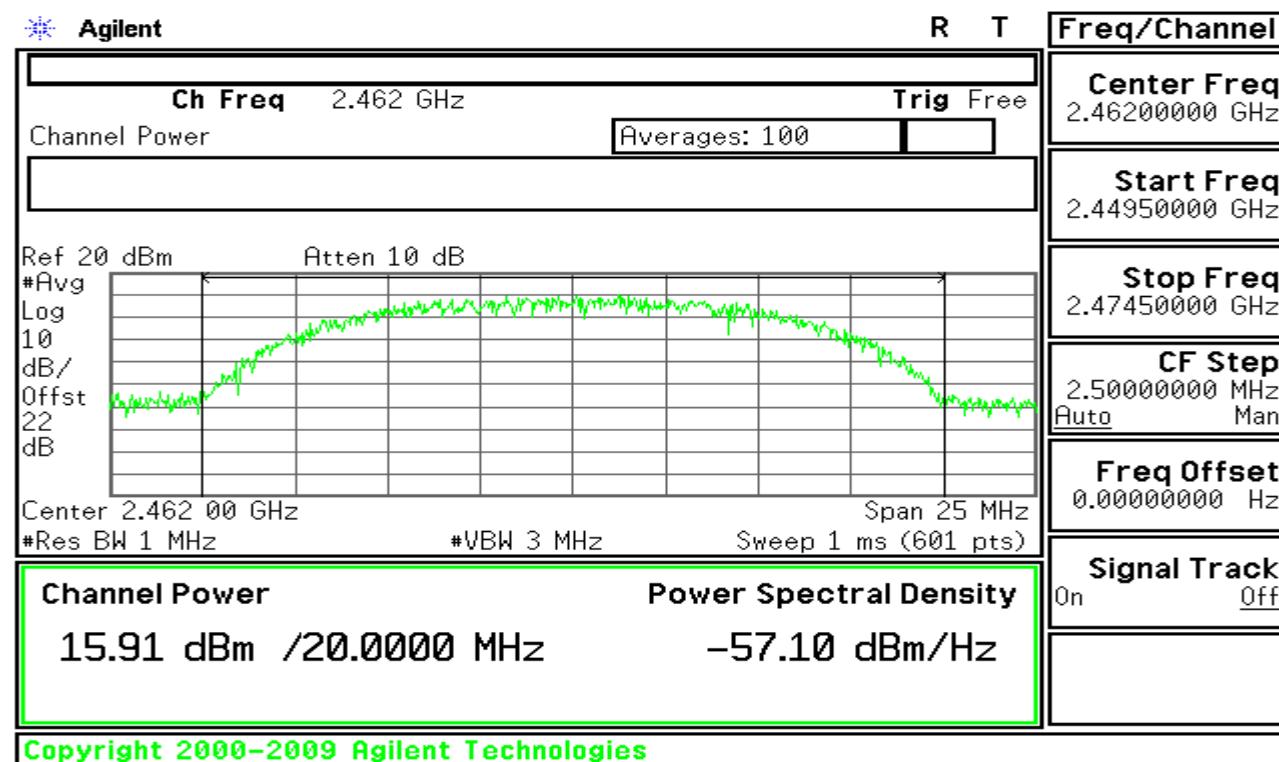


Peak Power (CH Mid)



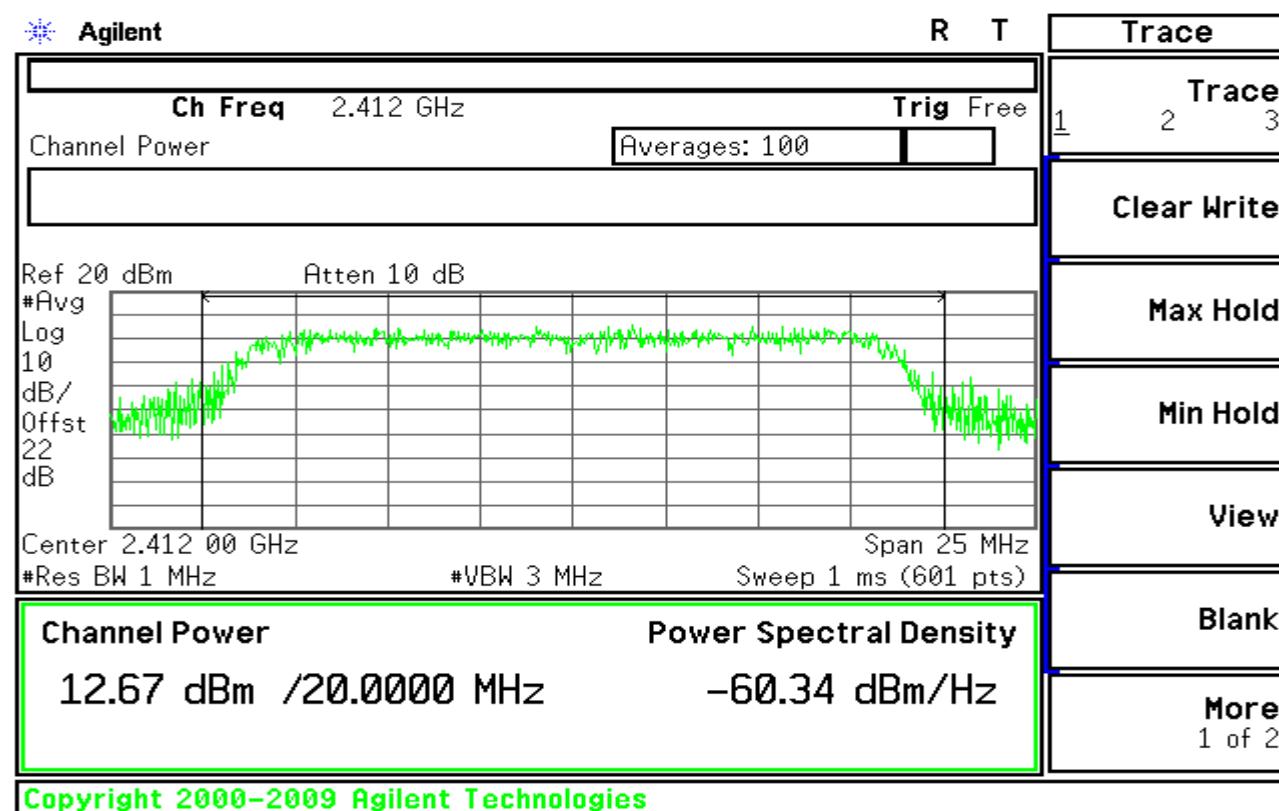


Peak Power (CH High)



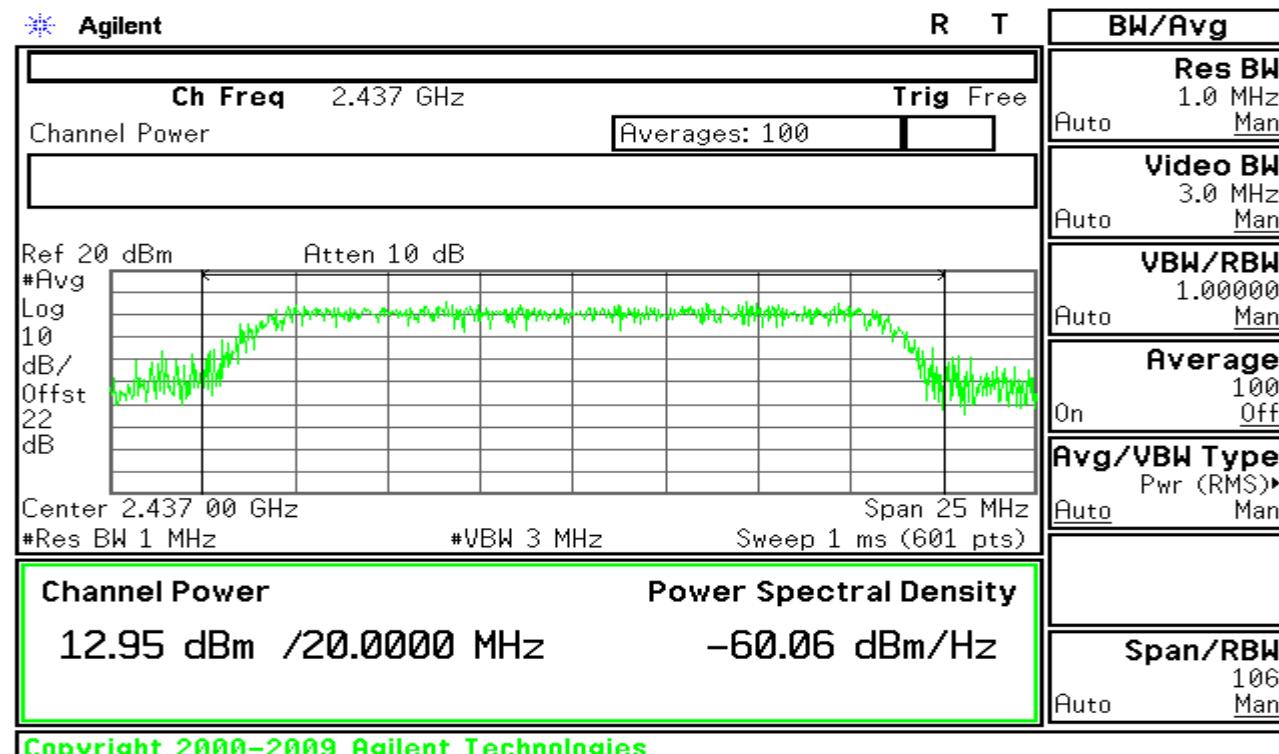
Test Plot (IEEE 802.11g mode)

Peak Power (CH Low)

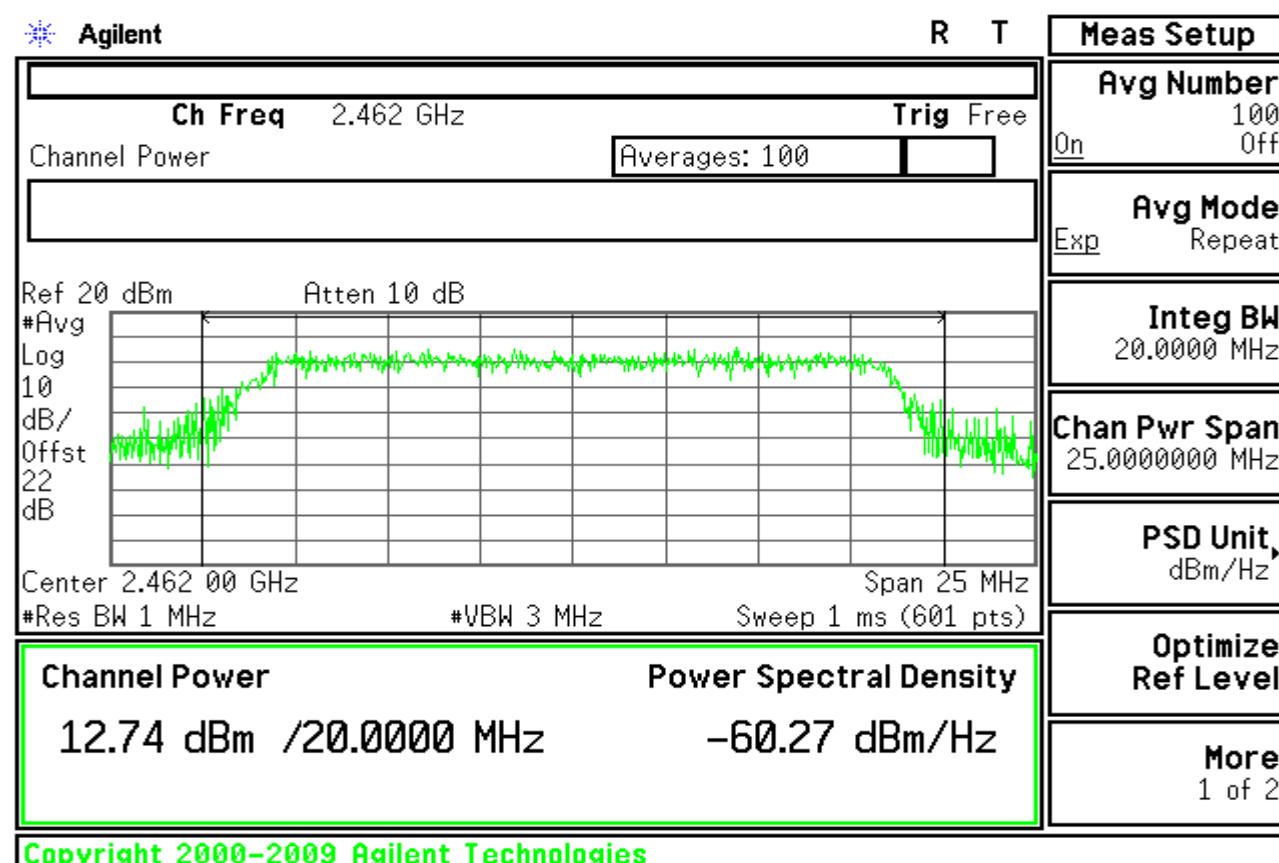




Peak Power (CH Mid)



Peak Power (CH High)





7.5. BAND EDGES MEASUREMENT:

7.5.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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, 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)).

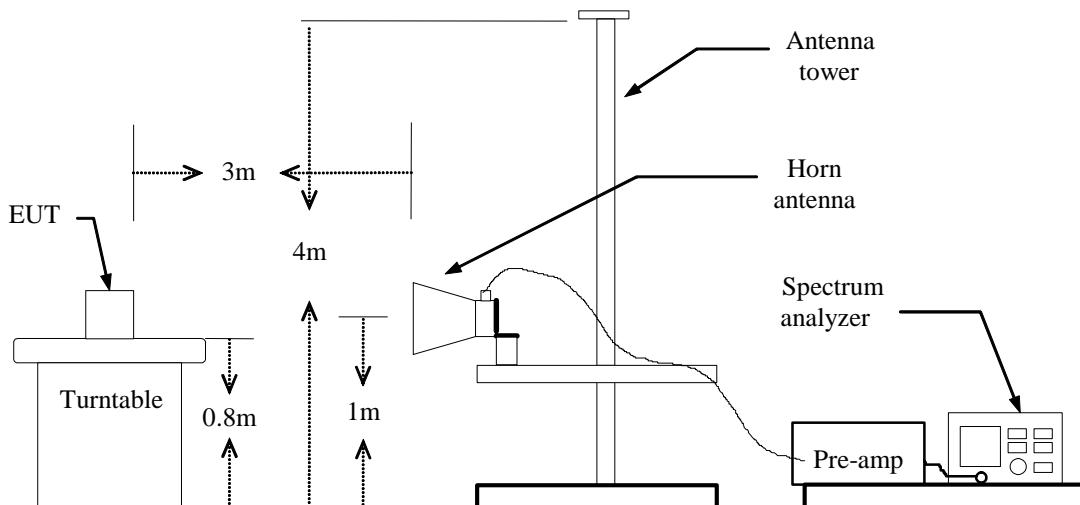
7.5.1.1. TEST INSTRUMENTS

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	04/24/2010
Spectrum Analyzer	Agilent	E4446A	US44300398	04/24/2010
EMI Test Receiver	R&S	ESPI3	101026	04/24/2010
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	02/28/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	02/28/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2010
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2010
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	04/24/2010
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	04/06/2010

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

7.5.2. 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

7.5.3. TEST SETUP



Test Data

Test Plot (IEEE 802.11b mode)

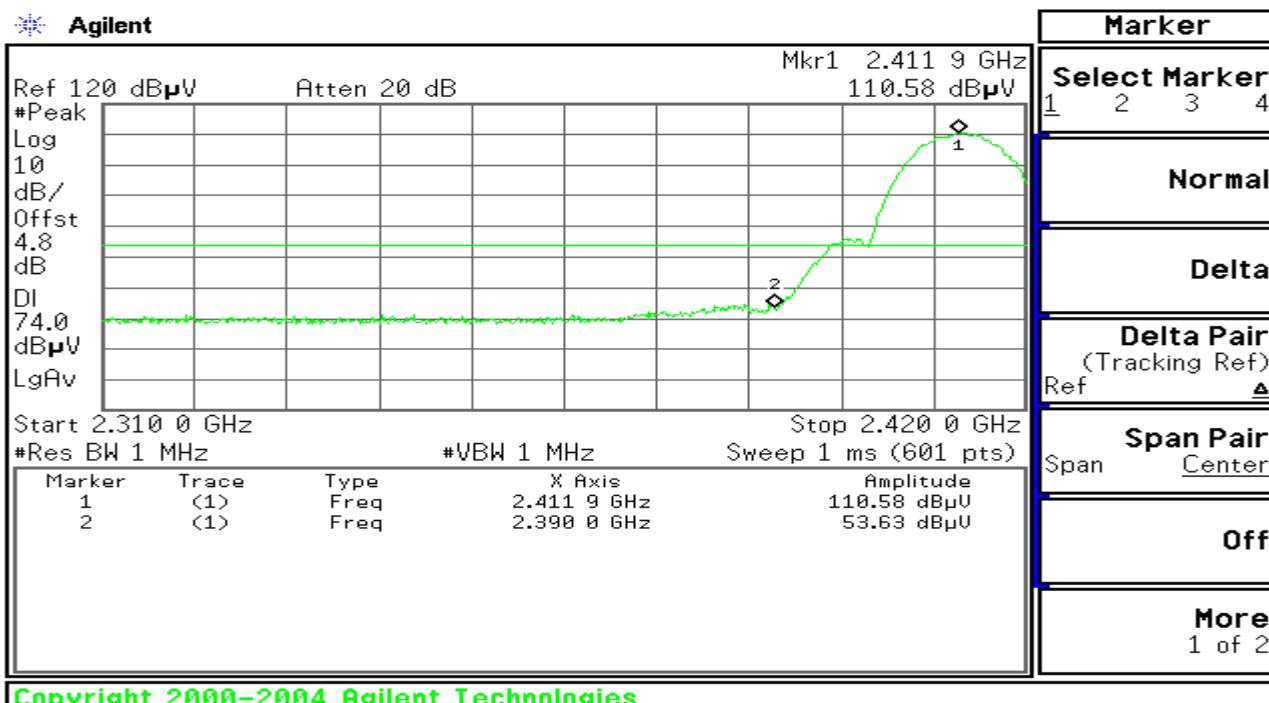
7.5.4. TEST RESULTS

Test Plot (IEEE 802.11b mode)

Band Edges (CH Low)

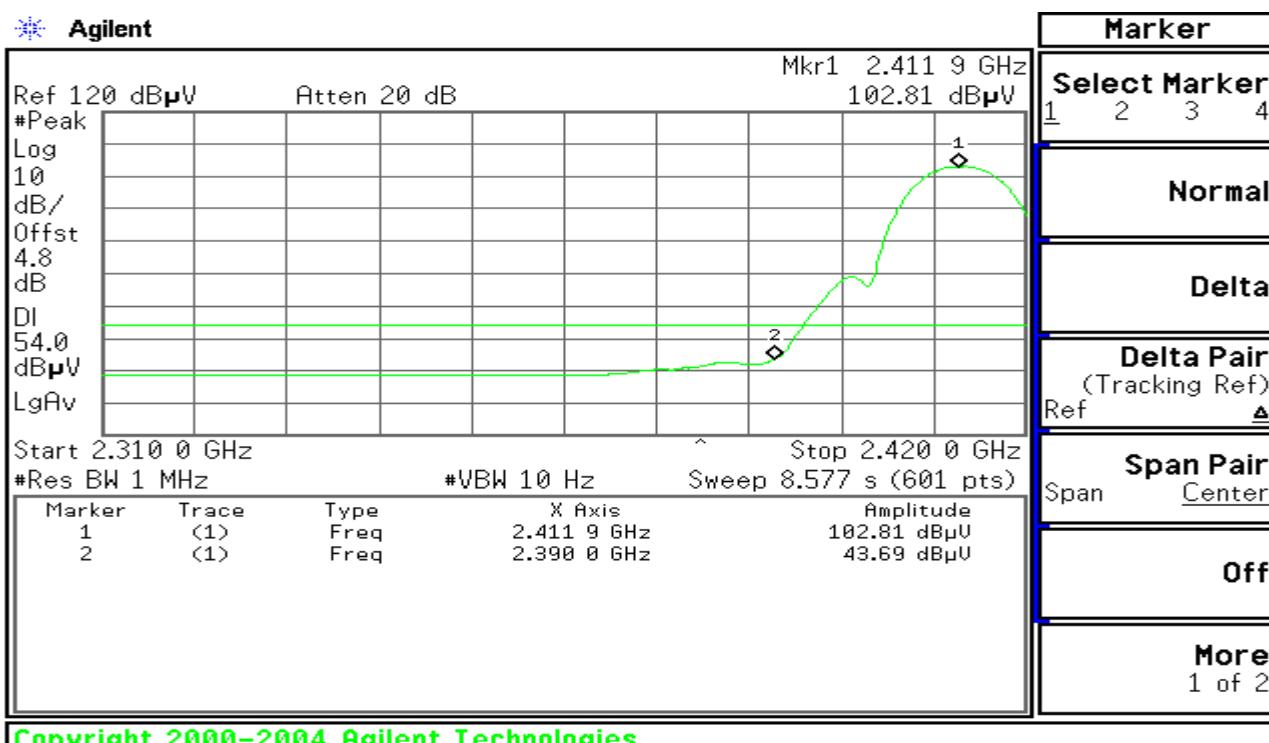
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

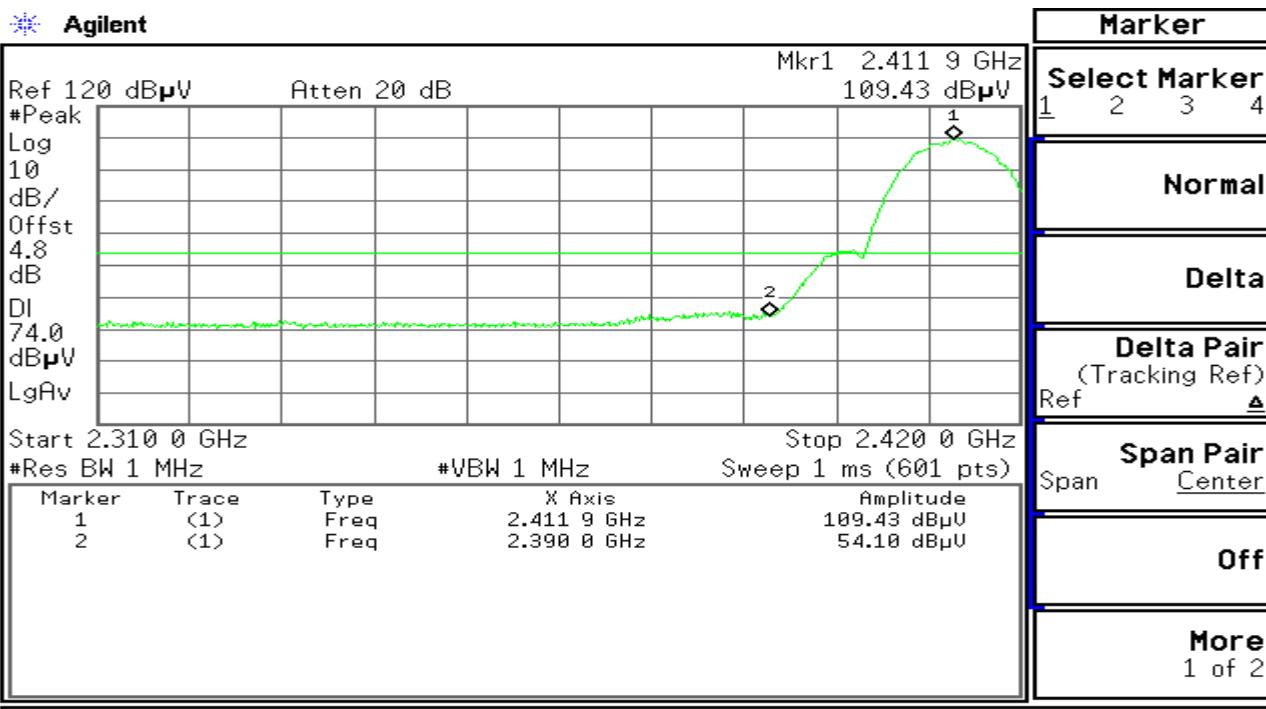
Polarity: Vertical





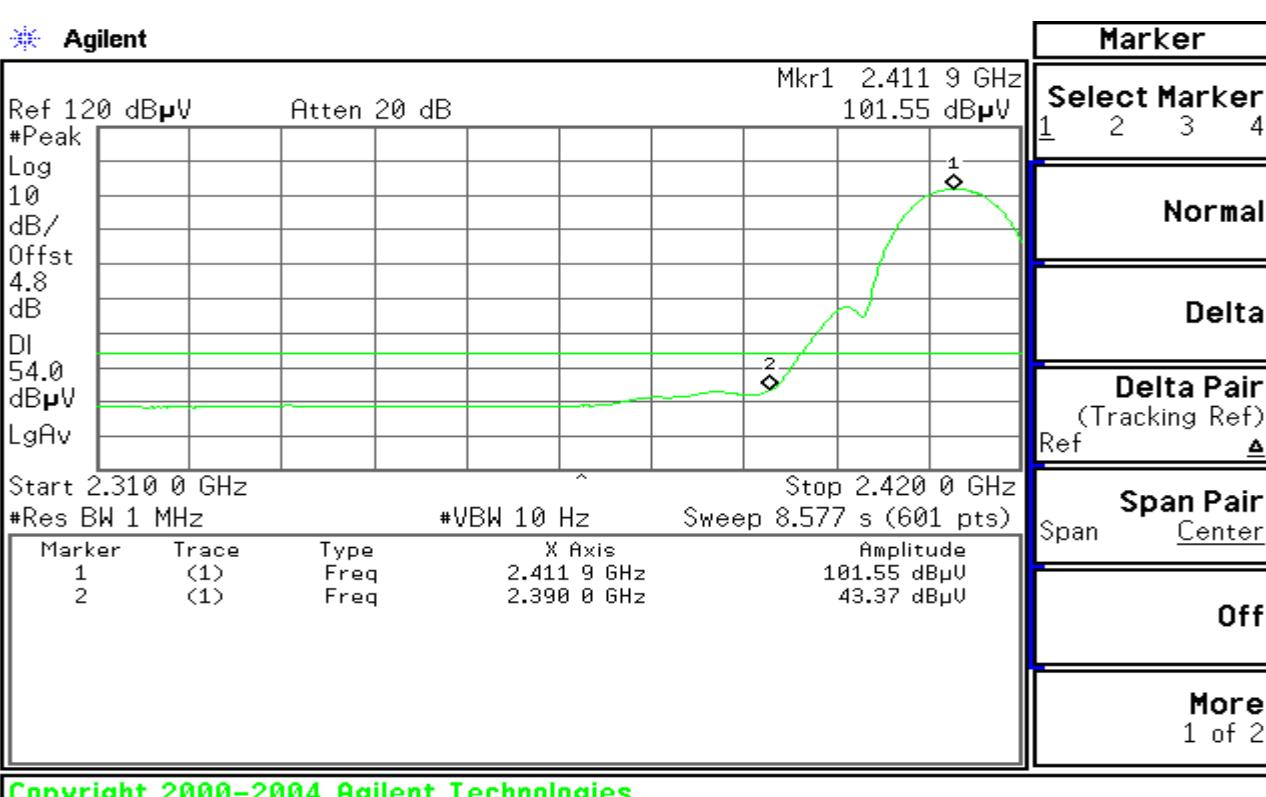
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

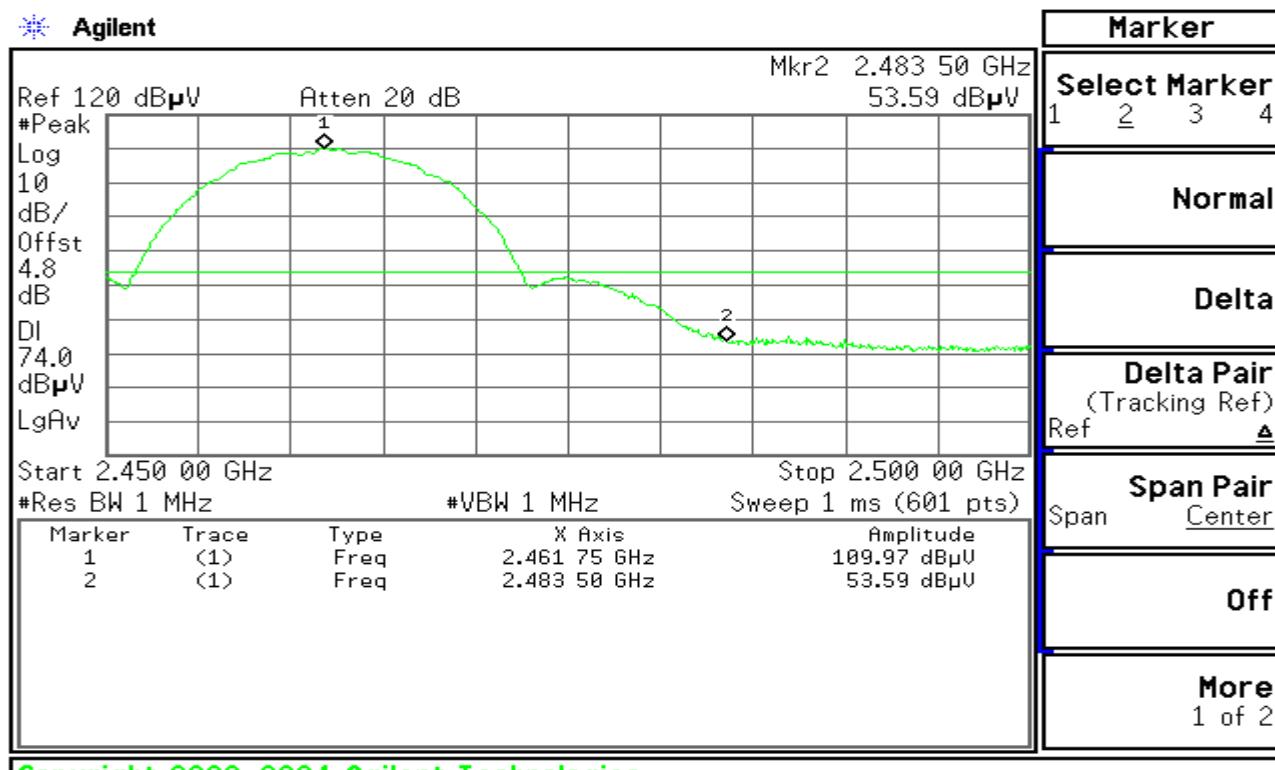
Polarity: Horizontal



Band Edges (CH High)

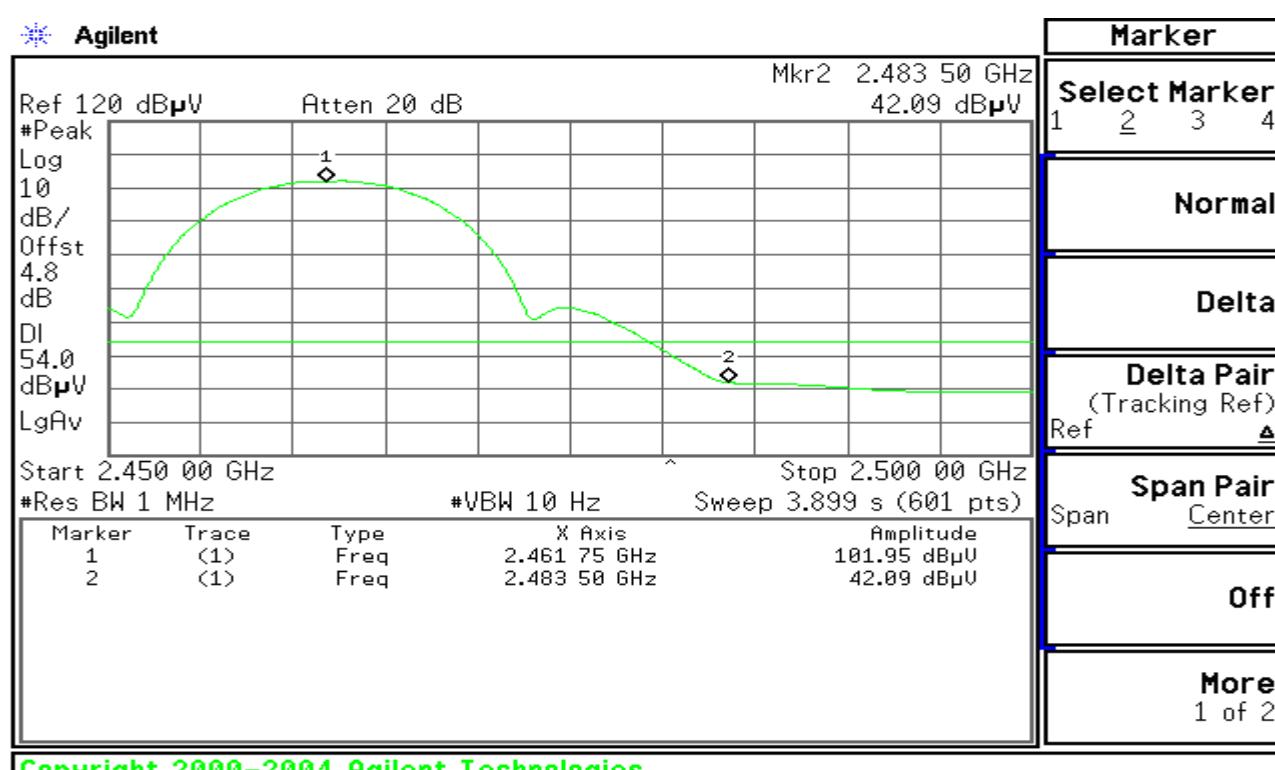
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

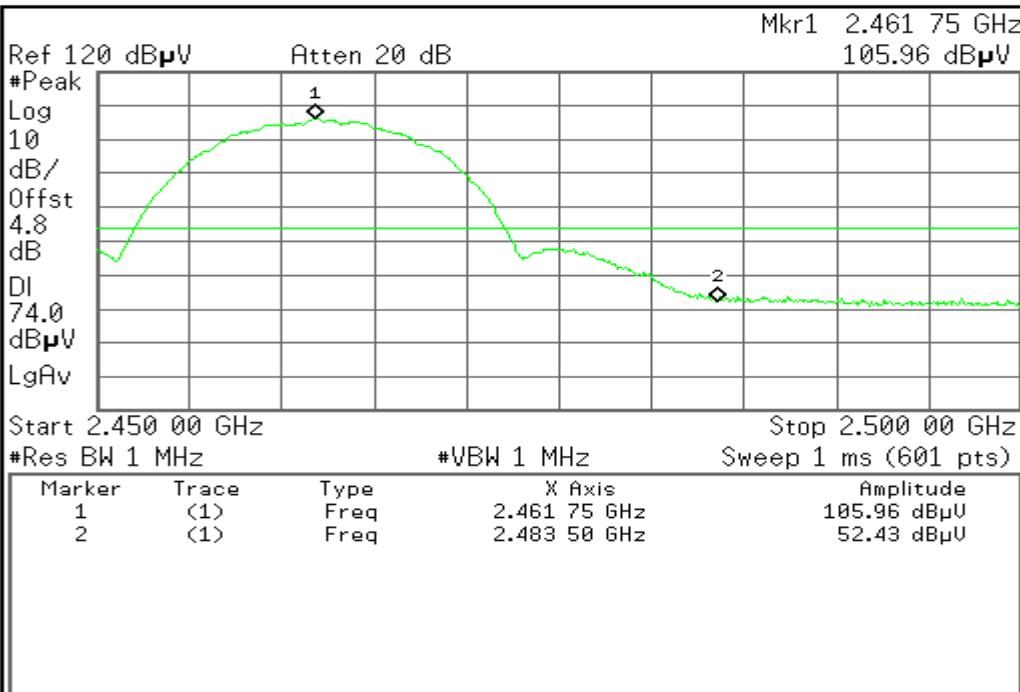




Detector mode: Peak

Polarity: Horizontal

Agilent

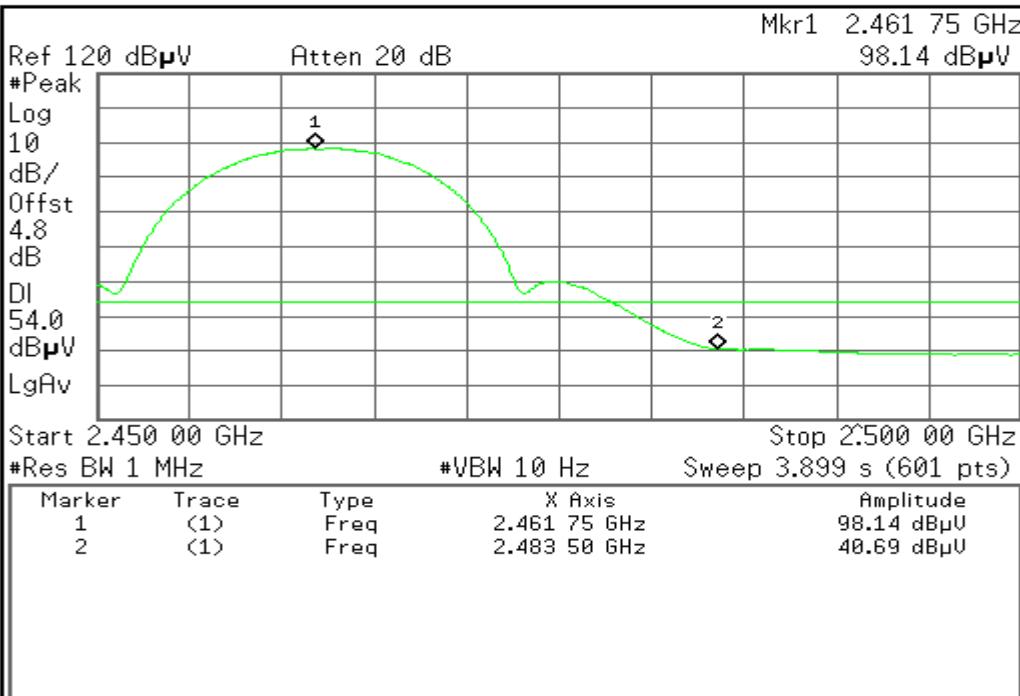


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Detector mode: Average

Polarity: Horizontal

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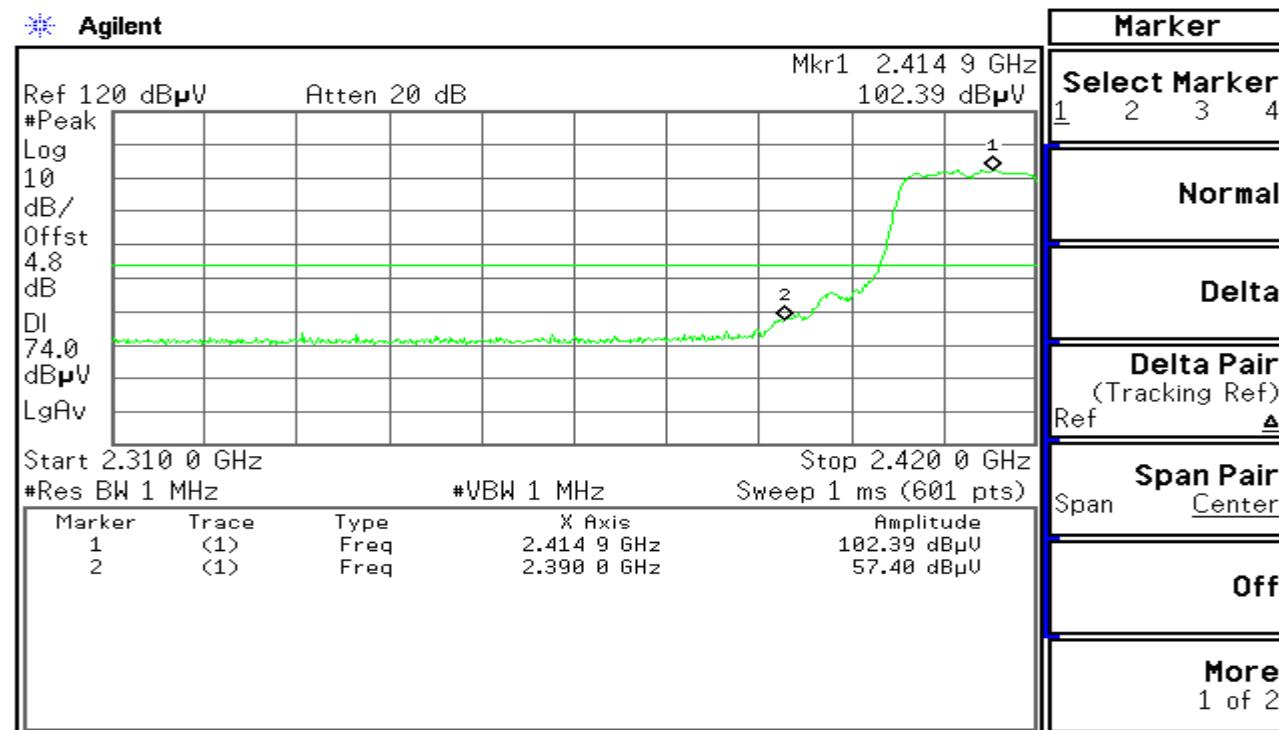
Test Data

Test Plot (IEEE 802.11g mode)

Test Plot (IEEE 802.11g mode)**Band Edges (CH Low)**

Detector mode: Peak

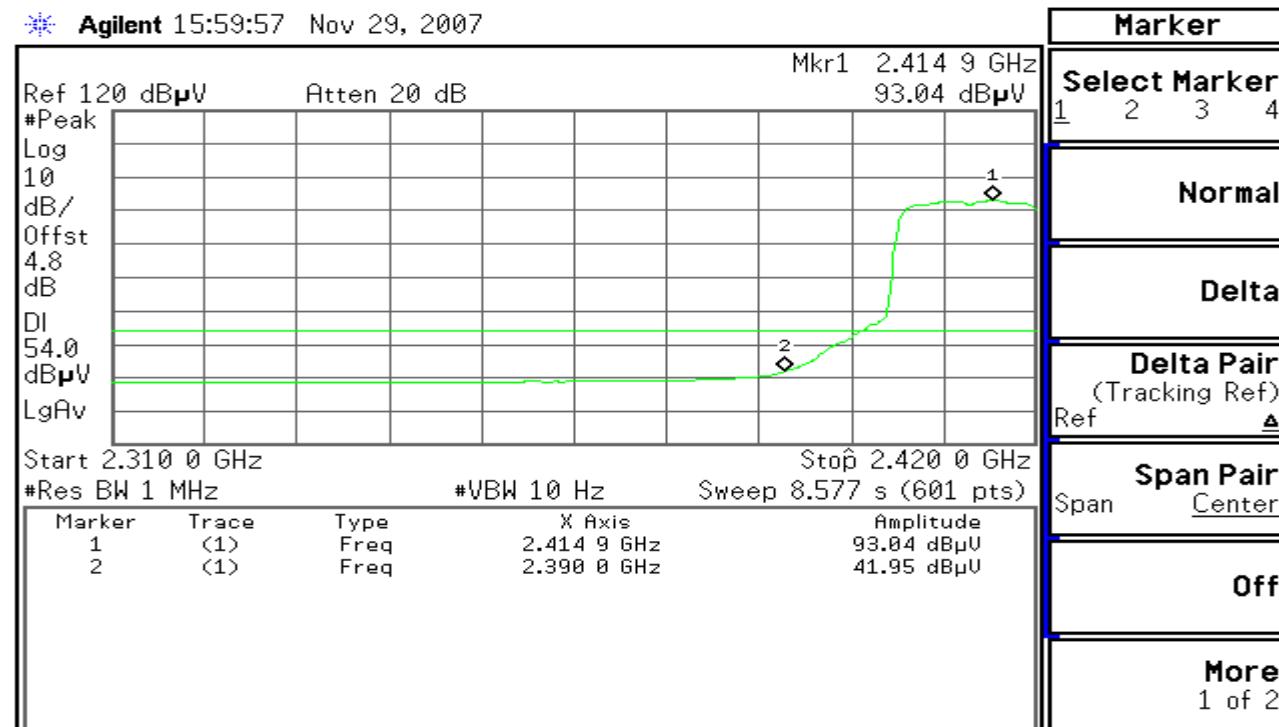
Polarity: Vertical



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Detector mode: Average

Polarity: Vertical

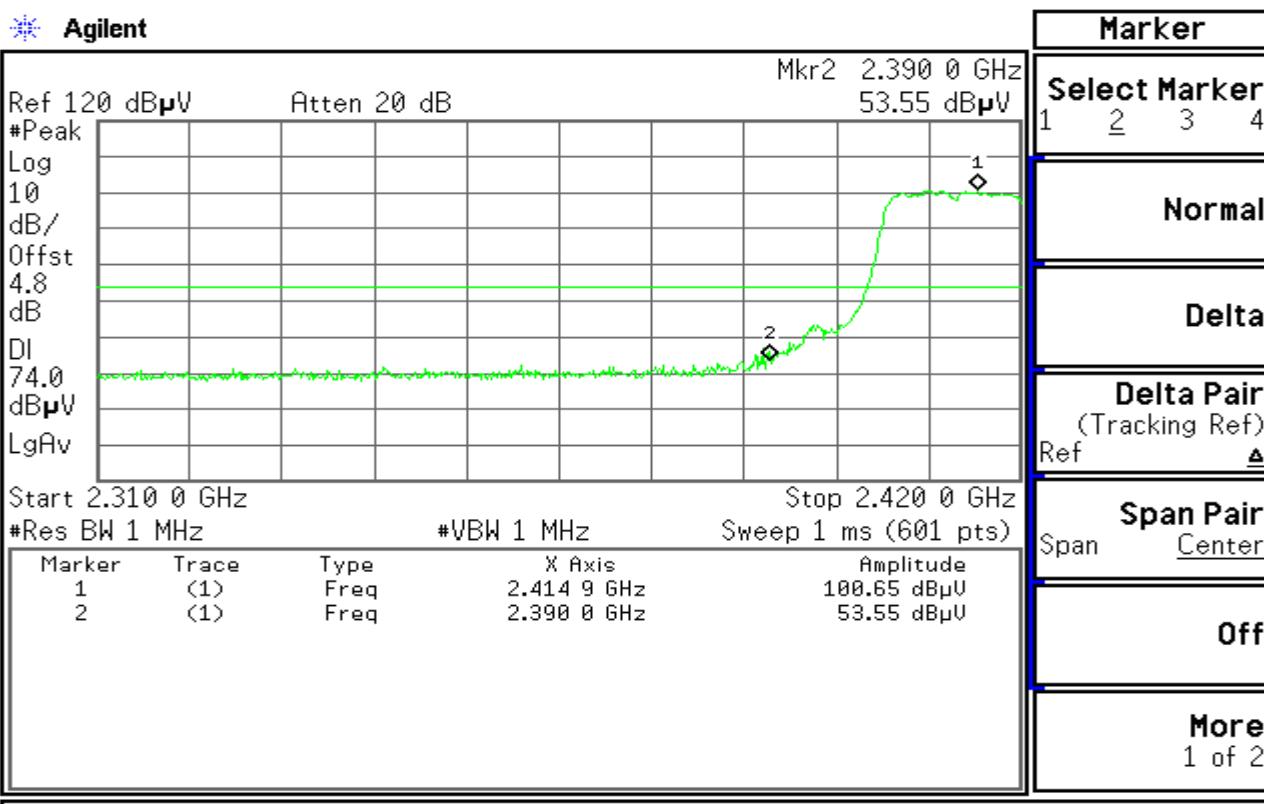


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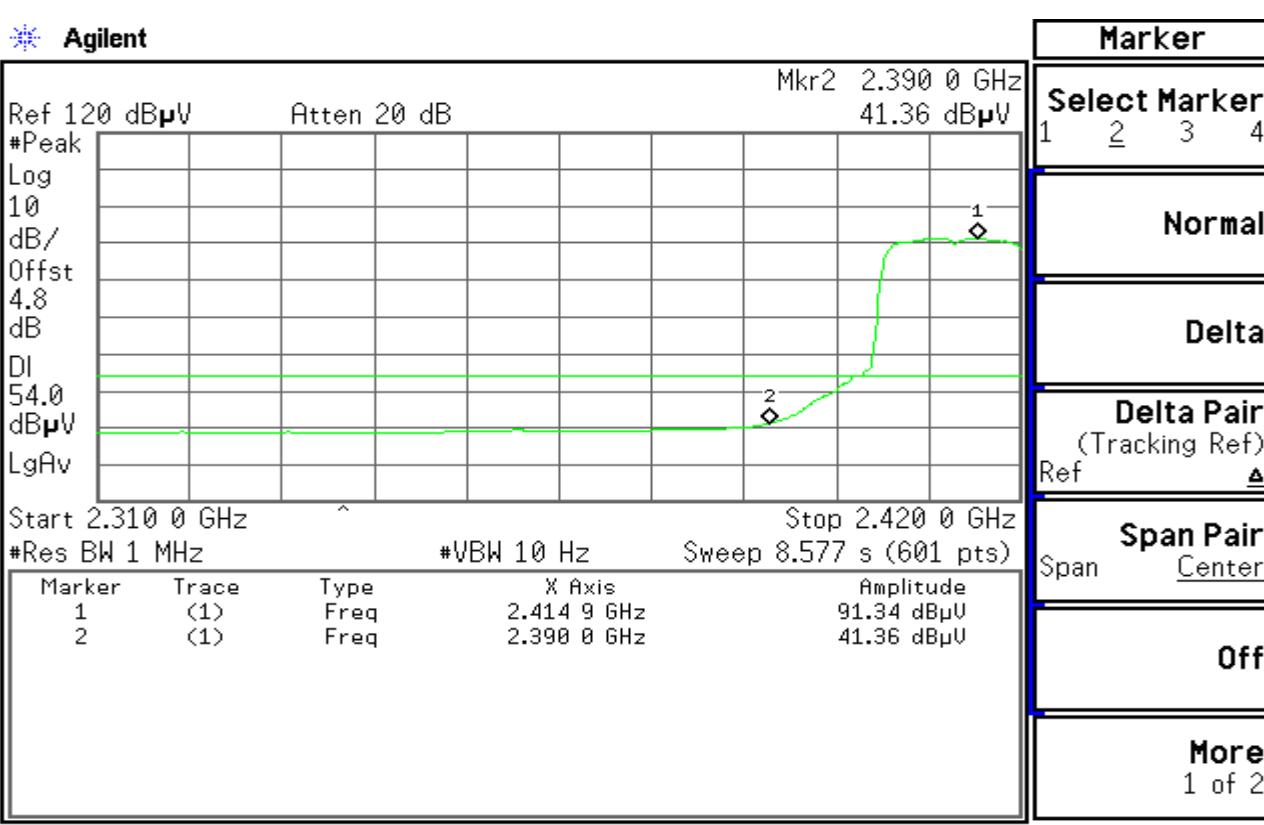
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

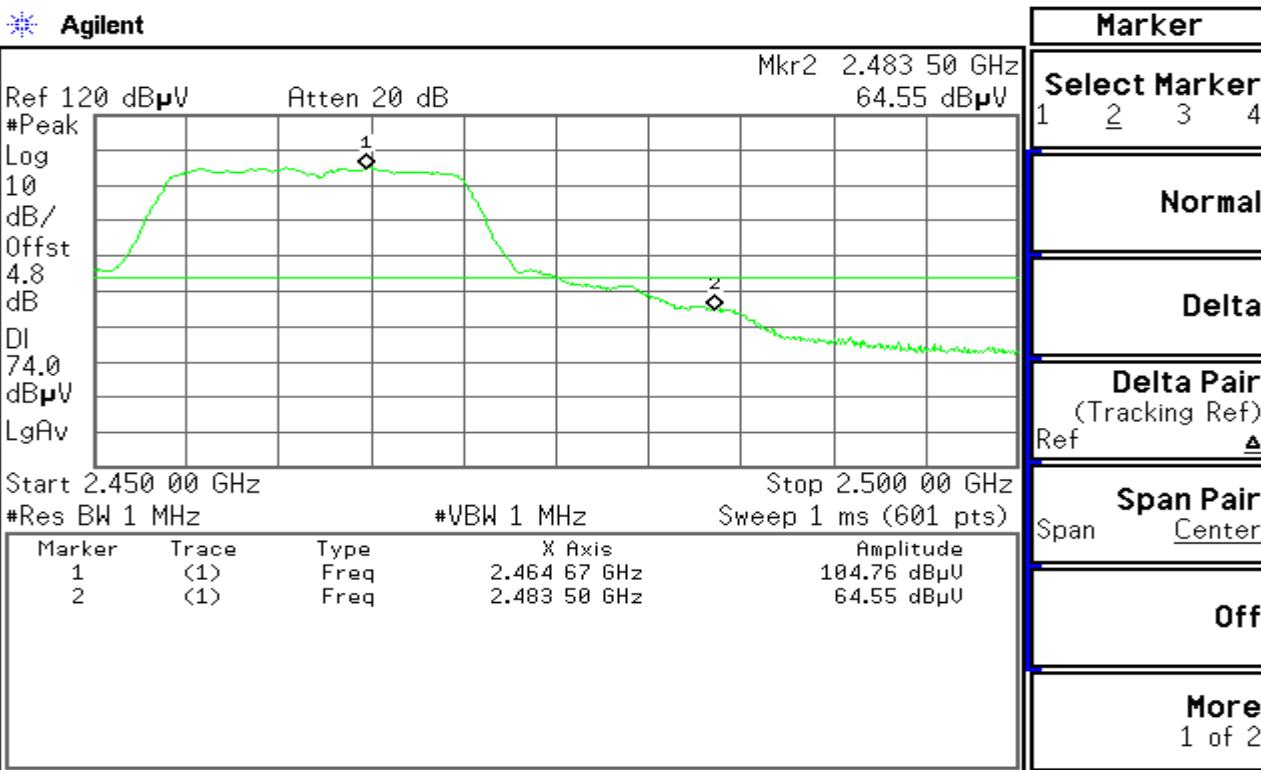




Band Edges (CH High)

Detector mode: Peak

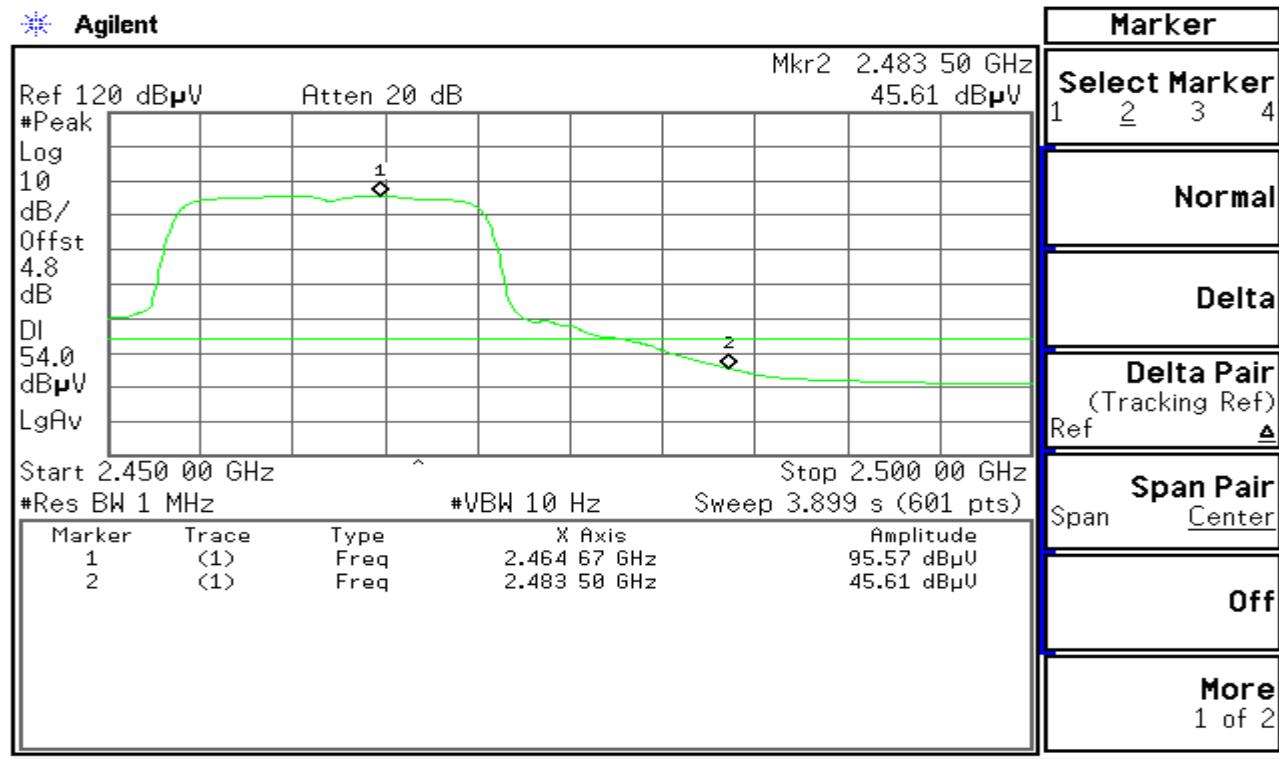
Polarity: Vertical



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Detector mode: Average

Polarity: Vertical

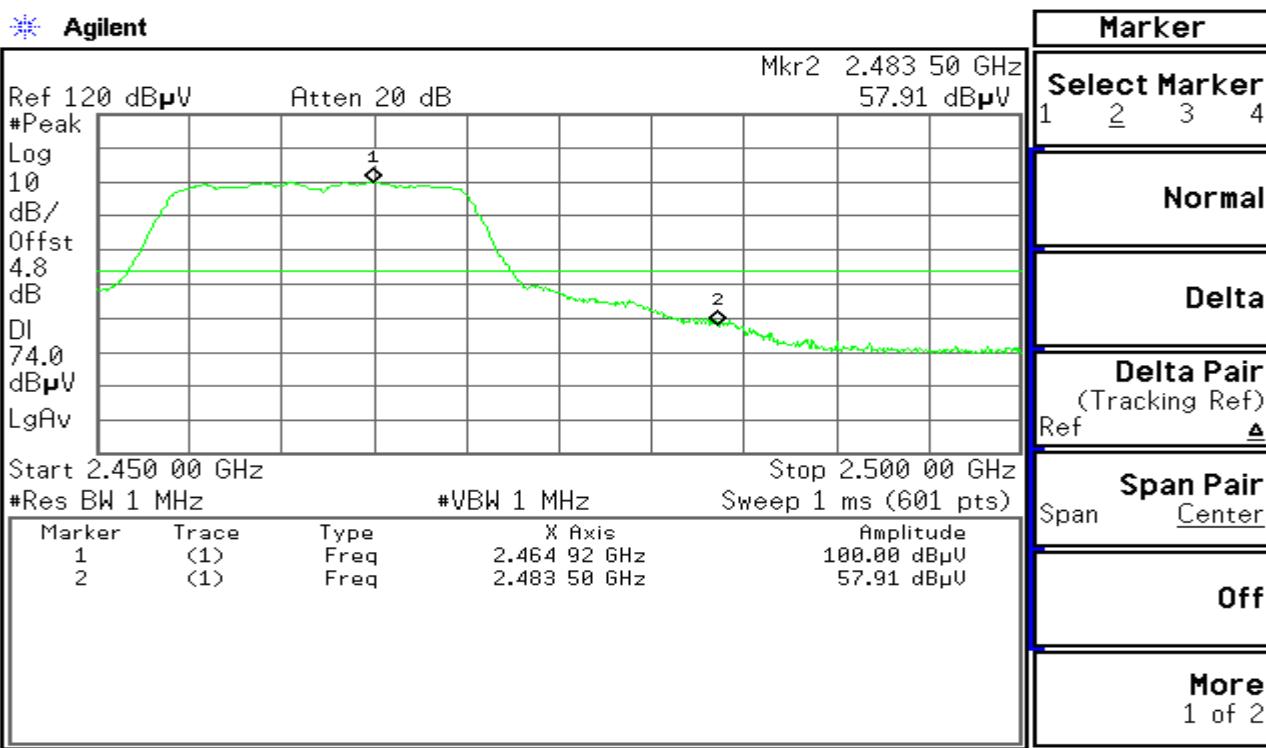


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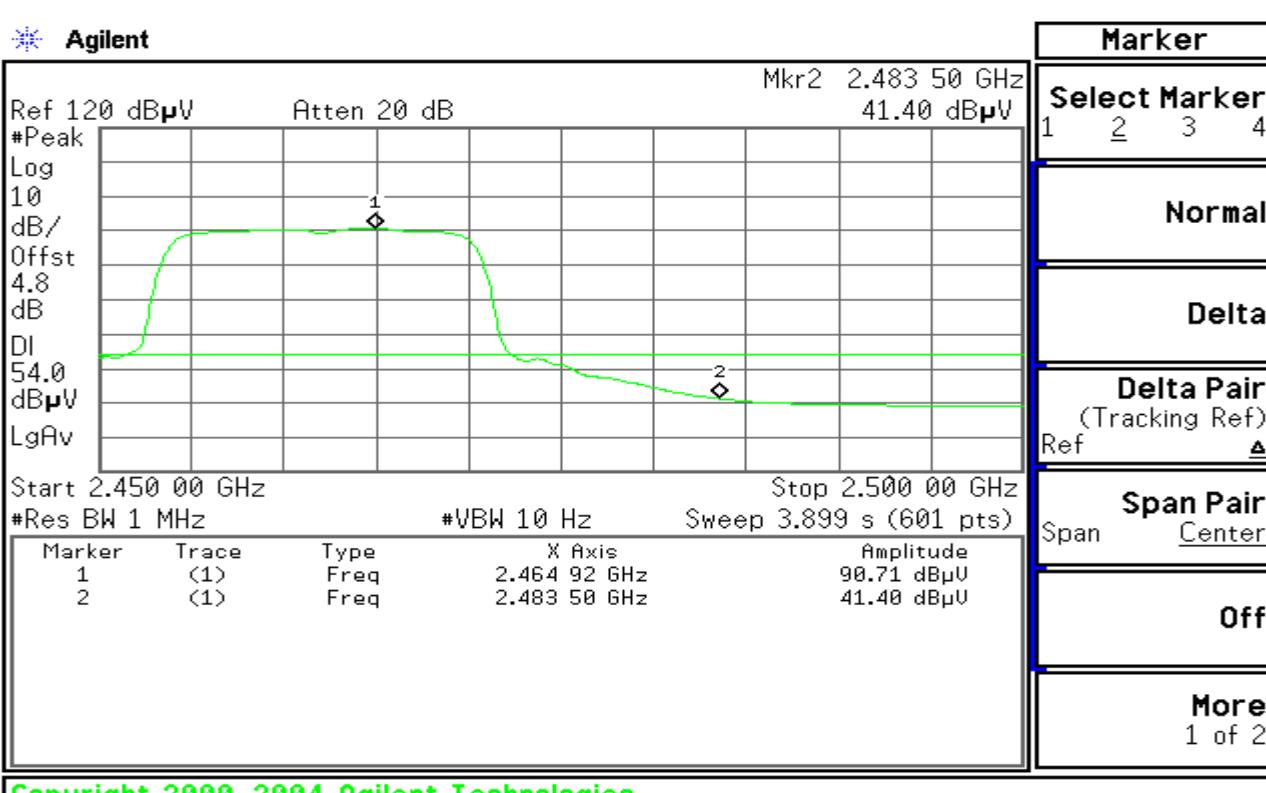
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal





7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

7.6.1. 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.

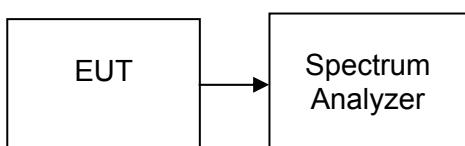
7.6.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	04/24/2010

7.6.3. 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.

7.6.4. TEST SETUP



r



7.6.5. TEST RESULTS

No non-compliance noted

Test Data

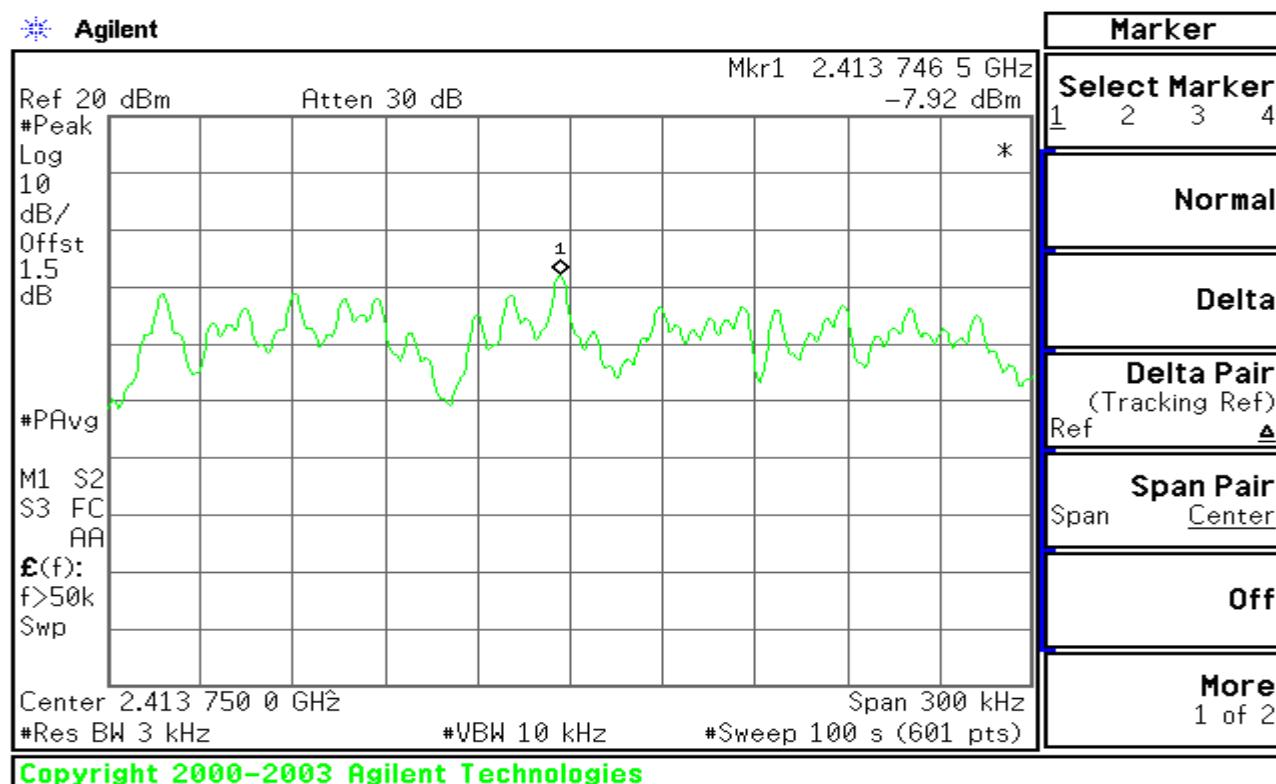
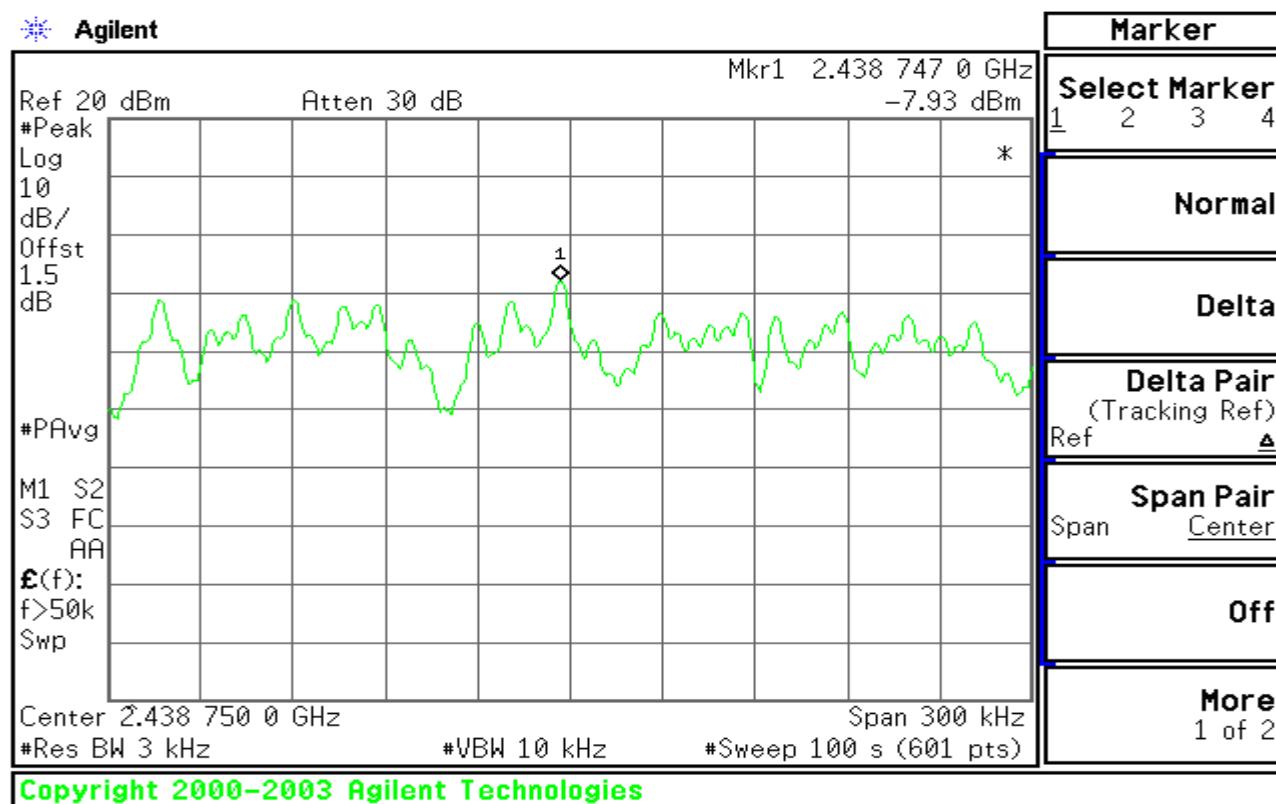
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-7.92	8.00	PASS
Mid	2437	-7.93		PASS
High	2462	-7.64		PASS

Test Data

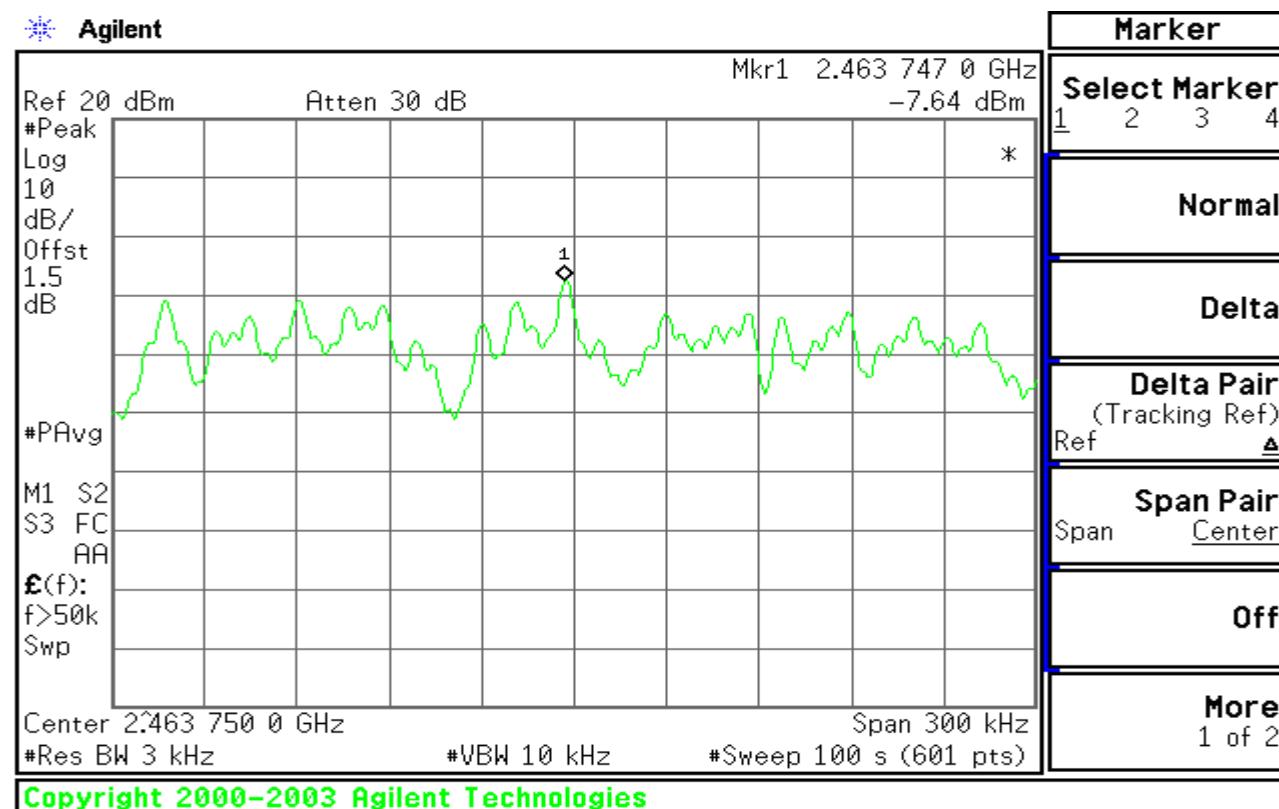
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-14.34	8.00	PASS
Mid	2437	-14.57		PASS
High	2462	-14.27		PASS

Test Plot (IEEE 802.11b mode)**PPSD (CH Low)****PPSD (CH Mid)**

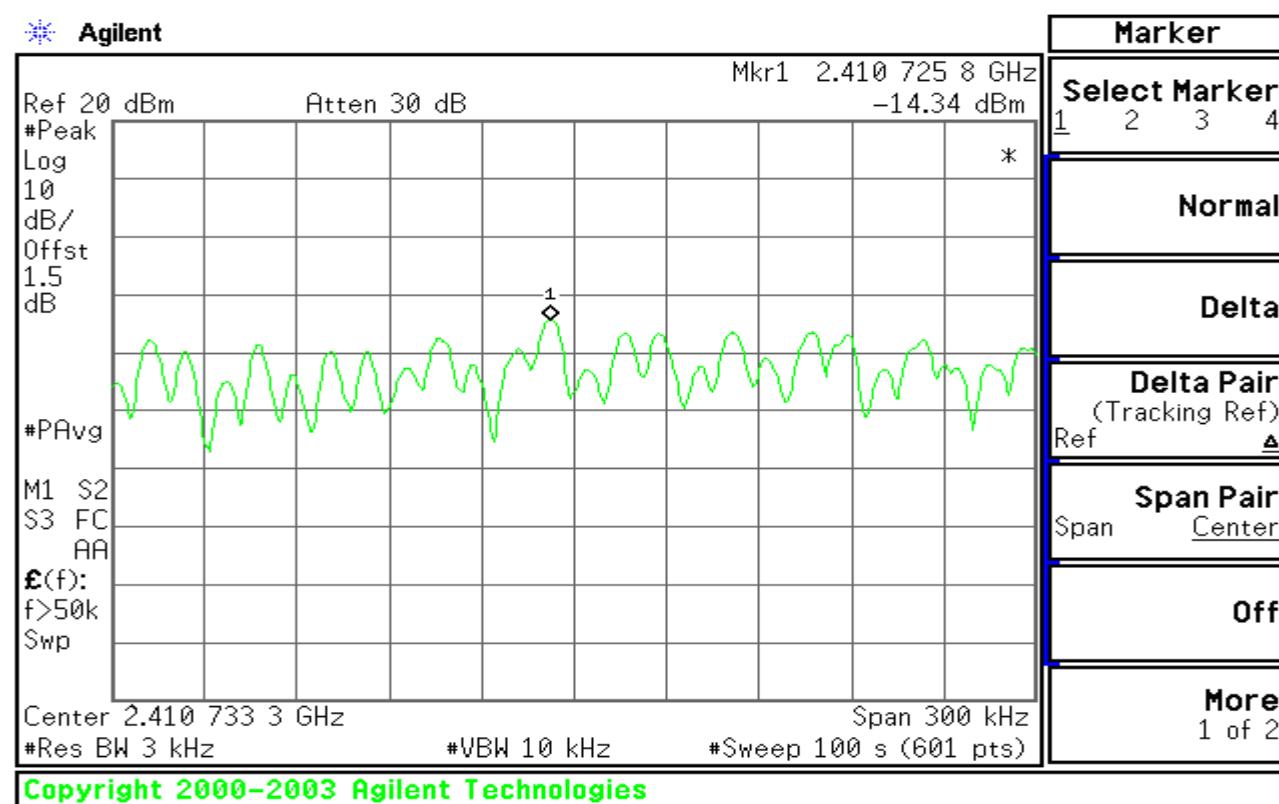


PPSD (CH High)



Test Plot (IEEE 802.11g mode)

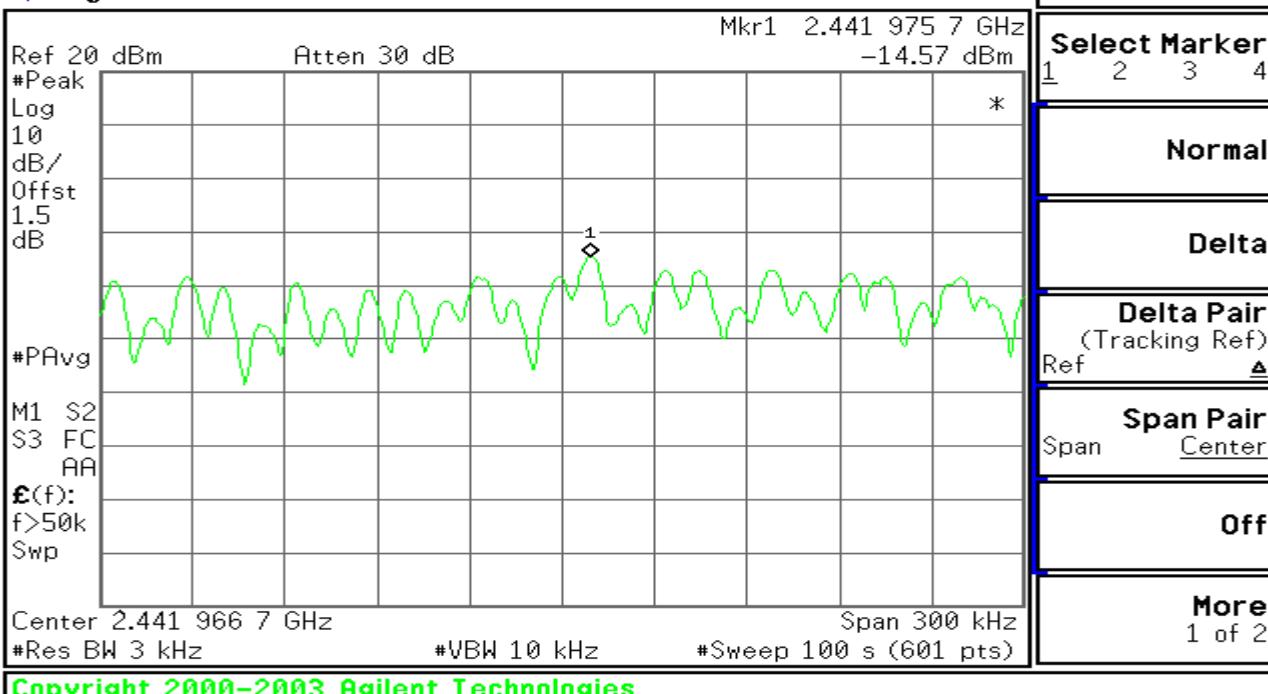
PPSD (CH Low)





PPSD (CH Mid)

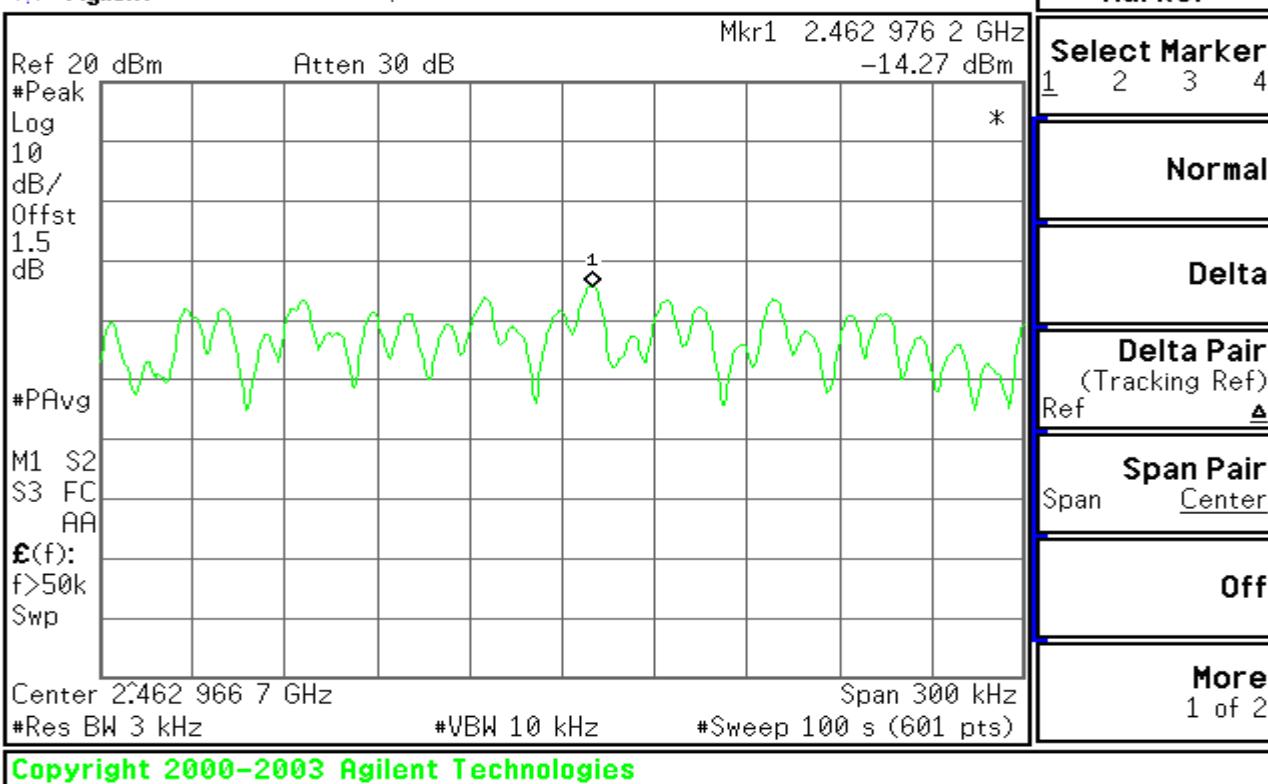
Agilent



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PPSD (CH High)

Agilent



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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	HSDPA/WCDMA/EDGE/GPRS/GSM850/900/1800/1900/2100MHz BT/WiFi/GPS Mobile Phone
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> Bluetooth: <u>2.402GHz ~ 2.480 GHz</u>
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation)
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b: 16.29 dBm (42.56mW) IEEE 802.11g: 12.95 dBm (19.72mW)
Antenna gain (Max)	1dBi (Numeric gain: 1.259)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

Remark:

1. The maximum output power is 16.29dBm (42.56mW) at 2442MHz (with 1.259 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/cm² even if the calculation indicates that the power density would be larger.



TEST RESULTS

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:

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

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d (m) / 100

Yields

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

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Maximum Permissible Exposure

EUT output power = 42.56mW

Numeric Antenna gain = 1.0

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 / cm²

→ Power density = 0.008mW / cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)