



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

**Handheld Terminal**

**Model: H-15**

**Trade Name: OPTICON**

*Issued to*

**OPTOELECTRONICS Co., Ltd.**  
4-12-17, Tsukagoshi chome, Warabi-shi,  
Saitama 335-0002 Japan

*Issued by*



**Compliance Certification Services Inc.**  
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## 1. TEST RESULT CERTIFICATION

**Applicant:** OPTOELECTRONICS Co., Ltd.  
4-12-17, Tsukagoshi chome, Warabi-shi,  
Saitama 335-0002 Japan

**Equipment Under Test:** Handheld Terminal

**Trade Name:** OPTICON

**Model:** H-15

**Date of Test:** July 30 ~ August 5, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

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.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

*Reviewed by:*

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Rex Lai  
Section Manager  
Compliance Certification Services Inc.

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Amanda Wu  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	Handheld Terminal
<b>Trade Name</b>	OPTICON
<b>Model Number</b>	H-15
<b>Model Discrepancy</b>	N/A
<b>Power Supply</b>	1. Power from Adapter Fuente / SFP0602000P Rating: I/P: AC 100-240VAC, 50-60Hz, 0.5A 2. Power from Battery OPTICON / BTR0300 Rating: 3.7VDC, 1880mAh
<b>Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	IEEE 802.11b: 15.30 dBm IEEE 802.11g: 16.26 dBm
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b Mode: 11, 5.5, 2, 1 Mbps IEEE 802.11g Mode: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1Mbps
<b>Number of Channels</b>	11 Channels
<b>Antenna Specification</b>	Gain: 3.45 dBi
<b>Antenna Designation</b>	PIFA Antenna

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **UFOH15** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### **3.5 DESCRIPTION OF TEST MODES**

The EUT (model: H-15) 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 and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

IEEE 802.11b mode:

Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1Mbps data rate were chosen for the final testing.

IEEE 802.11g mode:

Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6Mbps data rate were chosen for the final testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z mode), lie-down position (X, Y mode) and cradle mode. The worst emission was found in cradle mode for powerline conducted emissions, Z mode for radiation emissions and the worst cases were recorded.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	02/24/2009
Power Meter	Agilent	E4416A	GB41291611	04/06/2009
Power Sensor	Agilent	E9327A	US40441097	06/19/2009

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/29/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/03/2009
4 Port Switch	TRC	4 Port Switch	SC94050020	05/03/2009
Horn-Antenna	TRC	HA-0502	06	06/04/2009
Horn-Antenna	TRC	HA-0801	04	06/19/2009
Horn-Antenna	TRC	HA-1201A	01	08/11/2009
Horn-Antenna	TRC	HA-1301A	01	08/11/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/28/2009
Loop Antenna	EMCO	6502	8905/2356	05/29/2009
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: 2324G-1 / -2	10/17/2009 11/04/2010
Test S/W	LABVIEW (V 6.1)			

*Remark: The measurement uncertainty is less than  $\pm 3.7046\text{dB}$  (30MHz ~ 1GHz),  $\pm 3.0958\text{dB}$  (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*



Conducted Emission Test Site # 1				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	SCHAFFNER	SCR 3501	410	12/16/2008
LISN	R&S	ESH3-Z5	848773/014	10/27/2009
LISN	FCC	FCC-LISN-50/250-16-2-07	06012	11/11/2009
Pulse Limiter	R&S	ESH3-Z2	100230	10/31/2009
Test S/W	LabVIEW 6.1 (CCS Conduction Test SW Version_01)			

**Remark:** The measurement uncertainty is less than +/- 1.93dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

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

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☒ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 EQUIPMENT**




Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

**5.3 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1309) to perform FCC Part 15/18 measurements	 FCC MRA: TW1309
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 & IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

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

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	DELL	PP05L	7T390 A03	E2K5HCKT	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	PC	PL926AV	SGH528048P	FCC DoC	HP	N/A	Unshielded, 1.8m
3.	LCD Monitor	173P	DII7H4JXB049 68Y	FCC DoC	Samsung	Shielded, 1.8m with 2 cores	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
4.	Printer	B241A	FAPY150357	FCC DoC	EPSON	Shielded, 1.8m	Unshielded, 1.8m
5.	Modem	DM-1414	304012269	IFAXDM1414	ACEEX	Shielded, 1.8m	Unshielded, 1.8m
6.	Multimedia Earphone	Axis-301	N/A	FCC DoC	Labtec	Unshielded, 1.8m*2	N/A
7.	USB Keyboard	Sk-8115	N/A	FCC DoC	DELL	Shielded, 1.8m	N/A
8.	USB Mouse	M056U0A	F0R00D2V	FCC DoC	DELL	Shielded, 1.8m	N/A



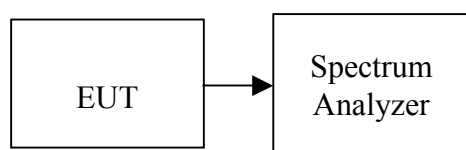
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6DB BANDWIDTH

#### LIMIT

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.

#### Test Configuration



#### TEST PROCEDURE

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.

#### TEST RESULTS

*No non-compliance noted.*

**Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.08	>500	PASS
Mid	2437	10.17		PASS
High	2462	10.25		PASS

**Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.50	>500	PASS
Mid	2437	16.50		PASS
High	2462	16.50		PASS



## Test Plot

### IEEE 802.11b

#### 6dB Bandwidth (CH Low)

Agilent 17:29:41 Aug 5, 2008

R T

6dB BW, b Mode Low Ch.

 $\Delta$  Mkr1 10.08 MHz

Ref 20 dBm

Atten 30 dB

-2.28 dB

#Peak

Log

10

dB/

Offst

7.5

dB

DI

-5.1

dBm

LgAv

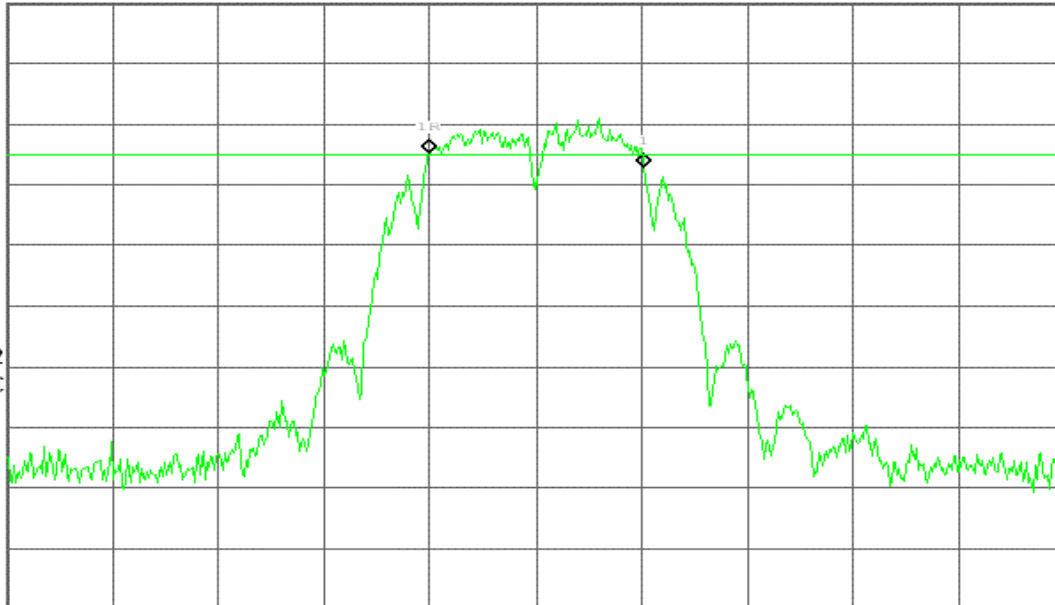
V1 S2

S3 FC

 $\alpha(f)$ :

FTun

Swp



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

#### 6dB Bandwidth (CH Mid)

Agilent 17:48:39 Aug 5, 2008

R T

6dB BW, b Mode Mid Ch.

 $\Delta$  Mkr1 10.17 MHz

Ref 20 dBm

Atten 30 dB

2.51 dB

#Peak

Log

10

dB/

Offst

7.5

dB

DI

-5.0

dBm

LgAv

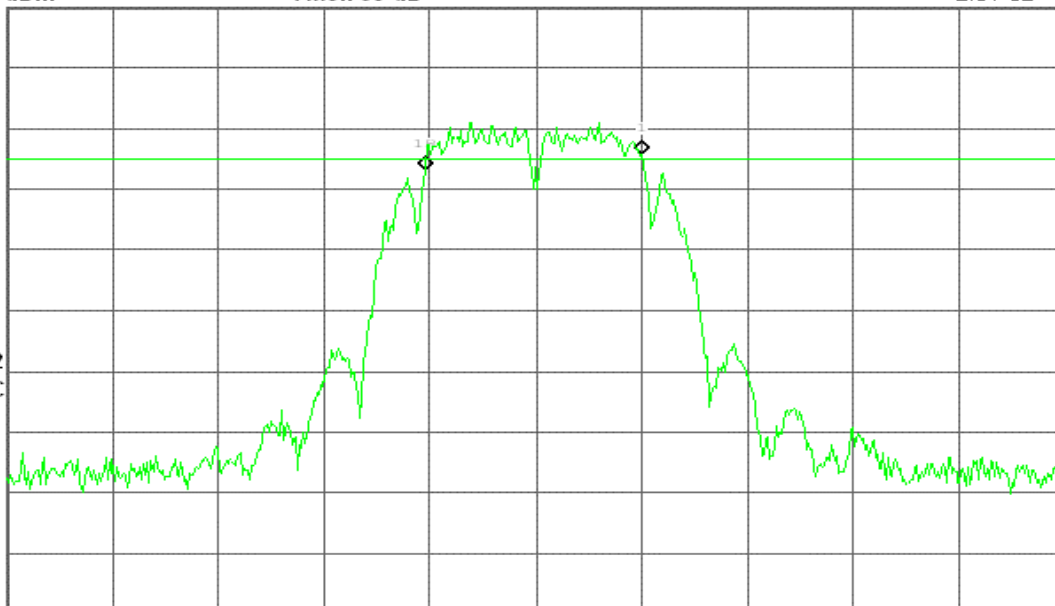
V1 S2

S3 FC

 $\alpha(f)$ :

FTun

Swp



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**6dB Bandwidth (CH High)**

\* Agilent 18:02:04 Aug 5, 2008

R T

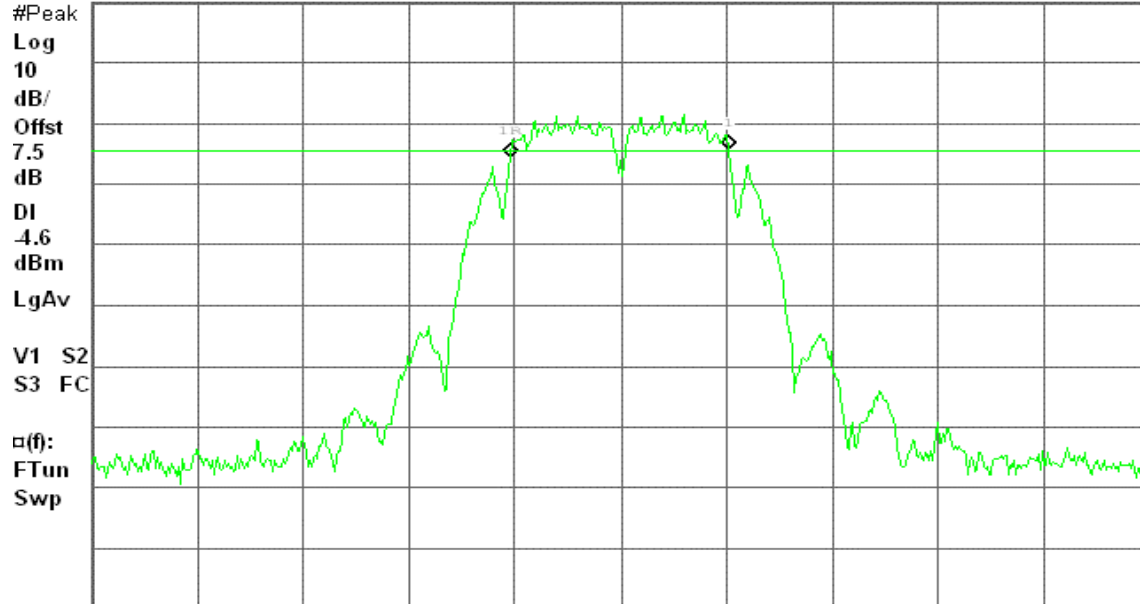
6dB BW, b Mode High Ch.

 $\Delta$  Mkr1 10.25 MHz

Ref 20 dBm

Atten 30 dB

1.15 dB



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

**IEEE 802.11g****6dB Bandwidth (CH Low)**

\* Agilent 18:20:13 Aug 5, 2008

R T

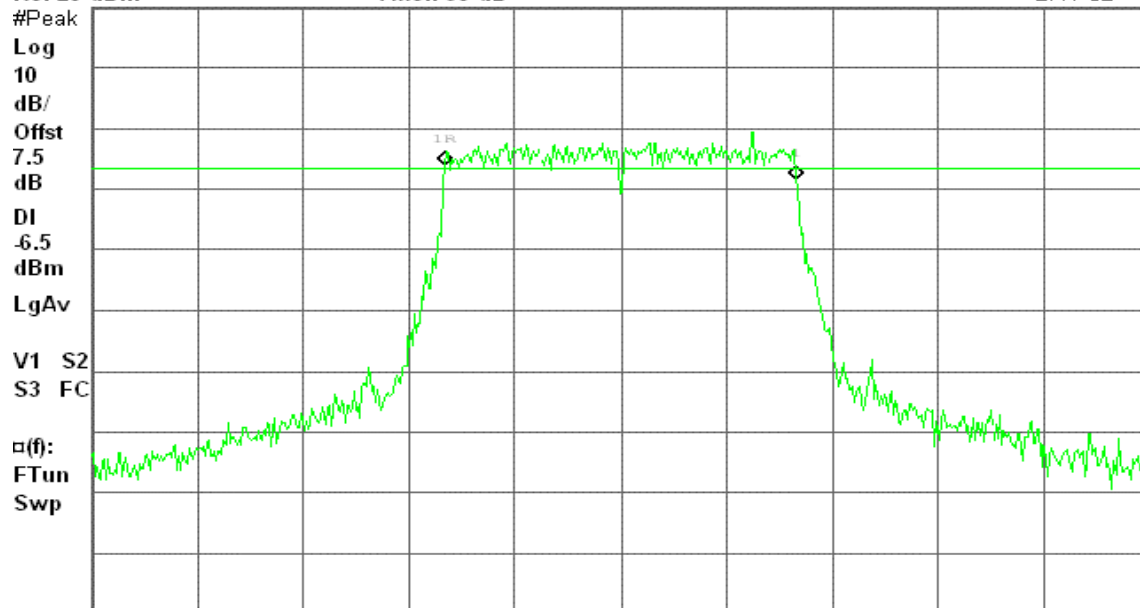
6dB BW, g Mode Low Ch.

 $\Delta$  Mkr1 16.50 MHz

Ref 20 dBm

Atten 30 dB

-2.41 dB



Center 2.412 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



## 6dB Bandwidth (CH Mid)

Agilent 18:29:53 Aug 5, 2008

R T

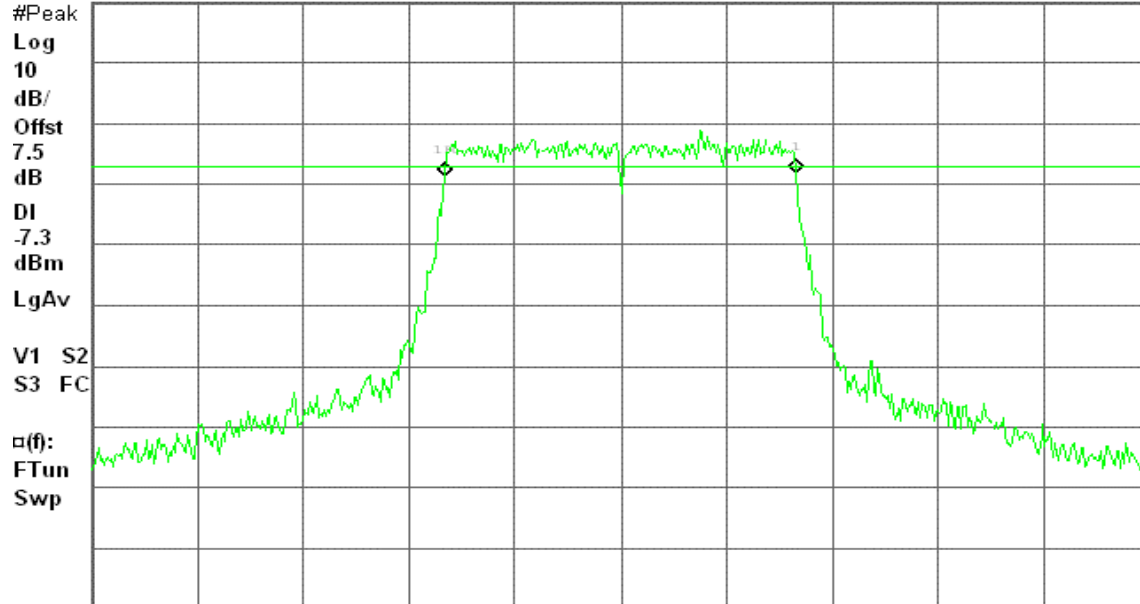
6dB BW, g Mode Mid Ch.

Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 30 dB

0.51 dB



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)

## 6dB Bandwidth (CH High)

Agilent 18:41:00 Aug 5, 2008

R T

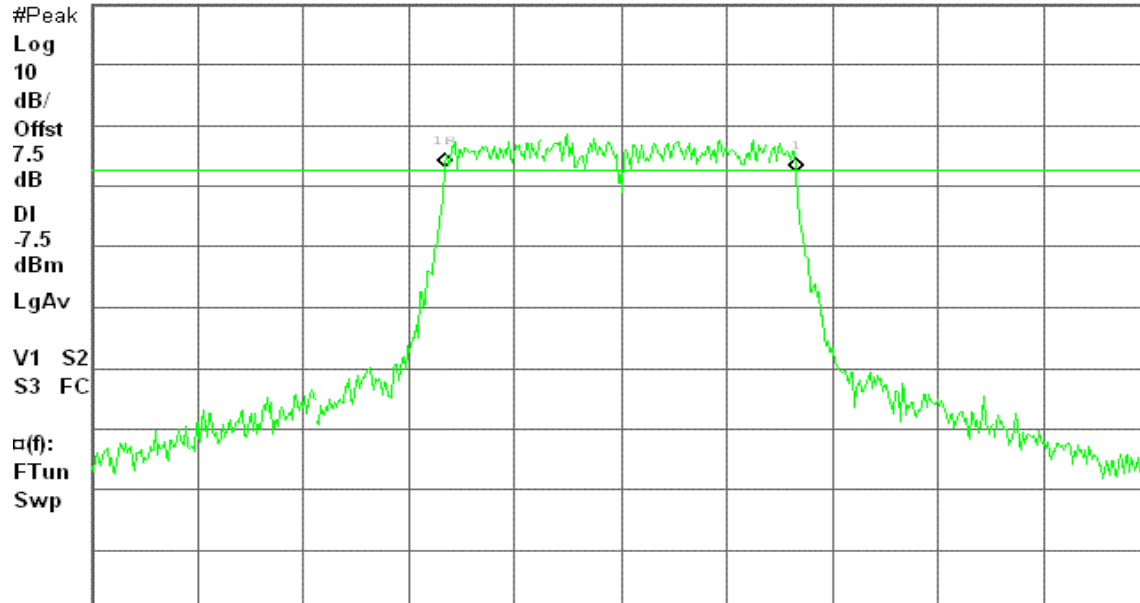
6dB BW, g Mode High Ch.

Δ Mkr1 16.50 MHz

Ref 20 dBm

Atten 30 dB

-0.67 dB



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



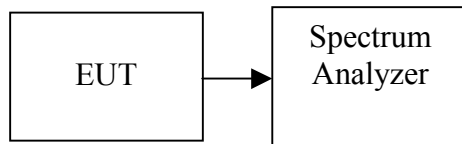
## 7.2 PEAK POWER

### LIMIT

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.

### Test Configuration



### TEST PROCEDURE

1. Peak power is measured using the spectrum analyzer's internal channel power integration function.
2. Power is integrated over a bandwidth greater than or equal to the 99% bandwidth.

### TEST RESULTS

*No non-compliance noted.*

#### Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	14.59	0.0288	1.00	PASS
Mid	2437	14.54	0.0284		PASS
High	2462	15.30	0.0339		PASS

#### Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.26	0.0423	1.00	PASS
Mid	2437	15.85	0.0385		PASS
High	2462	16.18	0.0415		PASS

**Test Plot****IEEE 802.11b****Peak Power (CH Low)**

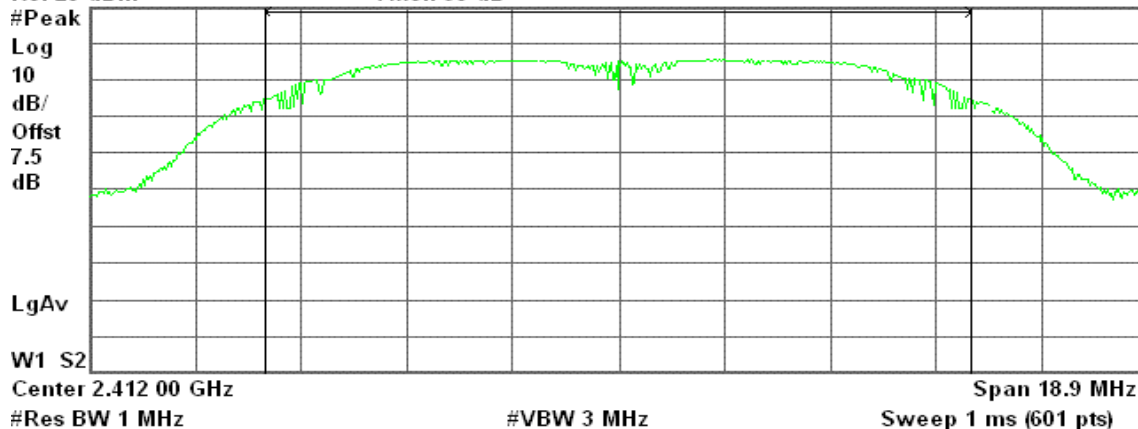
\* Agilent 17:31:58 Aug 5, 2008

R T

Peak Output Power, b Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

14.59 dBm / 12.5980 MHz

-56.41 dBm/Hz

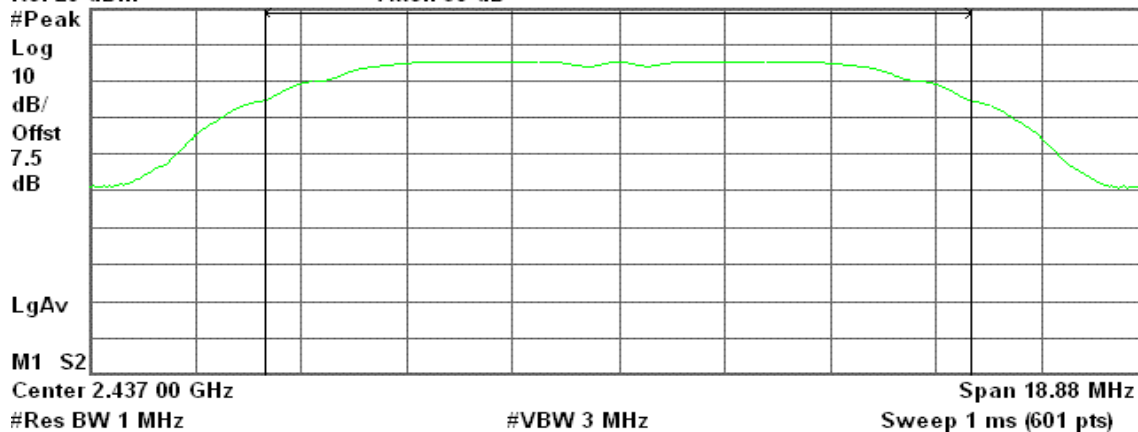
**Peak Power (CH Mid)**

\* Agilent 17:58:56 Aug 5, 2008

R T

Ref 20 dBm

Atten 30 dB



Channel Power

Power Spectral Density

14.54 dBm / 12.5850 MHz

-56.46 dBm/Hz



## Peak Power (CH High)

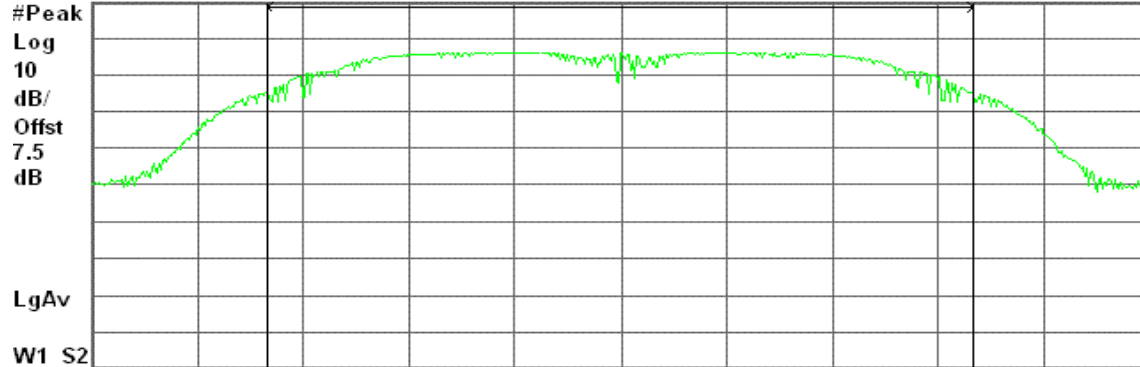
Agilent 18:03:41 Aug 5, 2008

R T

Peak Output Power , b Mode High Ch.

Ref 20 dBm

Atten 30 dB



Center 2.462 00 GHz

Span 18.88 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

15.30 dBm / 12.5880 MHz

-55.70 dBm/Hz

## IEEE 802.11g

### Peak Power (CH Low)

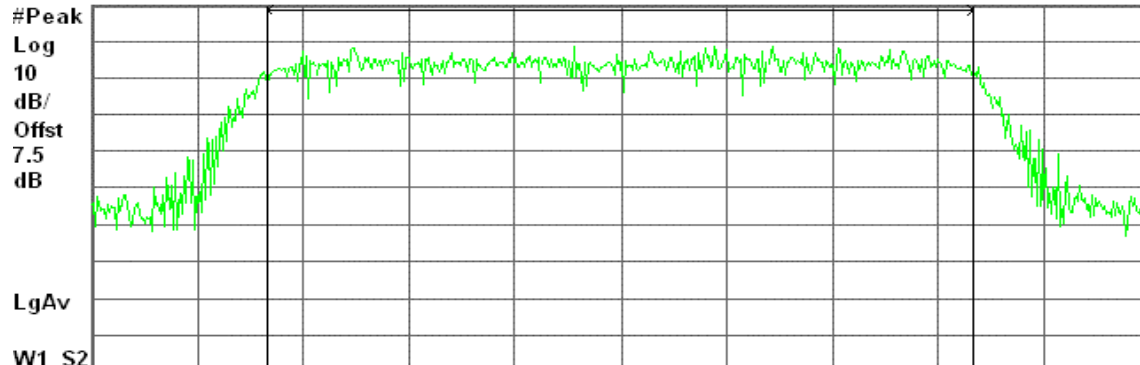
Agilent 18:21:56 Aug 5, 2008

R T

Peak Output Power , g Mode Low Ch.

Ref 20 dBm

Atten 30 dB



Center 2.412 00 GHz

Span 24.77 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.26 dBm / 16.5110 MHz

-55.92 dBm/Hz



## Peak Power (CH Mid)

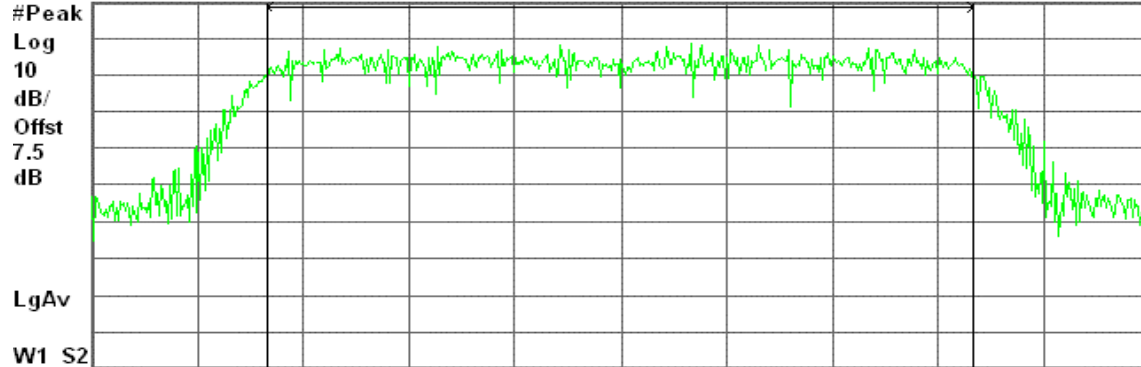
Agilent 18:31:38 Aug 5, 2008

R T

Peak Output Power , g Mode Mid Ch.

Ref 20 dBm

Atten 30 dB



Center 2.437 00 GHz

Span 24.71 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

15.85 dBm / 16.4710 MHz

-56.31 dBm/Hz

## Peak Power (CH High)

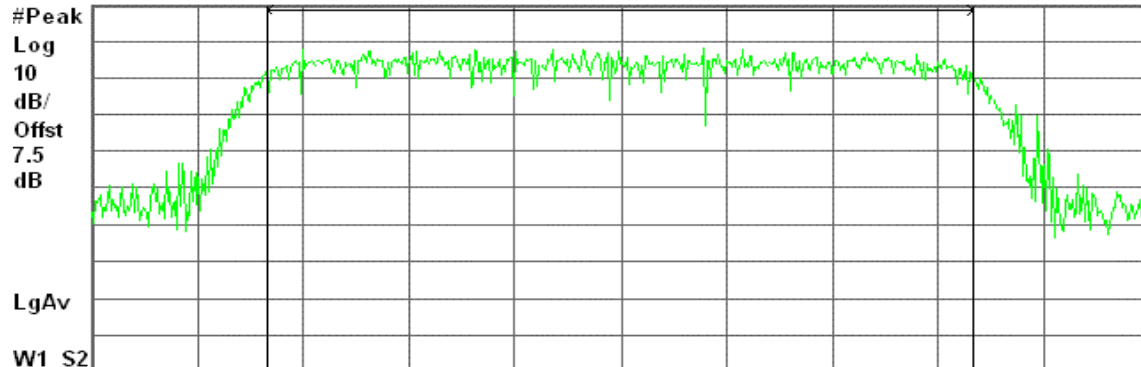
Agilent 18:46:11 Aug 5, 2008

R T

Peak Output Power , g Mode High Ch.

Ref 20 dBm

Atten 30 dB



Center 2.462 00 GHz

Span 24.78 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

16.18 dBm / 16.5210 MHz

-56.00 dBm/Hz

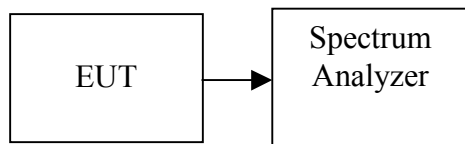


## **7.3 AVERAGE POWER**

### **LIMIT**

None; for reporting purposes only.

### **Test Configuration**



### **TEST PROCEDURE**

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

### **TEST RESULTS**

*No non-compliance noted.*



**Test Data**

**Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	12.05
Mid	2437	12.22
High	2462	12.76

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	12.92
Mid	2437	12.56
High	2462	12.96



## Test Plot

### IEEE 802.11b

#### Average Power (CH Low)

\* Agilent 17:33:32 Aug 5, 2008

R T

AVG Output Power , b Mode Low Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.5

dB

#PAvg

100

W1 S2

Center 2.412 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 18.9 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.05 dBm / 12.5980 MHz

-58.96 dBm/Hz

#### Average Power (CH Mid)

\* Agilent 17:51:14 Aug 5, 2008

R T

AVG Output Power , b Mode Mid Ch.

Ref 30 dBm

Atten 40 dB

#Samp

Log

10

dB/

Offst

7.5

dB

#PAvg

100

W1 S2

Center 2.437 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 18.88 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.22 dBm / 12.5850 MHz

-58.78 dBm/Hz



## Average Power (CH High)

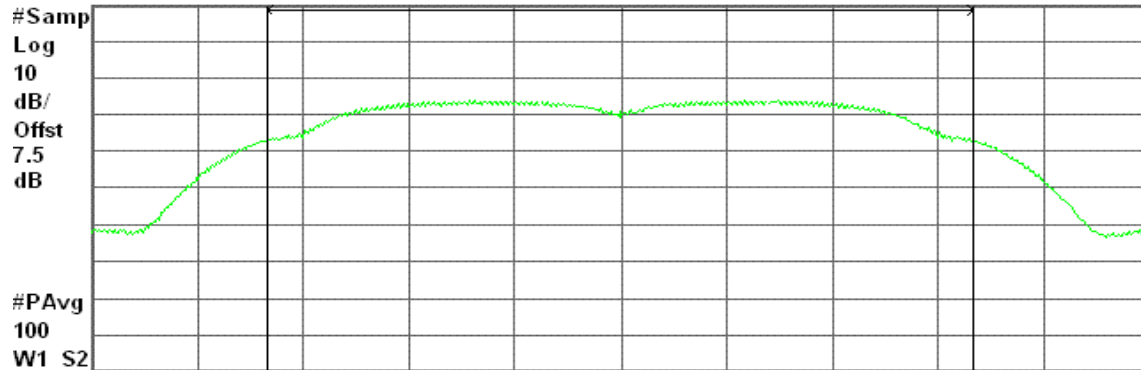
Agilent 18:10:44 Aug 5, 2008

R T

AVG Output Power , b Mode High Ch.

Ref 30 dBm

Atten 40 dB



Center 2.462 00 GHz

Span 18.88 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.76 dBm / 12.5880 MHz

-58.24 dBm/Hz

## IEEE 802.11g

### Average Power (CH Low)

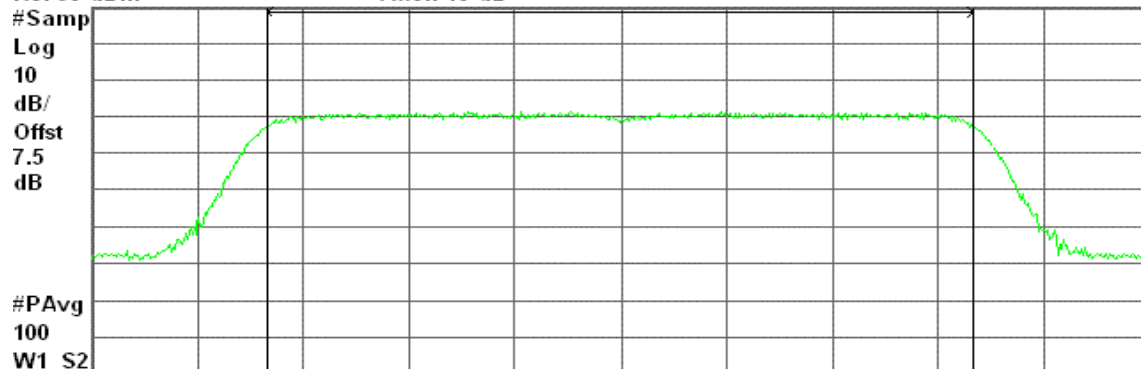
Agilent 18:23:04 Aug 5, 2008

R T

AVG Output Power , g Mode Low Ch.

Ref 30 dBm

Atten 40 dB



Center 2.412 00 GHz

Span 24.77 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.92 dBm / 16.5110 MHz

-59.26 dBm/Hz



## Average Power (CH Mid)

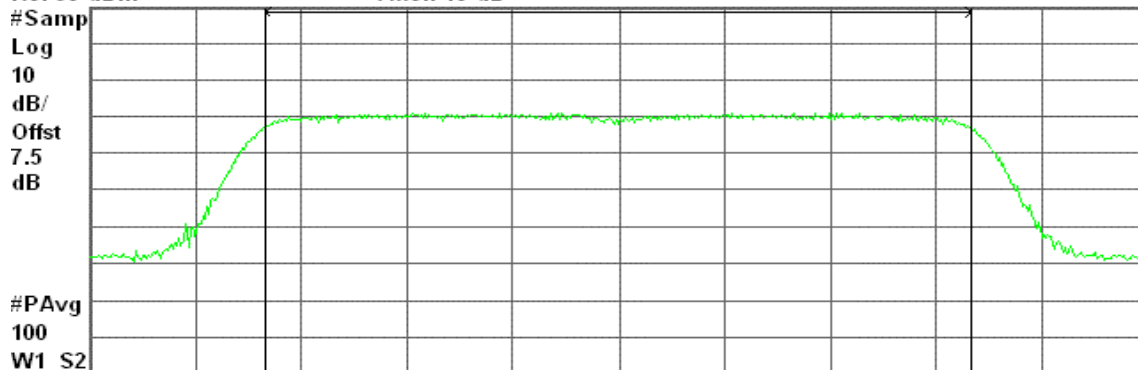
\* Agilent 18:33:25 Aug 5, 2008

R T

AVG Output Power , g Mode Mid Ch.

Ref 30 dBm

Atten 40 dB



Center 2.437 00 GHz

Span 24.71 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.56 dBm / 16.4710 MHz

-59.61 dBm/Hz

## Average Power (CH High)

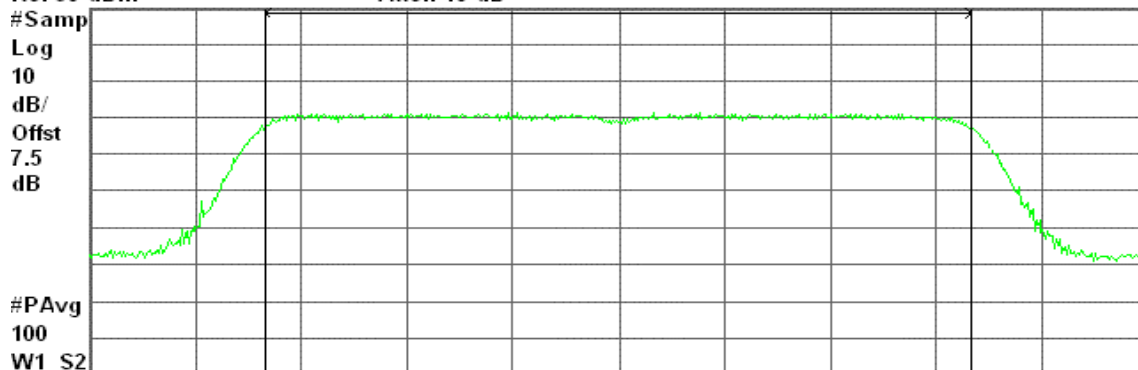
\* Agilent 18:48:03 Aug 5, 2008

R T

AVG Output Power , g Mode High Ch.

Ref 30 dBm

Atten 40 dB



Center 2.462 00 GHz

Span 24.78 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.96 dBm / 16.5210 MHz

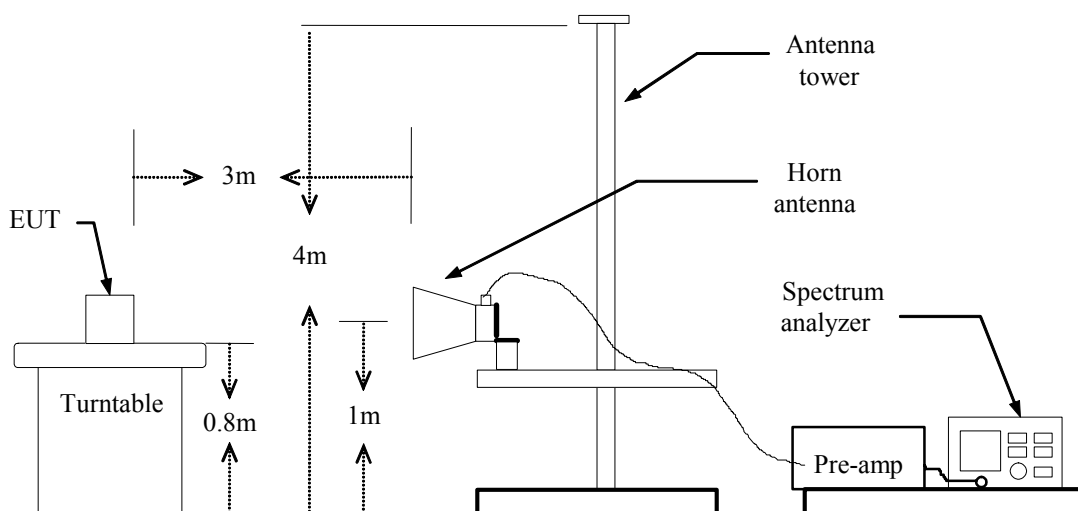
-59.23 dBm/Hz

## 7.4 BAND EDGES MEASUREMENT

### LIMIT

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)).

### Test Configuration

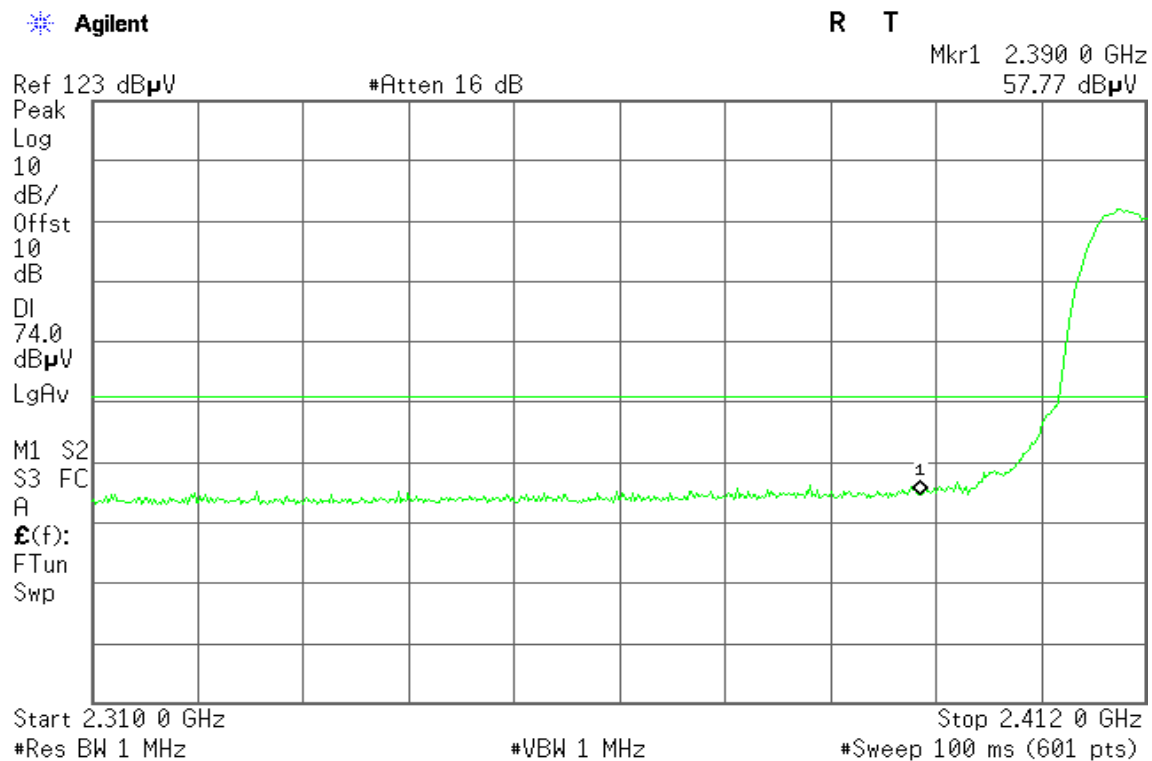
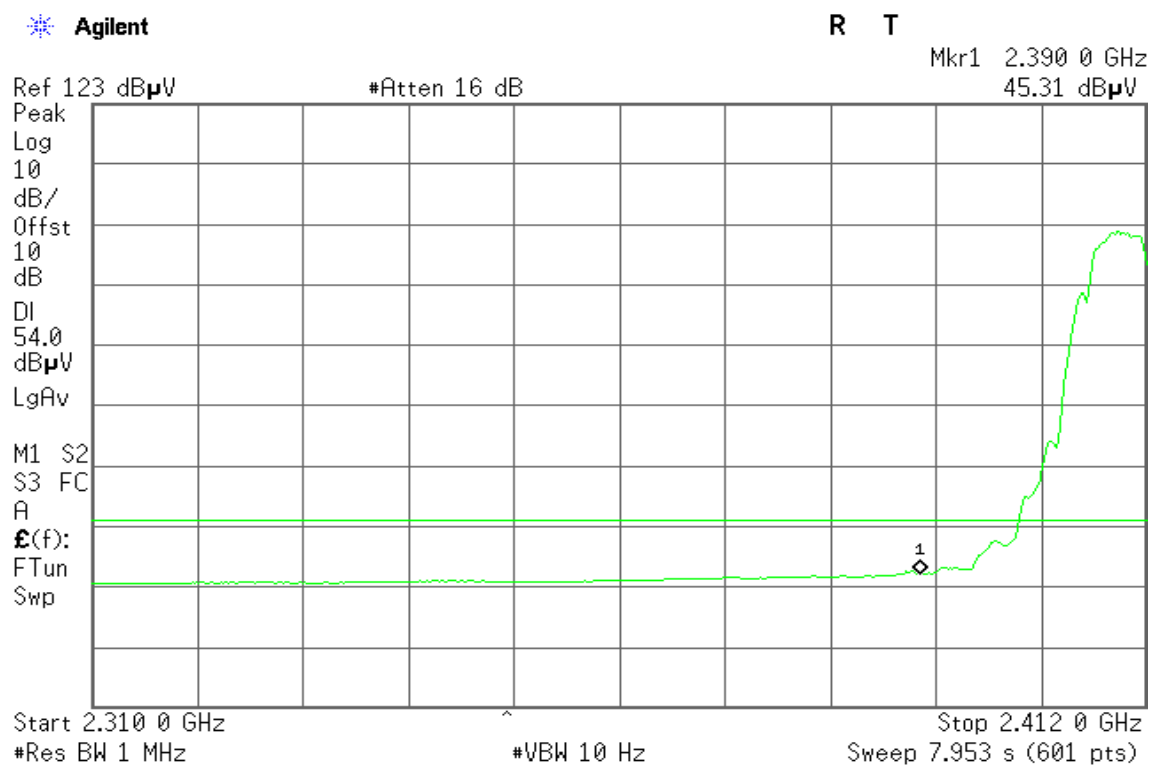


### TEST PROCEDURE

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 measured.

### TEST RESULTS

Refer to attach spectrum analyzer data chart.

**Band Edges (IEEE 802.11b / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

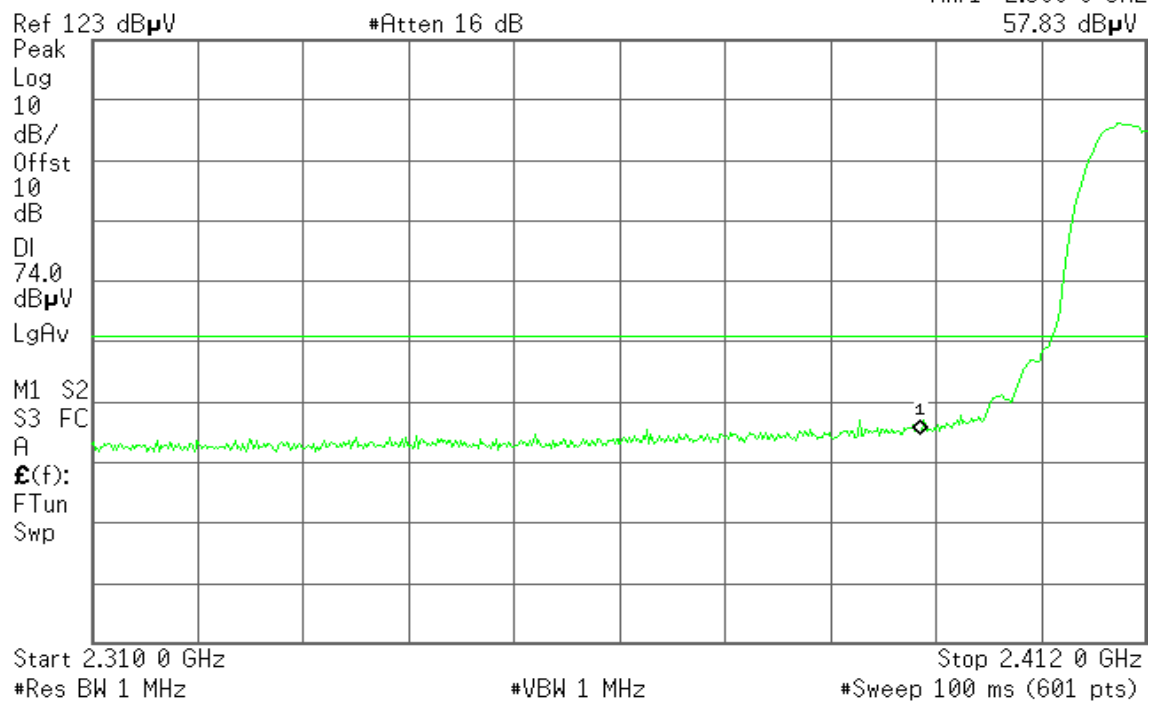


Detector mode: Peak

Polarity: Horizontal

Agilent

R T

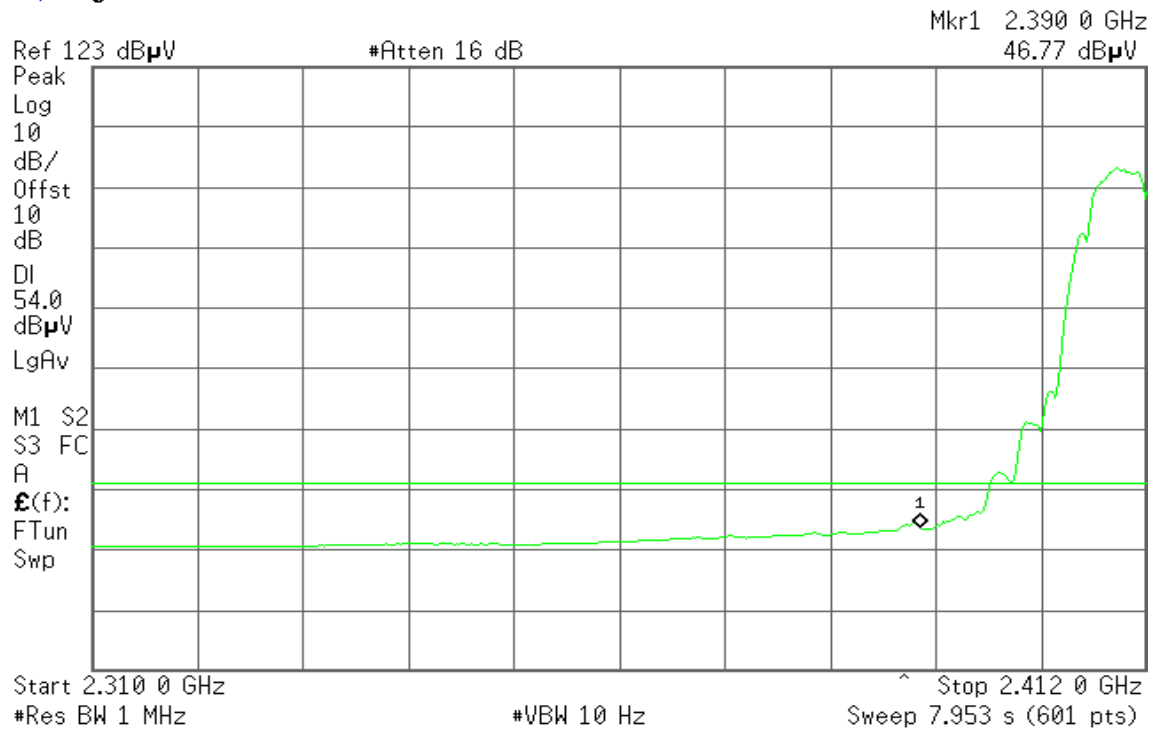


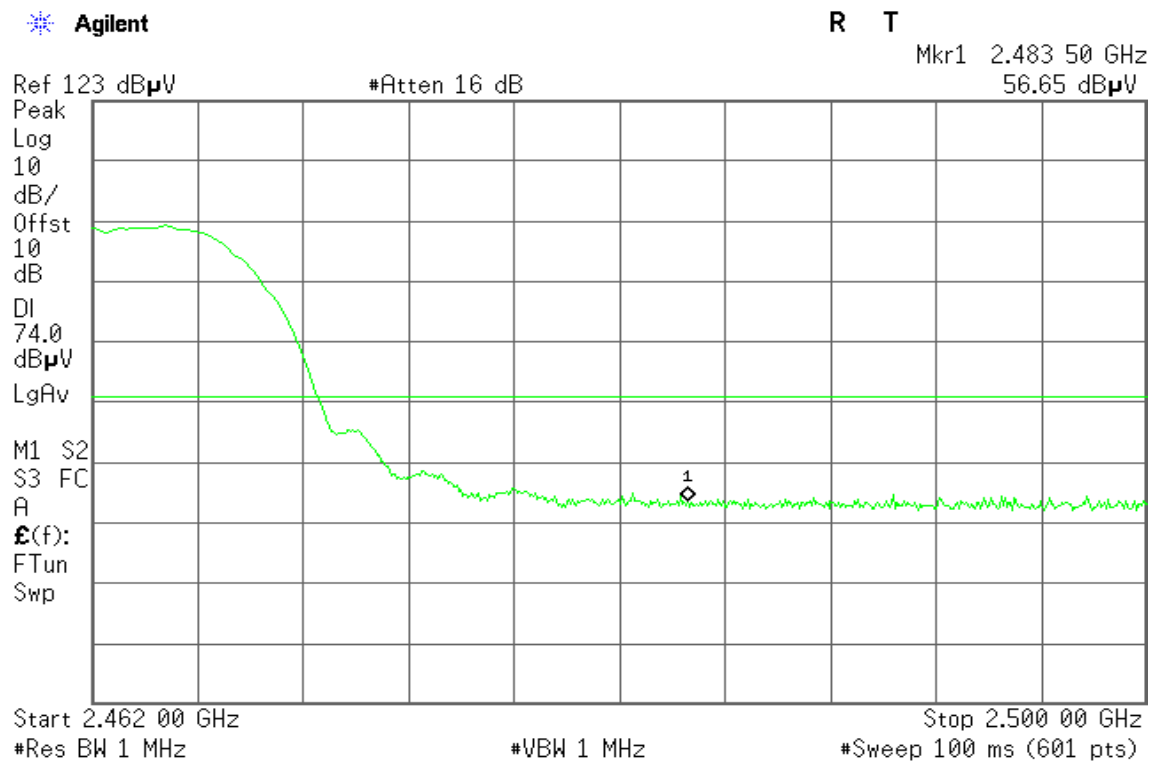
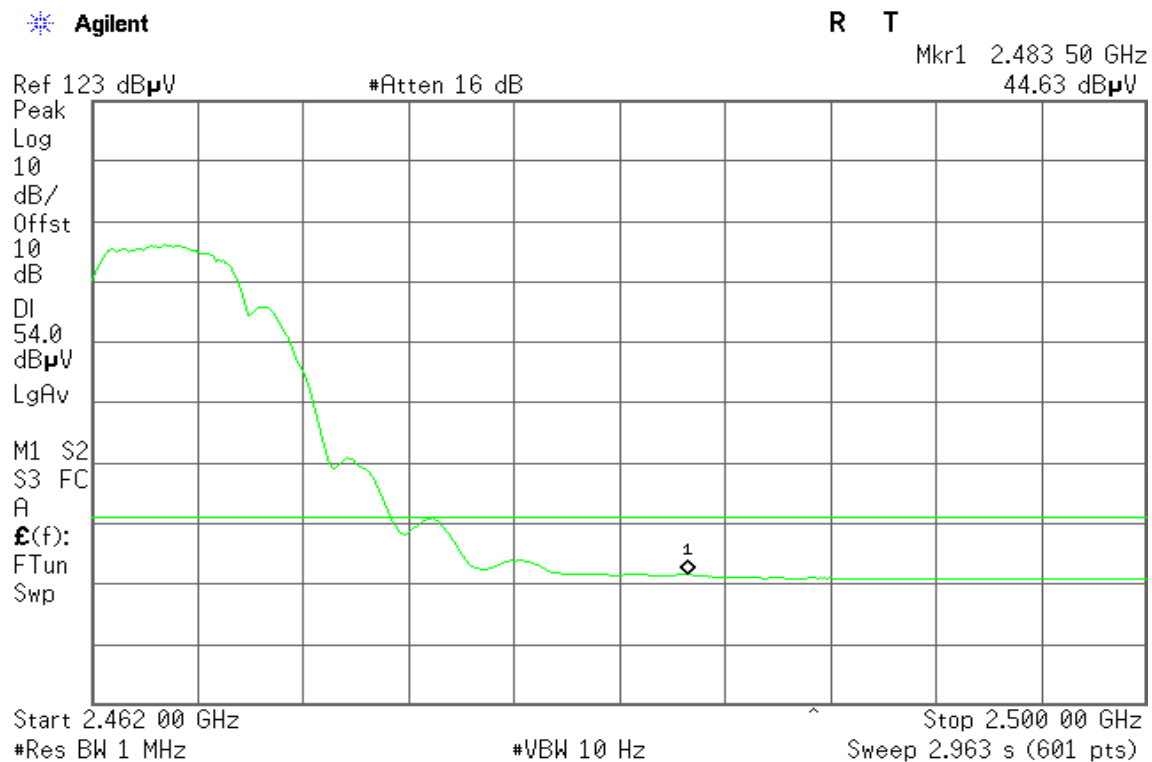
Detector mode: Average

Polarity: Horizontal

Agilent

R T



**Band Edges (IEEE 802.11b / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz  
59.52 dB $\mu$ V

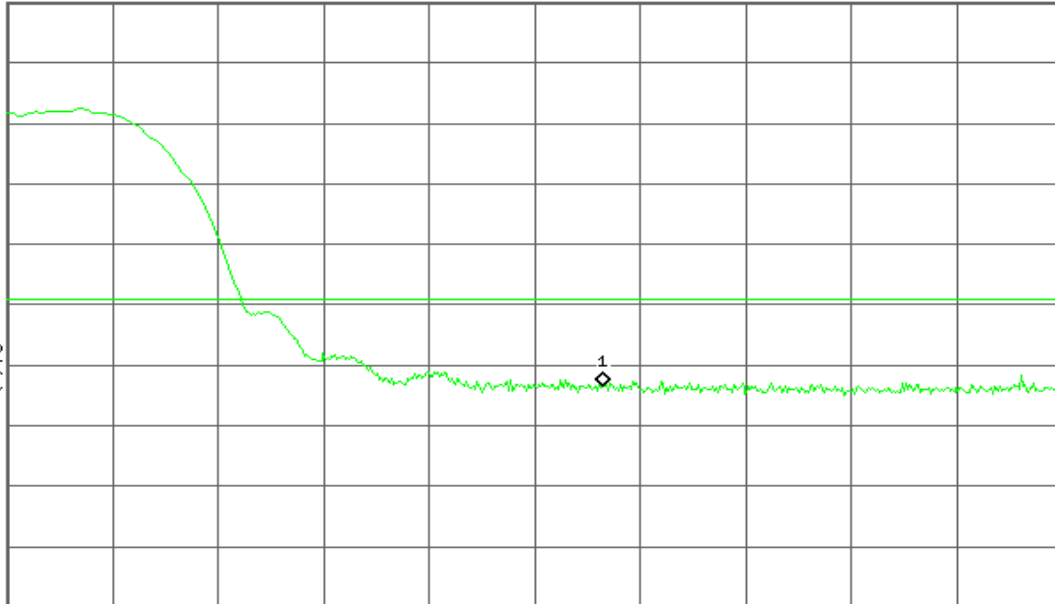
Ref 123 dB $\mu$ V

#Atten 16 dB

Peak  
Log  
10  
dB/  
Offst  
10  
dB  
DI  
74.0  
dB $\mu$ V  
LgAv

M1 S2  
S3 FC

$\mathcal{E}(f)$ :  
FTun  
Swp



Start 2.462 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz  
44.75 dB $\mu$ V

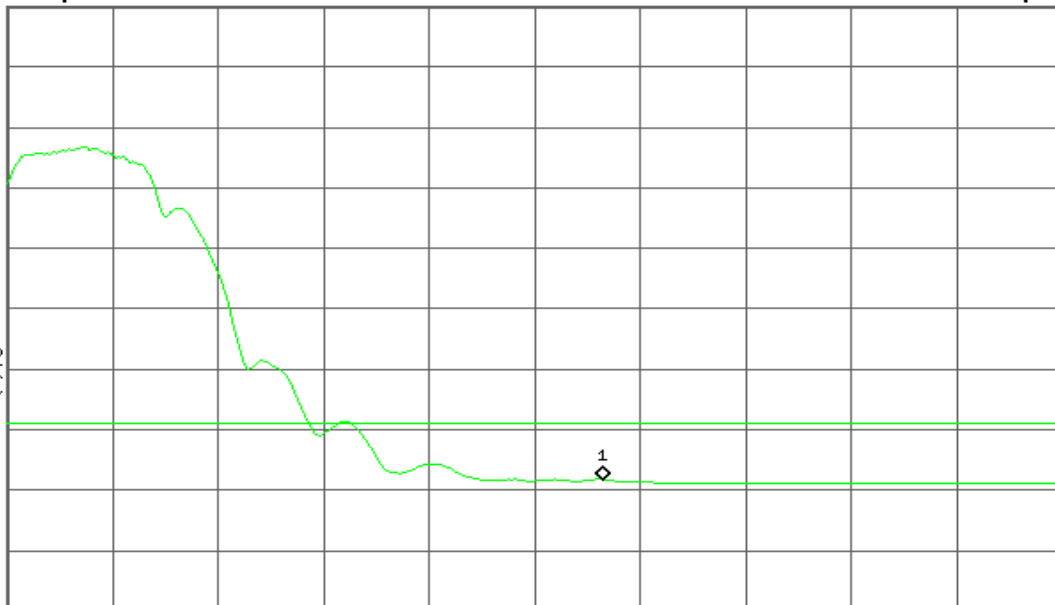
Ref 123 dB $\mu$ V

#Atten 16 dB

Peak  
Log  
10  
dB/  
Offst  
10  
dB  
DI  
54.0  
dB $\mu$ V  
LgAv

M1 S2  
S3 FC

A  
 $\mathcal{E}(f)$ :  
FTun  
Swp



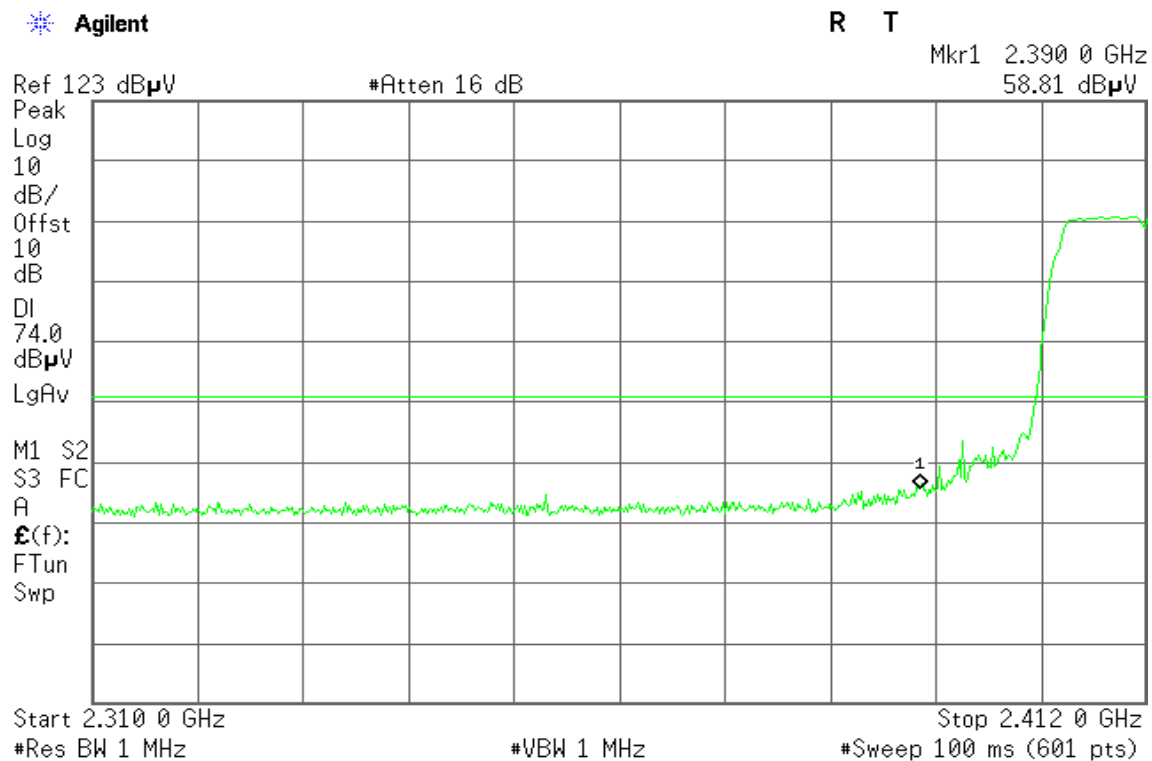
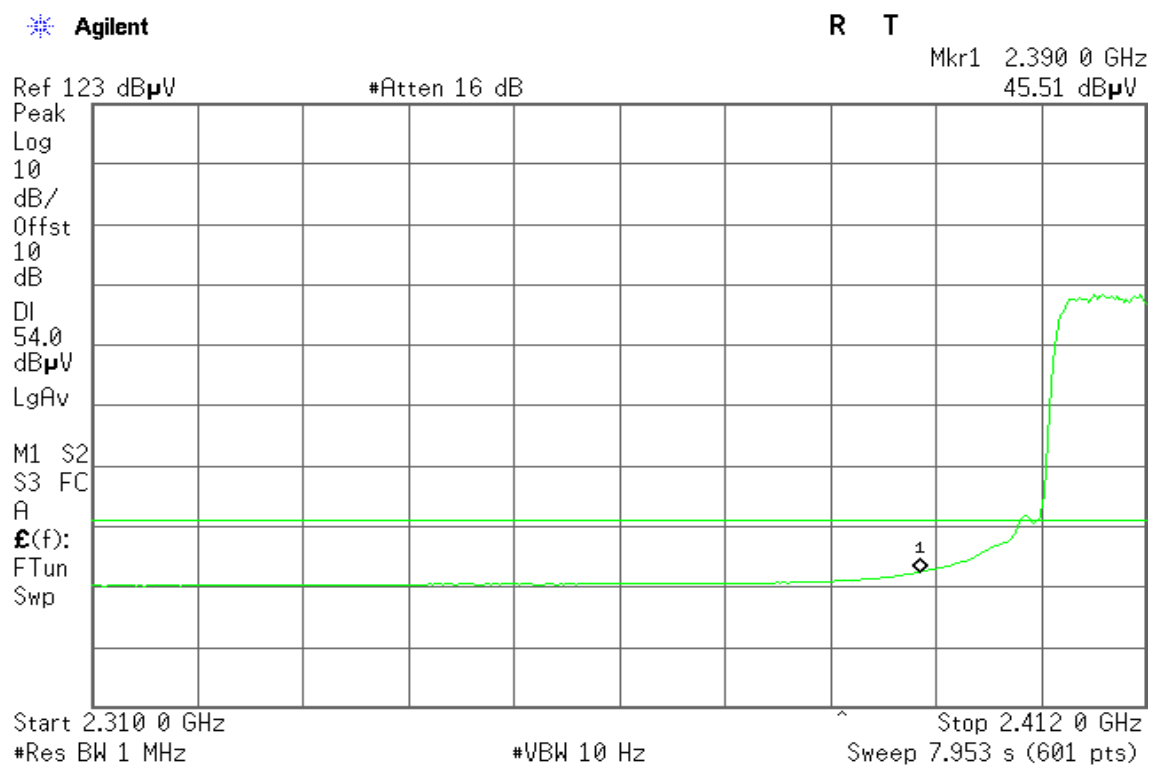
Start 2.462 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 2.963 s (601 pts)

**Band Edges (IEEE 802.11g / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

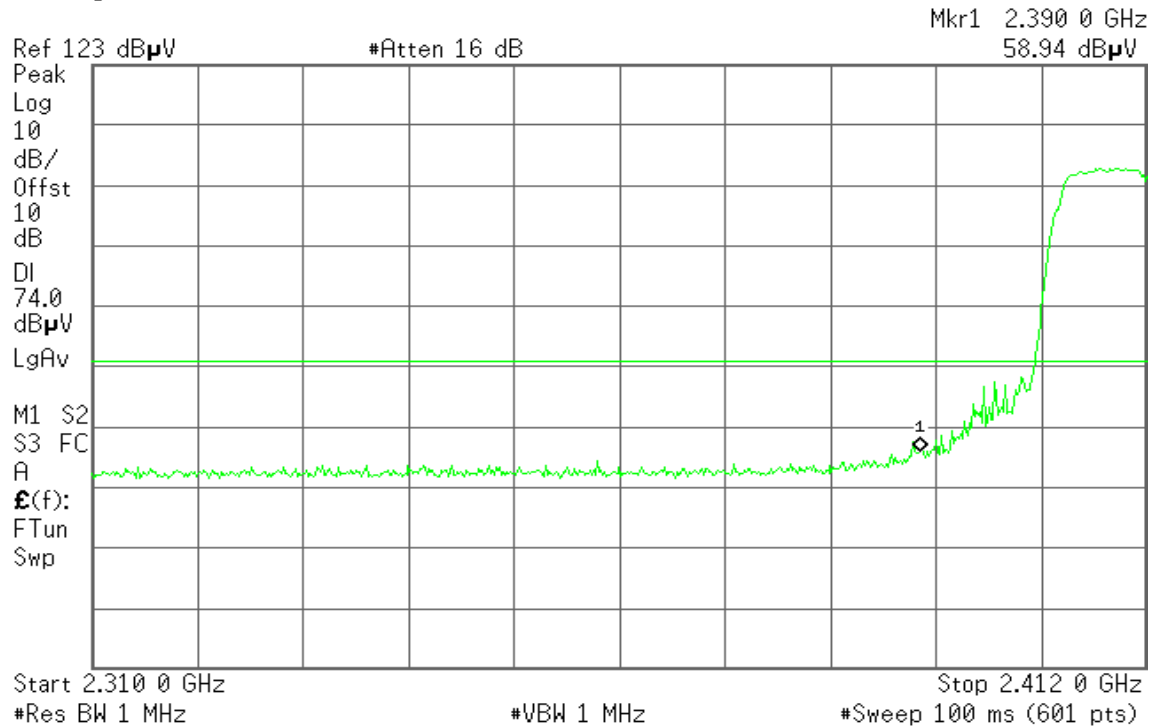


Detector mode: Peak

Polarity: Horizontal

Agilent

R T

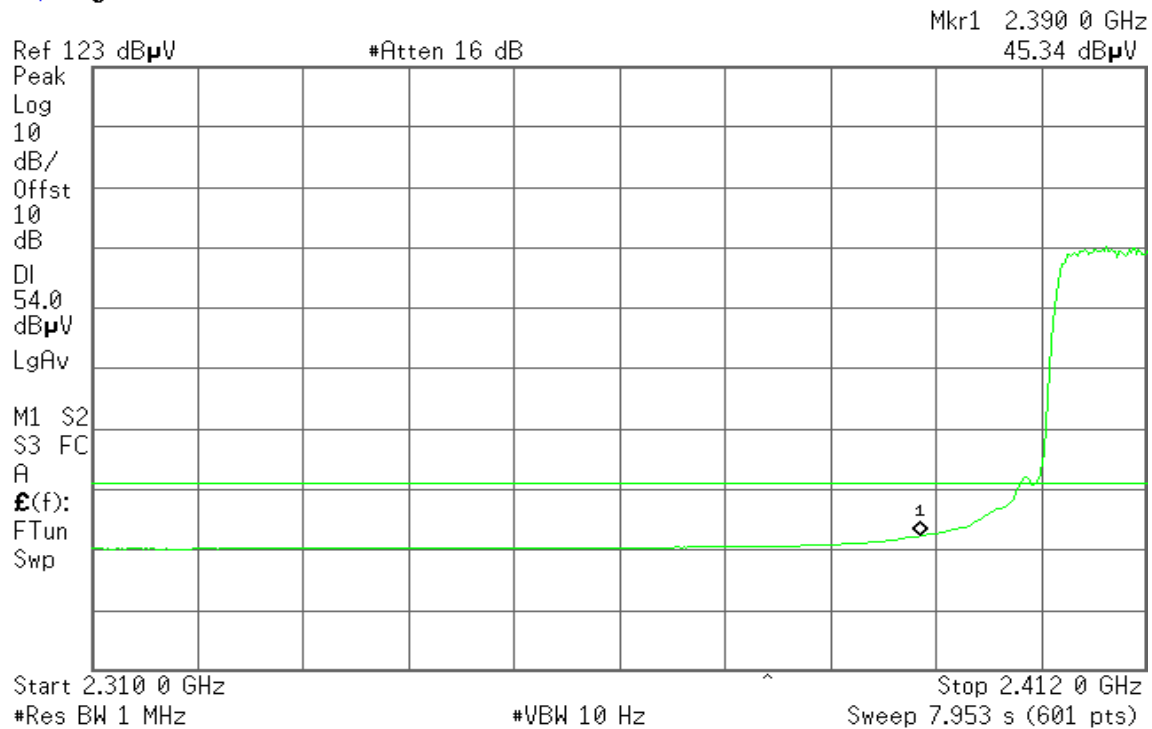


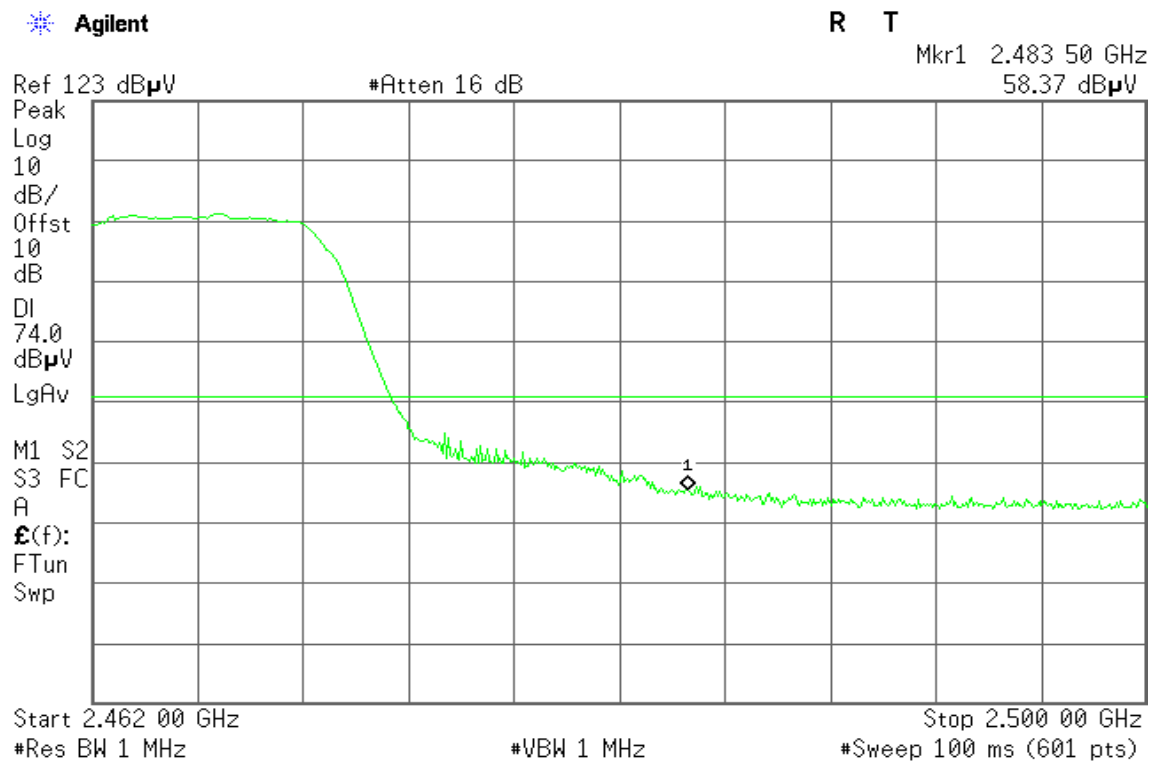
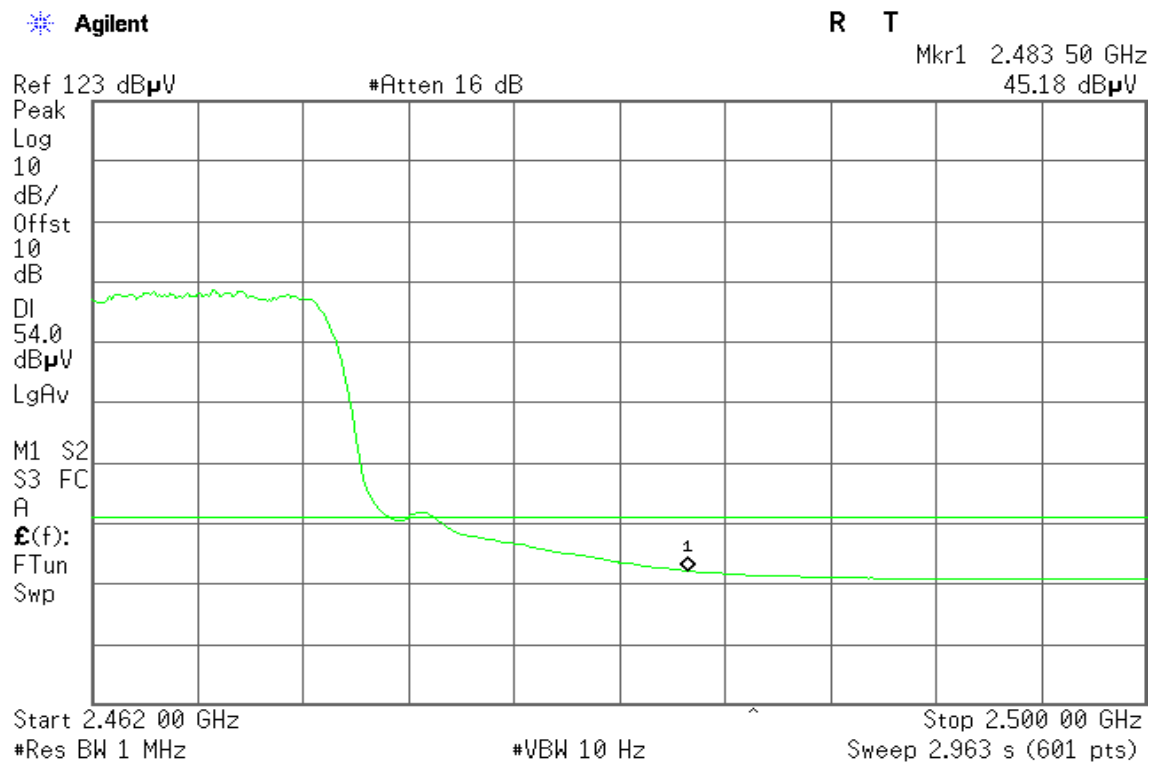
Detector mode: Average

Polarity: Horizontal

Agilent

R T



**Band Edges (IEEE 802.11g / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**



Detector mode: Peak

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz  
59.85 dB $\mu$ VRef 123 dB $\mu$ V

#Atten 16 dB

Peak

Log

10

dB/

Offst

10

dB

DI

74.0

dB $\mu$ V

LgAv

M1 S2

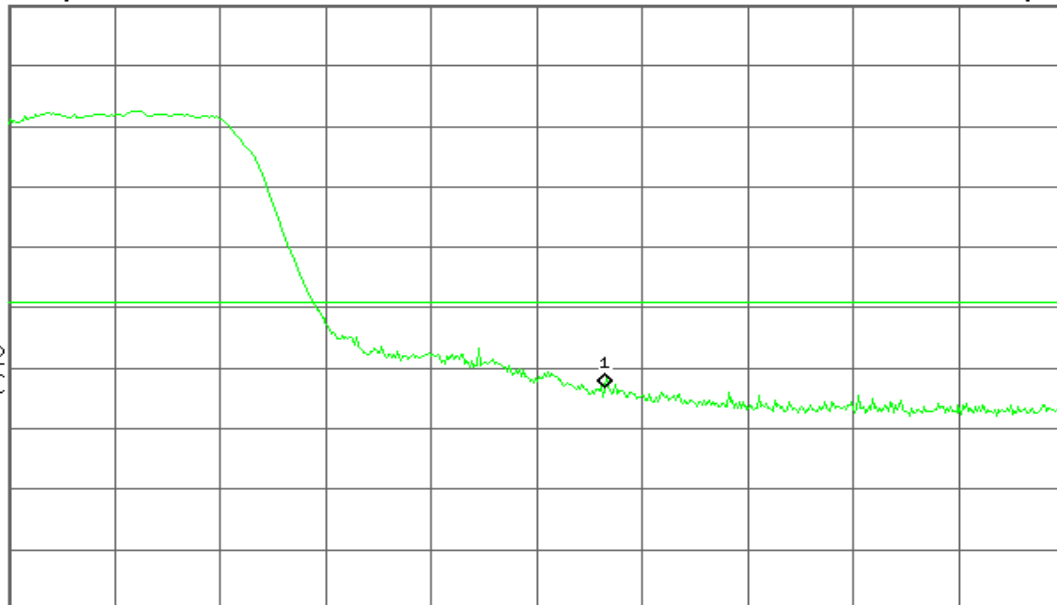
S3 FC

A

E(f):

FTun

Swp



Start 2.462 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent

R T

Mkr1 2.483 50 GHz  
46.02 dB $\mu$ VRef 123 dB $\mu$ V

#Atten 16 dB

Peak

Log

10

dB/

Offst

10

dB

DI

54.0

dB $\mu$ V

LgAv

M1 S2

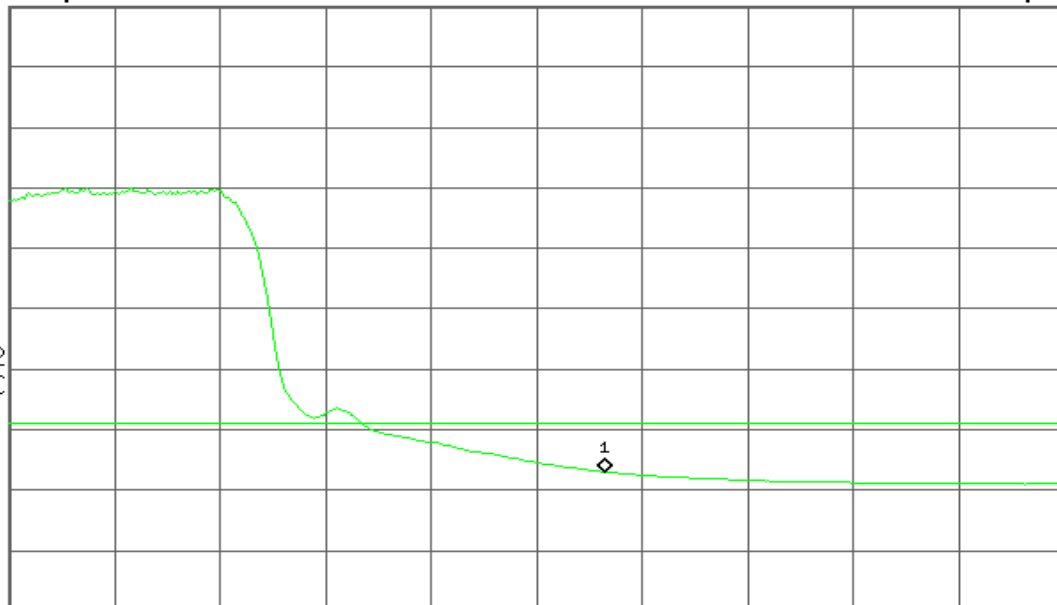
S3 FC

A

E(f):

FTun

Swp



Start 2.462 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 2.963 s (601 pts)

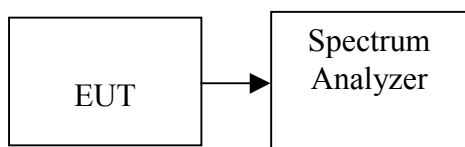


## 7.5 PEAK POWER SPECTRAL DENSITY

### LIMIT

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.

### Test Configuration



### TEST PROCEDURE

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.

### TEST RESULTS

*No non-compliance noted.*

**Test Data****Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	2.44	8.00	PASS
Mid	2437	2.76		PASS
High	2462	2.83		PASS

**Test mode: IEEE 802.11g**

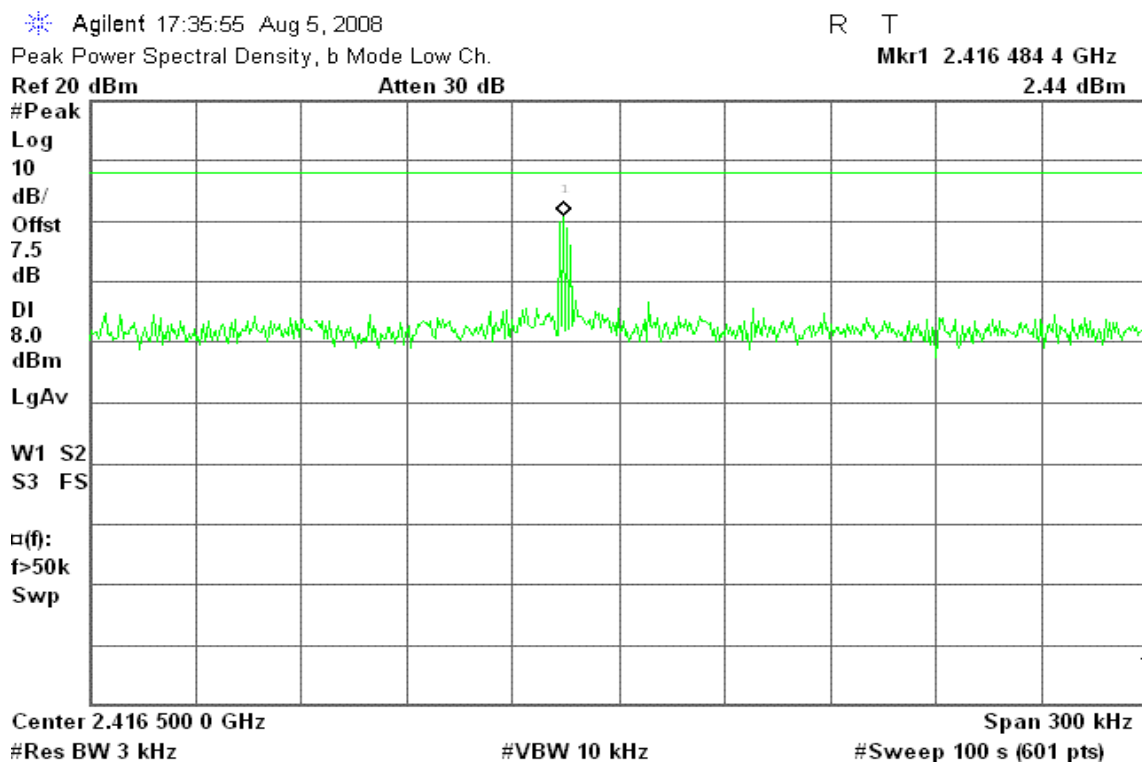
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-13.28	8.00	PASS
Mid	2437	-14.95		PASS
High	2462	-13.39		PASS



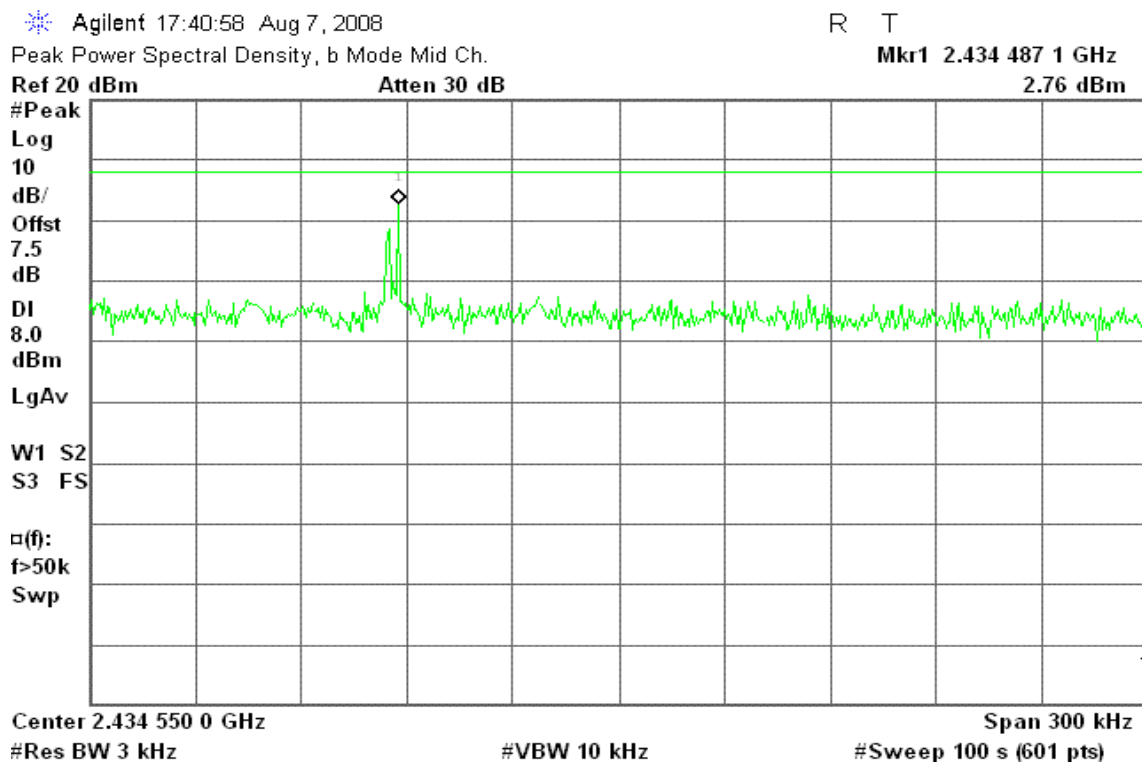
## Test Plot

### IEEE 802.11b

### PPSD (CH Low)



### PPSD (CH Mid)





## PPSD (CH High)

\* Agilent 18:07:21 Aug 5, 2008

R T

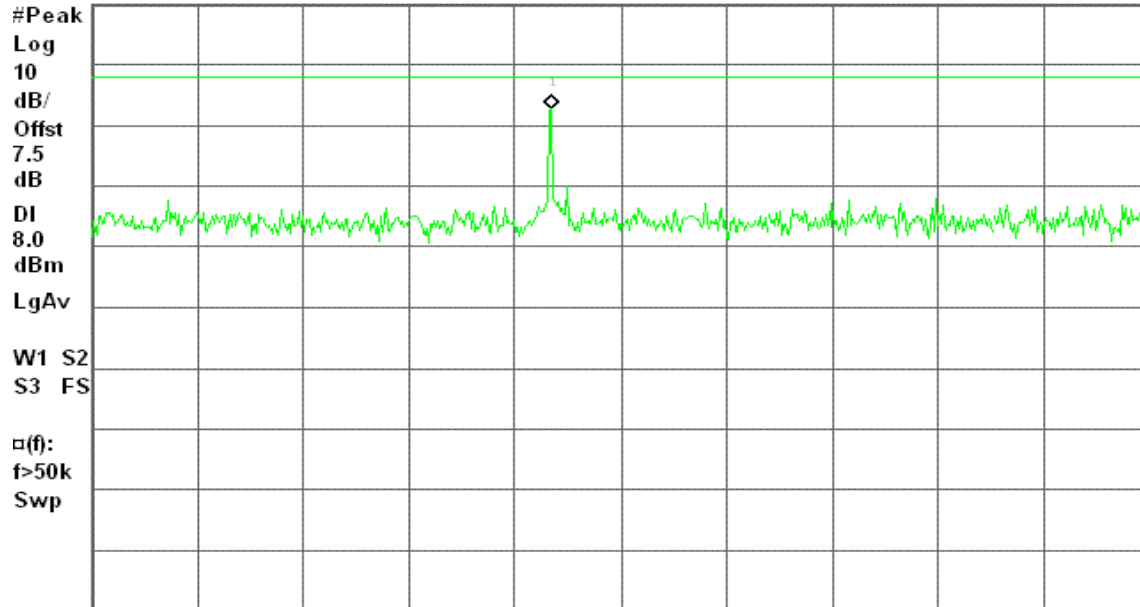
Peak Power Spectral Density, b Mode High Ch.

Mkr1 2.465 480 4 GHz

Ref 20 dBm

Atten 30 dB

2.83 dBm



Center 2.465 500 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

## IEEE 802.11g

## PPSD (CH Low)

\* Agilent 18:25:19 Aug 5, 2008

R T

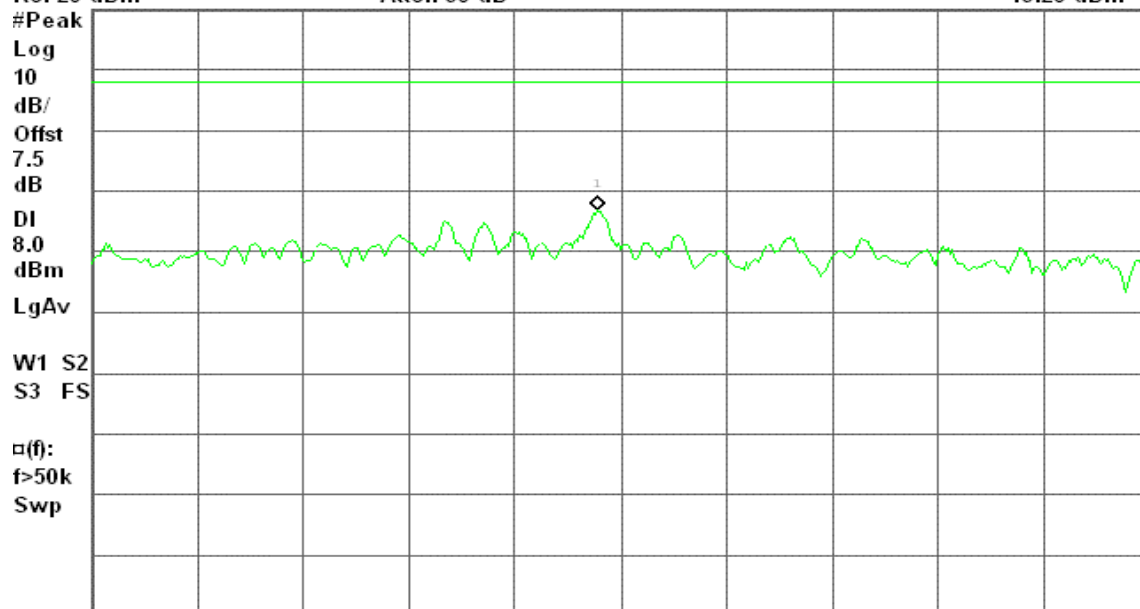
Peak Power Spectral Density, g Mode Low Ch.

Mkr1 2.410 443 0 GHz

Ref 20 dBm

Atten 30 dB

-13.28 dBm



Center 2.410 450 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



## PPSD (CH Mid)

\* Agilent 18:36:12 Aug 5, 2008

R T

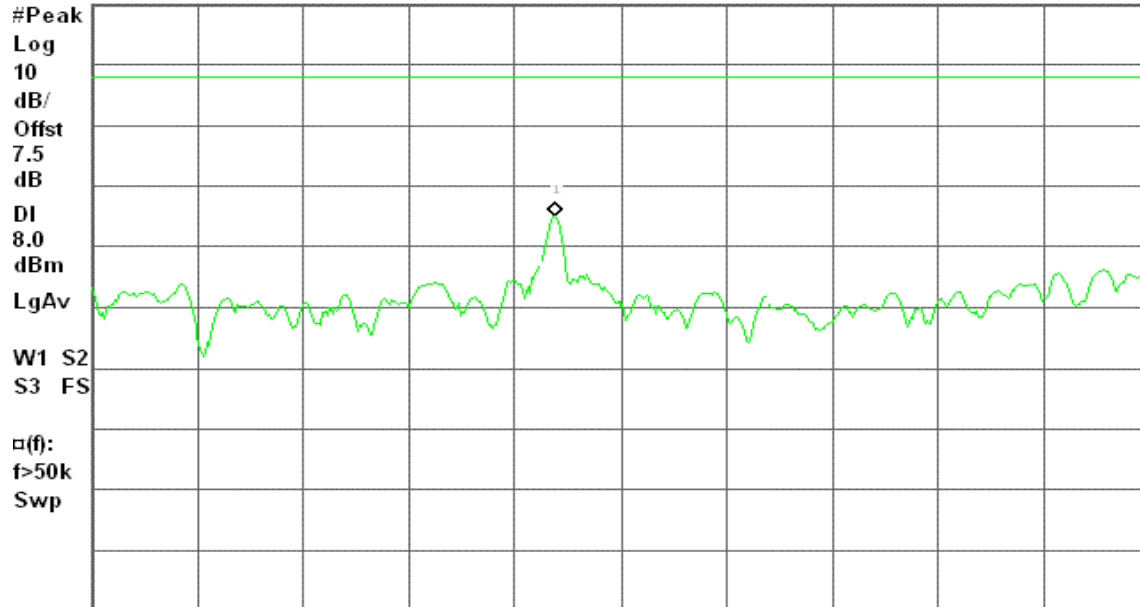
Peak Power Spectral Density, g Mode Mid Ch.

Mkr1 2.436 981 4 GHz

Ref 20 dBm

Atten 30 dB

-14.95 dBm



Center 2.437 000 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)

## PPSD (CH High)

\* Agilent 18:52:41 Aug 5, 2008

R T

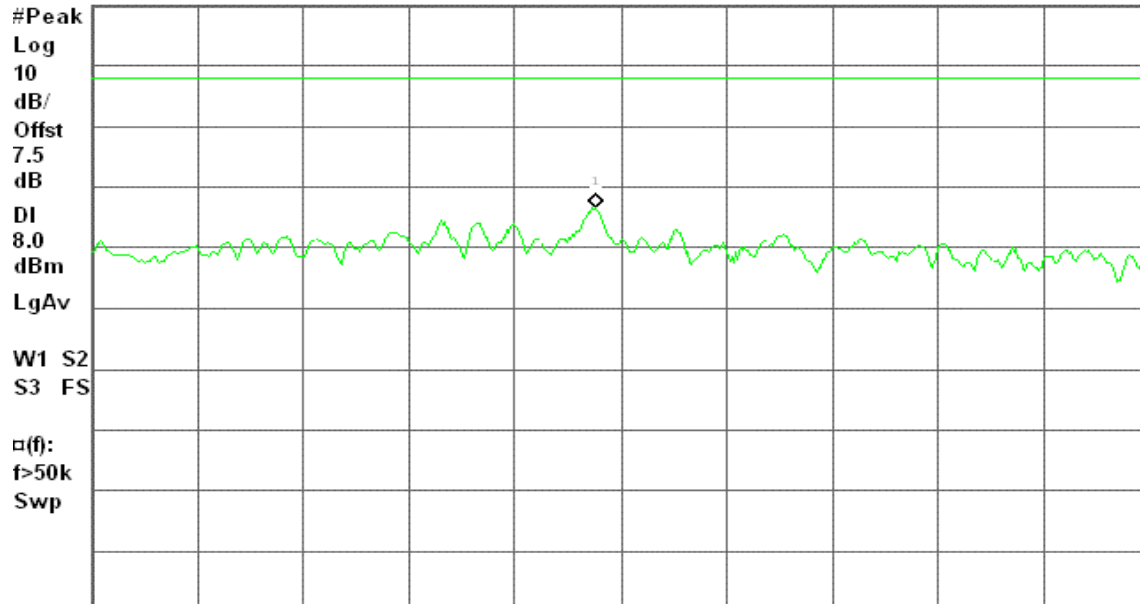
Peak Power Spectral Density, g Mode High Ch.

Mkr1 2.460 442 5 GHz

Ref 20 dBm

Atten 30 dB

-13.39 dBm



Center 2.460 450 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



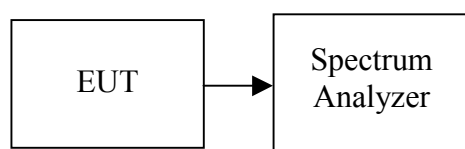
## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Measurement

#### LIMIT

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)).

#### Test Configuration



#### TEST PROCEDURE

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.

#### TEST RESULTS

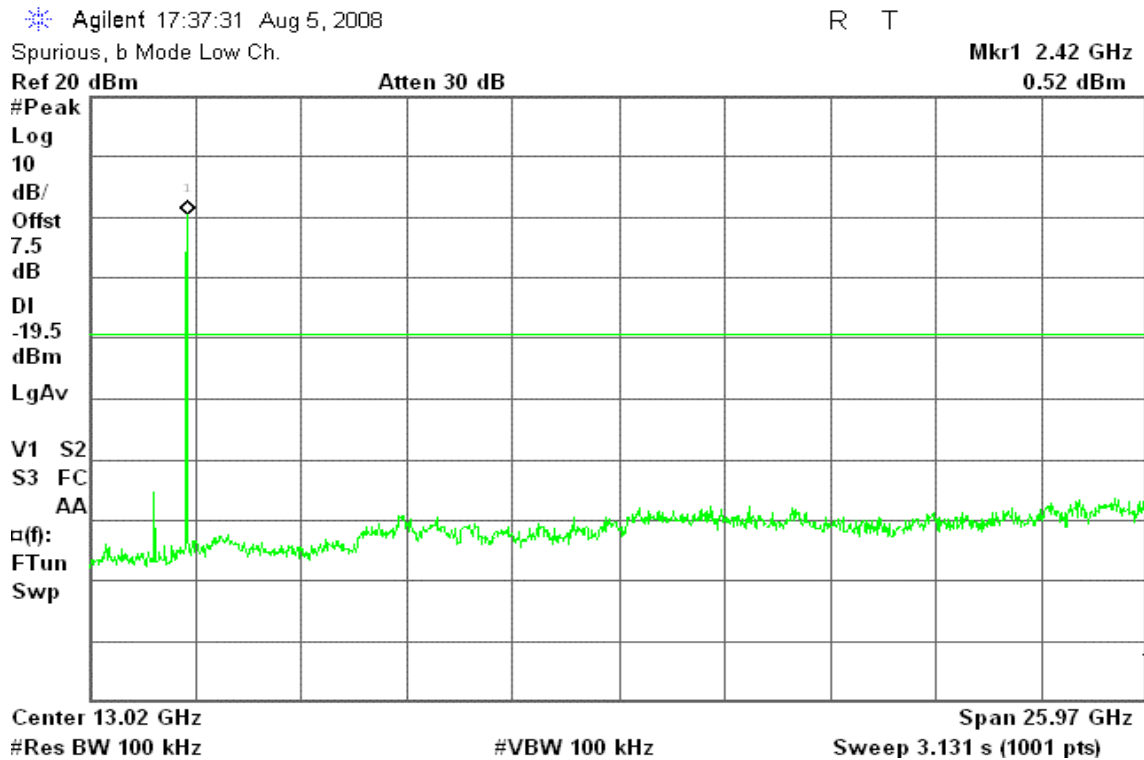
*No non-compliance noted.*



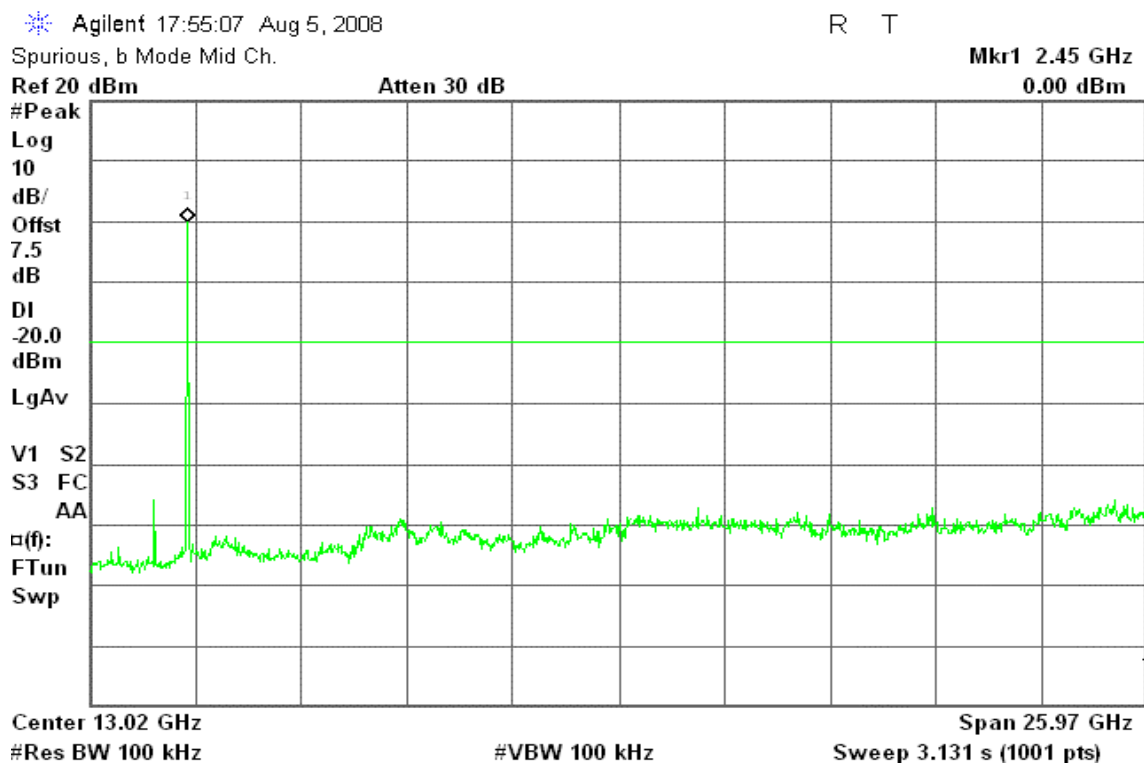
## Test Plot

### IEEE 802.11b

#### CH Low



#### CH Mid





## CH High

Agilent 18:08:20 Aug 5, 2008

R T

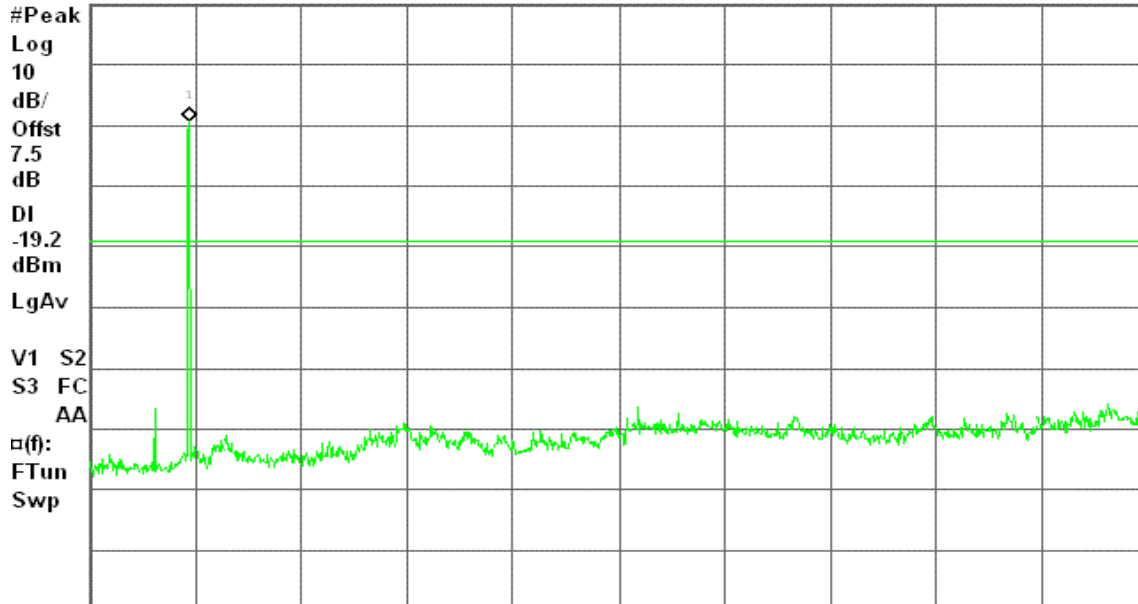
Spurious, b Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

0.76 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

## IEEE 802.11g

### CH Low

Agilent 18:26:24 Aug 5, 2008

R T

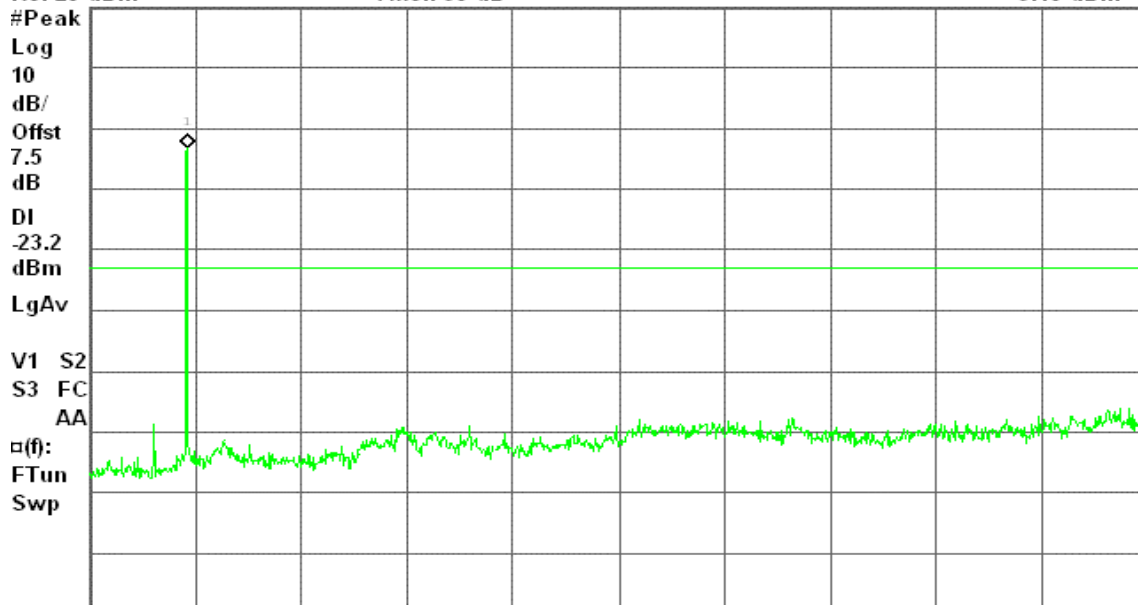
Spurious, g Mode Low Ch.

Mkr1 2.42 GHz

Ref 20 dBm

Atten 30 dB

-3.18 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



## CH Mid

Agilent 18:37:11 Aug 5, 2008

R T

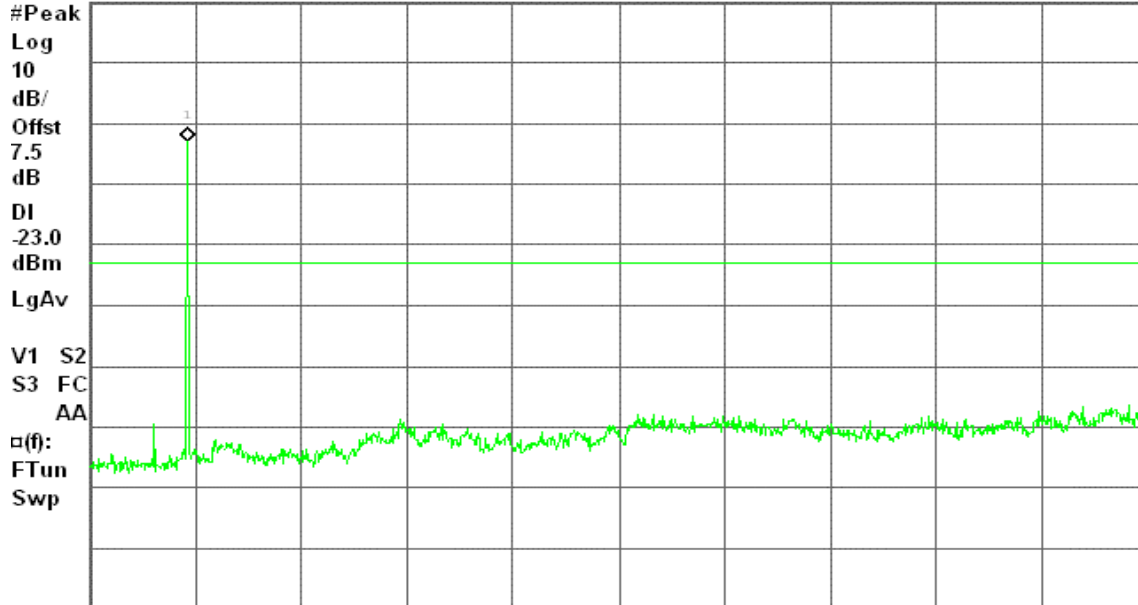
Spurious, g Mode Mid Ch.

Mkr1 2.45 GHz

Ref 20 dBm

Atten 30 dB

-2.98 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)

## CH High

Agilent 18:53:35 Aug 5, 2008

R T

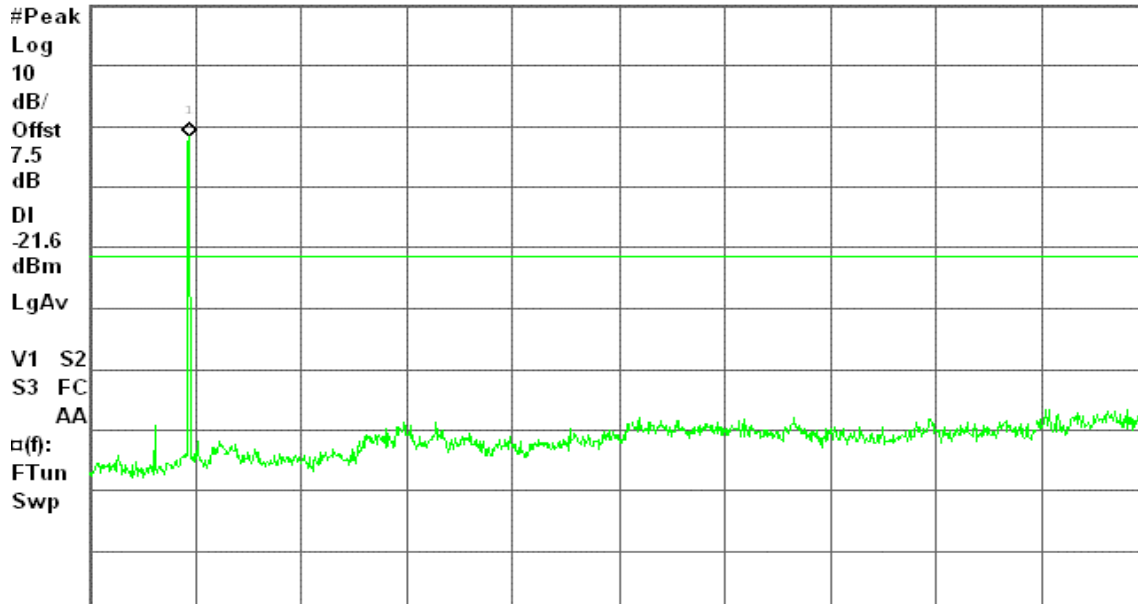
Spurious, g Mode High Ch.

Mkr1 2.47 GHz

Ref 20 dBm

Atten 30 dB

-1.63 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.131 s (1001 pts)



## 7.6.2 Radiated Emissions

### LIMIT

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 ( $\mu\text{V/m}$ )	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

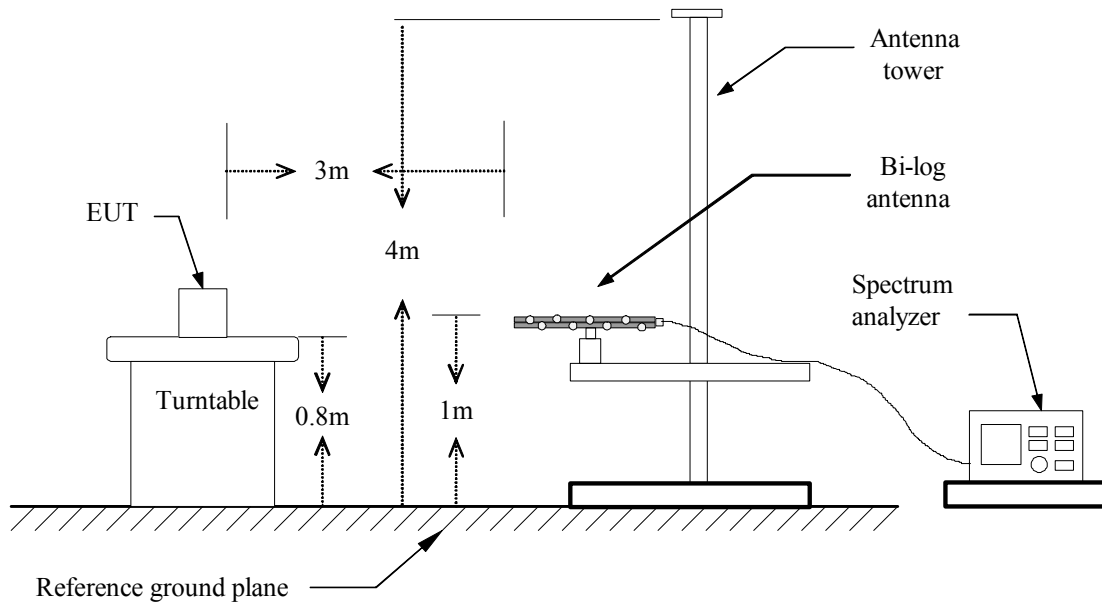
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

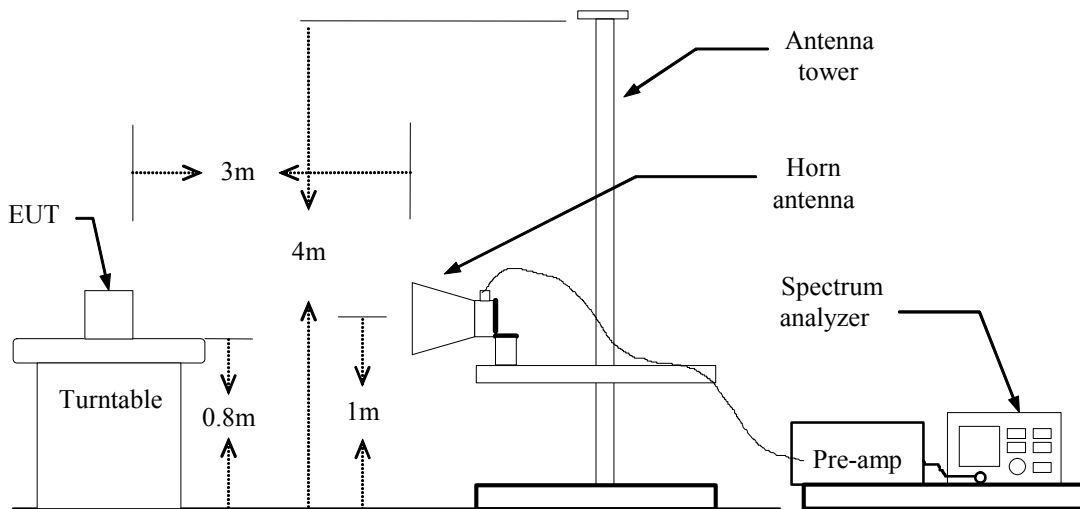
Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

## Test Configuration

### **Below 1 GHz**



### **Above 1 GHz**





## **TEST PROCEDURE**

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.

**Below 1 GHz****Operation Mode:** Normal Link**Test Date:** July 31, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
89.82	V	45.53	-14.87	30.66	43.50	-12.84	Peak
105.98	V	40.25	-11.02	29.23	43.50	-14.27	Peak
324.23	V	32.12	-5.63	26.49	46.00	-19.51	Peak
519.85	V	32.17	-0.03	32.13	46.00	-13.87	Peak
654.03	V	33.05	1.85	34.90	46.00	-11.10	Peak
797.92	V	32.38	5.11	37.49	46.00	-8.51	Peak
89.82	H	48.70	-14.87	33.84	43.50	-9.66	Peak
105.98	H	36.63	-11.02	25.61	43.50	-17.89	Peak
151.25	H	32.73	-8.45	24.28	43.50	-19.22	Peak
437.40	H	32.22	-2.62	29.60	46.00	-16.40	Peak
607.15	H	32.02	1.34	33.37	46.00	-12.63	Peak
815.70	H	31.64	5.24	36.88	46.00	-9.12	Peak

**Remark:**

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:** IEEE 802.11b / TX / CH Low**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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	50.71	---	0.35	51.06	---	74.00	54.00	-2.94	Peak
N/A										
4825.00	H	51.86	---	0.35	52.21	---	74.00	54.00	-1.79	Peak
N/A										

**Remark:**

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:** IEEE 802.11b / TX / CH Mid**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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
4875.00	V	52.96	---	0.24	53.20	---	74.00	54.00	-0.80	Peak
N/A										
4875.00	H	52.93	---	0.24	53.17	---	74.00	54.00	-0.83	Peak
N/A										

**Remark:**

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:** IEEE 802.11b / TX / CH High**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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	55.40	51.69	0.13	55.52	51.82	74.00	54.00	-2.18	Peak
N/A										
4925.00	H	51.75	---	0.13	51.88	---	74.00	54.00	-2.12	Peak
N/A										

**Remark:**

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:** IEEE 802.11g / TX / CH Low**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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
4816.67	V	46.89	---	0.37	47.26	---	74.00	54.00	-6.74	Peak
N/A										
4825.00	H	46.46	---	0.35	46.81	---	74.00	54.00	-7.19	Peak
N/A										

**Remark:**

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:** IEEE 802.11g / TX / CH Mid**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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
4875.00	V	46.76	---	0.24	47.00	---	74.00	54.00	-7.00	Peak
N/A										
4875.00	H	46.45	---	0.24	46.68	---	74.00	54.00	-7.32	Peak
7308.33	H	45.70	---	2.95	48.65	---	74.00	54.00	-5.35	Peak
N/A										

**Remark:**

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:** IEEE 802.11g / TX / CH High**Test Date:** July 30, 2008**Temperature:** 23°C**Tested by:** Jerry Lin**Humidity:** 53 % 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	48.56	---	0.13	48.69	---	74.00	54.00	-5.31	Peak
N/A										
4925.00	H	46.52	---	0.13	46.64	---	74.00	54.00	-7.36	Peak
N/A										

**Remark:**

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).



## 7.7 POWERLINE CONDUCTED EMISSIONS

### **LIMIT**

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  $\mu$ 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 $\mu$ 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

### **Test Configuration**

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

### **TEST PROCEDURE**

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

### Test Data

**Operation Mode:** Normal Link

**Test Date:** July 30, 2008

**Temperature:** 22°C

**Tested by:** Lawrence Lee

**Humidity:** 45% RH

Freq. (MHz)	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
0.1976	54.94	43.34	0.16	55.10	43.50	63.71	53.71	-8.61	-10.21	L1
0.2650	49.37	37.27	0.13	49.50	37.40	61.27	51.27	-11.77	-13.87	L1
0.5350	48.47	36.37	0.03	48.50	36.40	56.00	46.00	-7.50	-9.60	L1
1.8700	47.17	31.07	0.03	47.20	31.10	56.00	46.00	-8.80	-14.90	L1
5.6550	48.73	36.53	0.27	49.00	36.80	60.00	50.00	-11.00	-13.20	L1
10.2000	45.53	33.13	0.57	46.10	33.70	60.00	50.00	-13.90	-16.30	L1
0.2000	49.65	38.75	0.15	49.80	38.90	63.61	53.61	-13.81	-14.71	L2
0.5190	47.17	32.07	0.03	47.20	32.10	56.00	46.00	-8.80	-13.90	L2
0.8150	43.17	26.37	0.03	43.20	26.40	56.00	46.00	-12.80	-19.60	L2
1.4650	42.87	24.27	0.03	42.90	24.30	56.00	46.00	-13.10	-21.70	L2
3.4600	42.57	25.87	0.13	42.70	26.00	56.00	46.00	-13.30	-20.00	L2
5.1150	45.55	32.55	0.25	45.80	32.80	60.00	50.00	-14.20	-17.20	L2

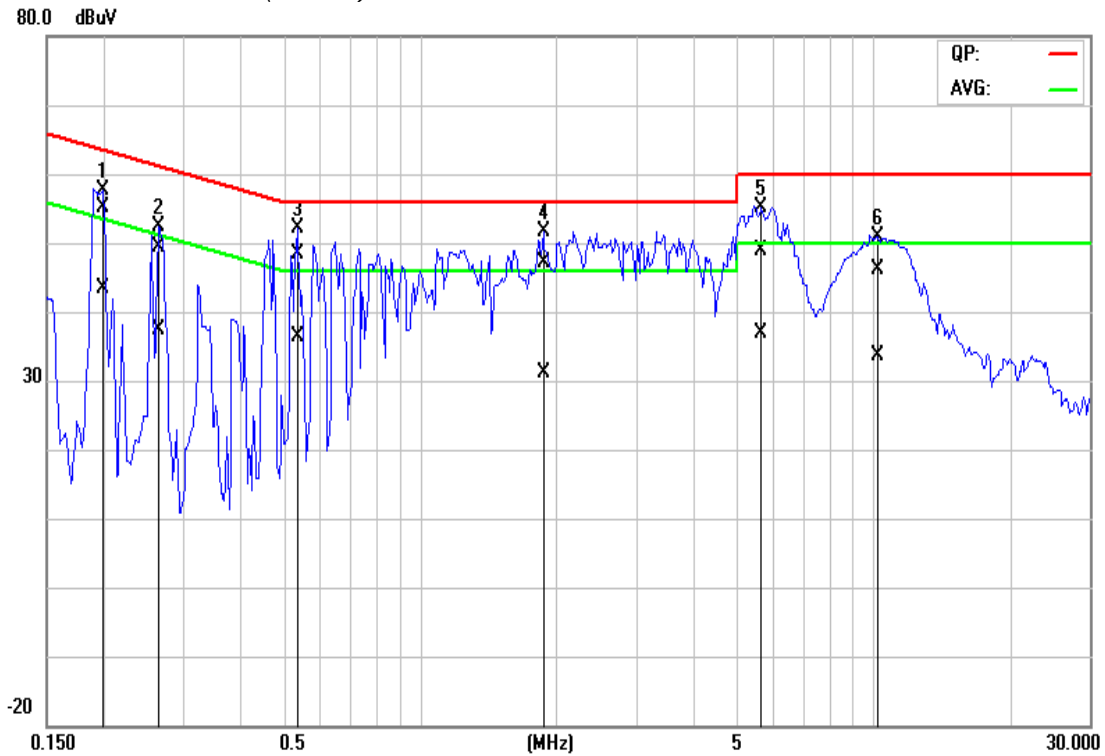
### Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)

