Trimble Navigation Limited

Ranger/TSC3 802.11 Radio

EMC Test Report

Report No. TRPO0054

Report Prepared By

NORTHWEST EMC

www.nwemc.com
1-888-EMI-CERT

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Last Date of Test: January 5, 2010
Trimble Navigation Limited
Model: Ranger/TSC3 802.11 Radio

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Spurious Radiated Emissions	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
Occupied Bandwidth	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
Output Power	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
Power Spectral Density	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
Spurious Conducted Emissions	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
Band Edge Compliance	FCC 15.247:2010	ANSI C63.10:2009	**Pass**
AC Powerline Conducted Emissions	FCC 15.207:2010	ANSI C63.10:2009	**Pass**

Modifications made to the product
See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400

Phone: (503) 844-4066 Fax: (503) 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

Approved By:

Don Facteau, IS Manager

NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP

Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0
NVLAP LAB CODE 200881-0

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1)*

CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.

NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).

Accreditations and Authorizations

Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, C-3464, and T-1634).*

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.

GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)*

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

Northwest EMC Locations

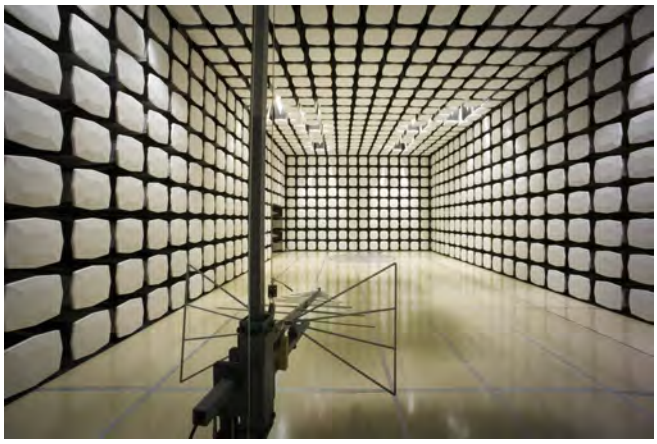
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

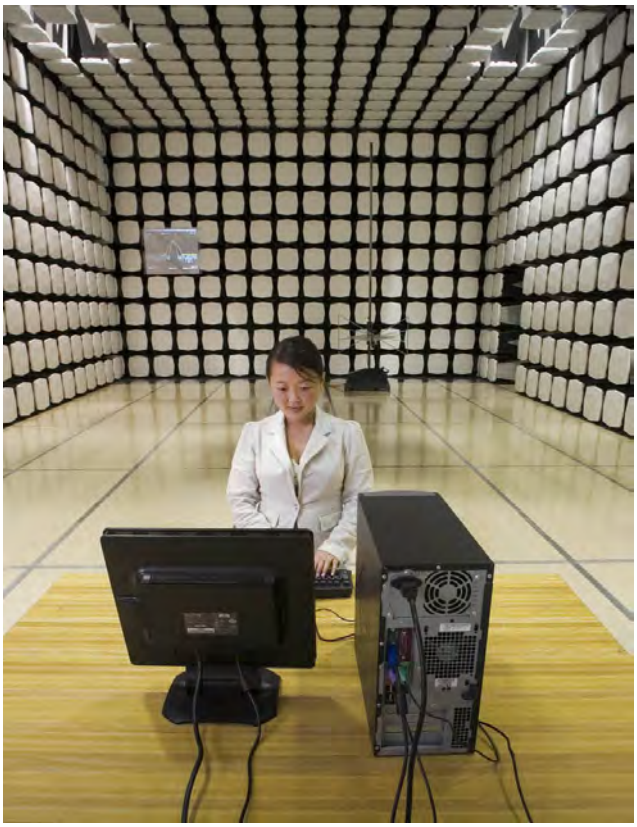
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796





Party Requesting the Test

Company Name:	Trimble Navigation Limited
Address:	345 SW Avery Ave
City, State, Zip:	Corvallis, OR 97333
Test Requested By:	Bob Grant
Model:	Ranger/TSC3 802.11 Radio
First Date of Test:	December 2, 2009
Last Date of Test:	January 5, 2010
Receipt Date of Samples:	December 1, 2009
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
802.11b/g - Bluetooth combo radio module

Testing Objective:
To demonstrate compliance of the 802.11 b/g portion of the radio with FCC 15.247 requirements.

CONFIGURATION 1 TRPO0054

Software/Firmware Running during test	
Description	**Version**
Windows Mobile Professional	6.5
BT_Spew (For BT radio)	1.2.0.2
WIFI_Spew (For 802.11 radio)	1.1.3.01

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hand Held Computer	Trimble Navigation Limited	Ranger/TSC3	RTL2A00004
802.11 / Bluetooth combo radio	Trimble Navigation Limited	Unknown	Unknown

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Ault	PW173KB1500F03	0933A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	PA	1.0m	PA	Hand Held Computer	AC Adapter
AC Power	No	1.8m	No	AC Adatper	AC Mains
Serial	Yes	1.0m	No	Hand Held Computer	Unterminated
USB	Yes	1.0m	No	Hand Held Computer	Unterminated
Mini USB	Yes	1.0m	No	Hand Held Computer	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 TRPO0054

Software/Firmware Running during test	
Description	**Version**
Windows Mobile Professional	6.5
BT_Spew (For BT radio)	1.2.0.2
WIFI_Spew (For 802.11 radio)	1.1.3.01

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Hand Held Computer	Trimble Navigation Limited	Ranger/TSC3	RTL2A00030
802.11 / Bluetooth combo radio	Trimble Navigation Limited	Unknown	Unknown

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Ault	PW173KB1500F03	0933A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	PA	1.0m	PA	Hand Held Computer	AC Adapter
AC Power	No	1.8m	No	AC Adatper	AC Mains
Serial	Yes	1.0m	No	Hand Held Computer	Unterminated
USB	Yes	1.0m	No	Hand Held Computer	Unterminated
Mini USB	Yes	1.0m	No	Hand Held Computer	Unterminated
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	12/2/2009	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	12/7/2009	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	12/7/2009	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	12/7/2009	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	1/4/2010	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	1/5/2010	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	1/5/2010	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Schedule testing was completed.

OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies in the ISM band. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at the required data rates available in 802.11(b)/(g).

NORTHWEST EMC

OCCUPIED BANDWIDTH

XMit 2009.03.05

EUT:	Ranger/TSC3 802.11 radio			Work Order:	TRPO0054
Serial Number:	Unknown			Date:	12/07/09
Customer:	Trimble Navigation Limited			Temperature:	20°C
Attendees:	None			Humidity:	38%
Project:	None			Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power:	120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

COMMENTS

None

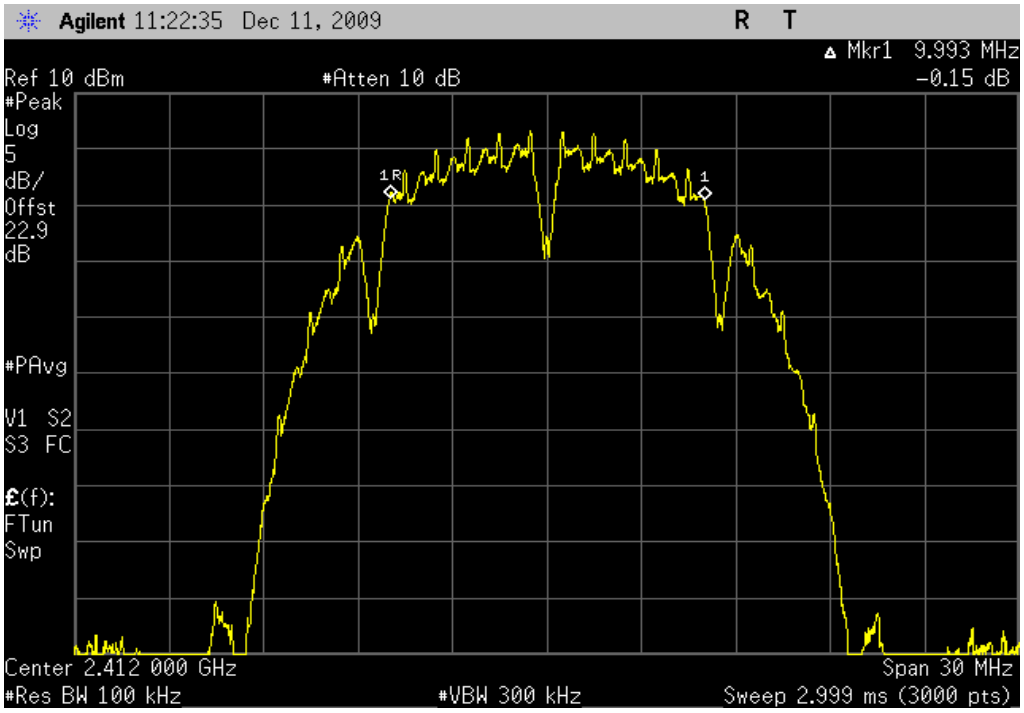
DEVIATIONS FROM TEST STANDARD

No Deviations

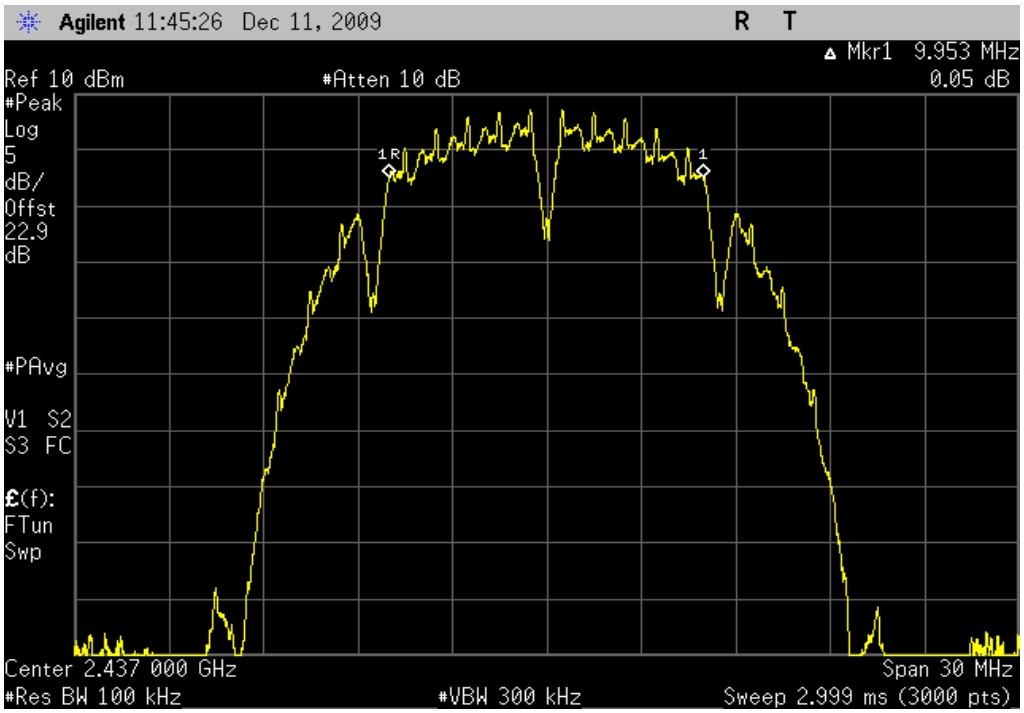
Configuration #	2	Signature

		Value	Limit	Results
802.11(b) 1 Mbps				
	Low Channel	9.993 MHz	> 500 kHz	Pass
	Mid Channel	9.953 MHz	> 500 kHz	Pass
	High Channel	9.953 MHz	> 500 kHz	Pass
802.11(b) 11 Mbps				
	Low Channel	9.533 MHz	> 500 kHz	Pass
	Mid Channel	9.523 MHz	> 500 kHz	Pass
	High Channel	9.532 MHz	> 500 kHz	Pass
802.11(g) 6 Mbps				
	Low Channel	16.566 MHz	> 500 kHz	Pass
	Mid Channel	16.536 MHz	> 500 kHz	Pass
	High Channel	16.566 MHz	> 500 kHz	Pass
802.11(g) 36 Mbps				
	Low Channel	16.546 MHz	> 500 kHz	Pass
	Mid Channel	16.546 MHz	> 500 kHz	Pass
	High Channel	16.536 MHz	> 500 kHz	Pass
802.11(g) 54 Mbps				
	Low Channel	16.546 MHz	> 500 kHz	Pass
	Mid Channel	16.546 MHz	> 500 kHz	Pass
	High Channel	16.526 MHz	> 500 kHz	Pass

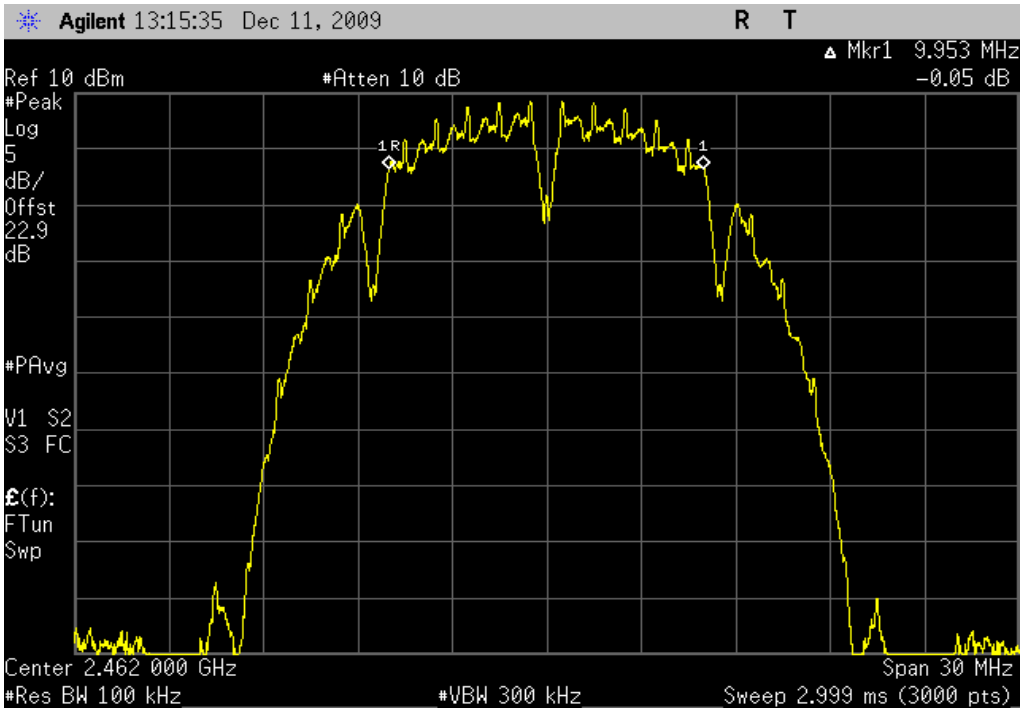
802.11(b) 1 Mbps, Low Channel					
Result:	Pass	**Value:**	9.993 MHz	**Limit:**	> 500 kHz



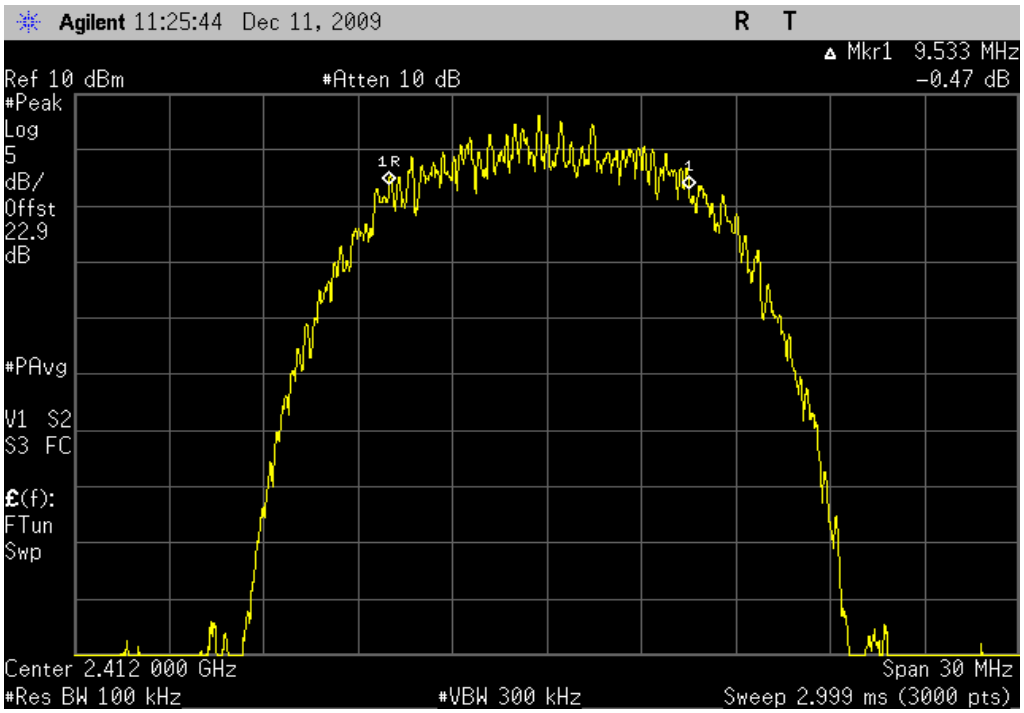
802.11(b) 1 Mbps, Mid Channel					
Result:	Pass	**Value:**	9.953 MHz	**Limit:**	> 500 kHz



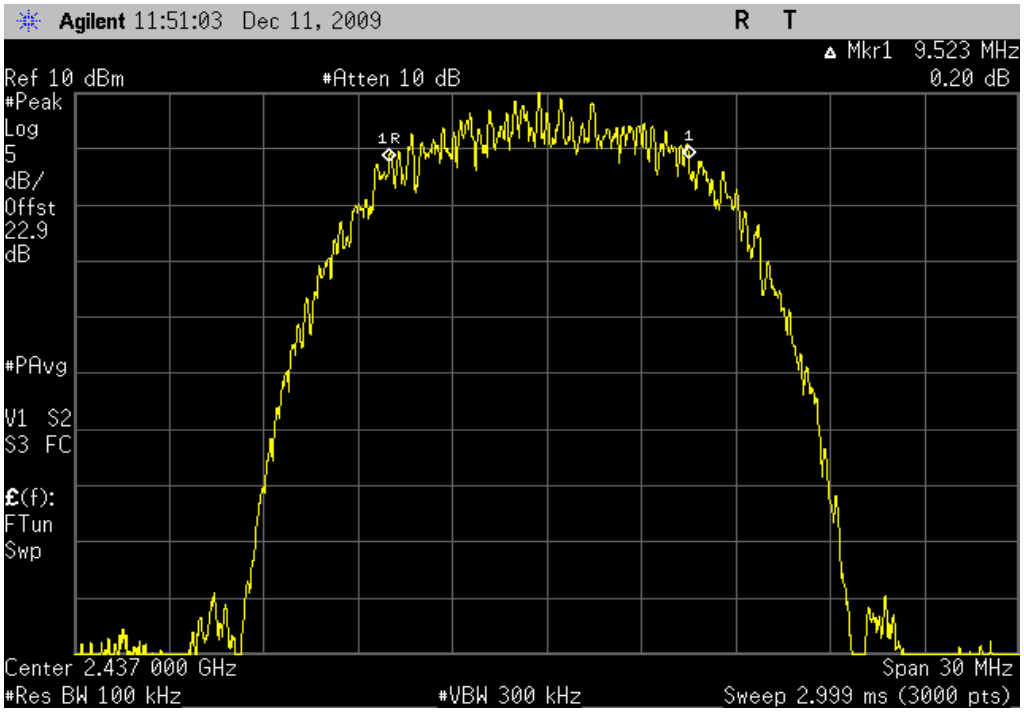
802.11(b) 1 Mbps, High Channel					
Result:	Pass	**Value:**	9.953 MHz	**Limit:**	> 500 kHz



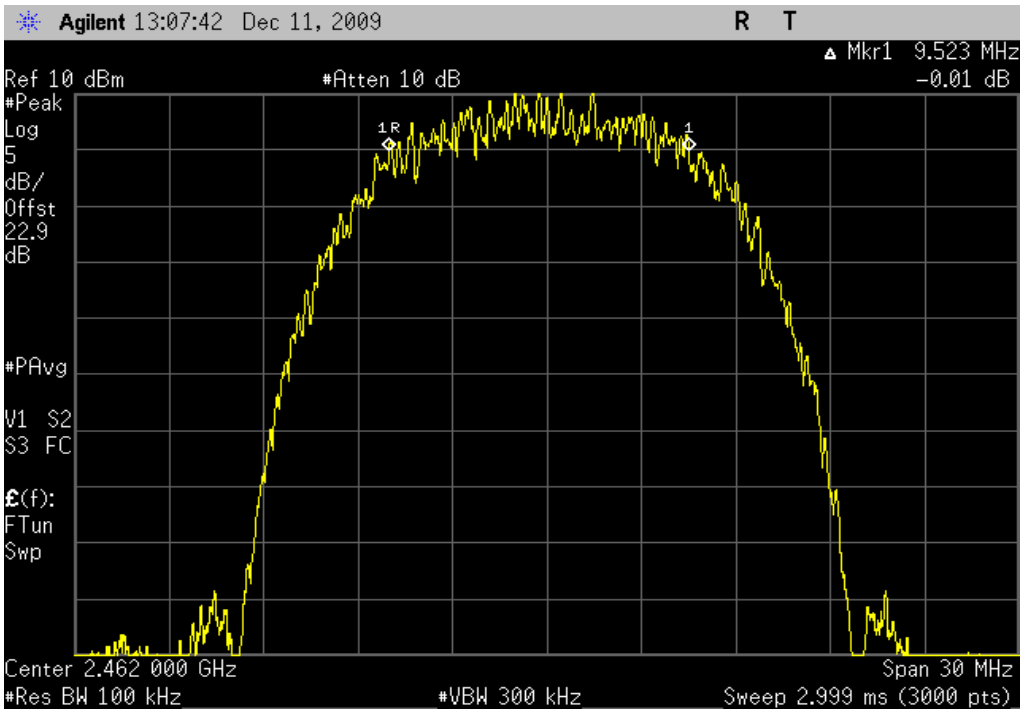
802.11(b) 11 Mbps, Low Channel					
Result:	Pass	**Value:**	9.533 MHz	**Limit:**	> 500 kHz



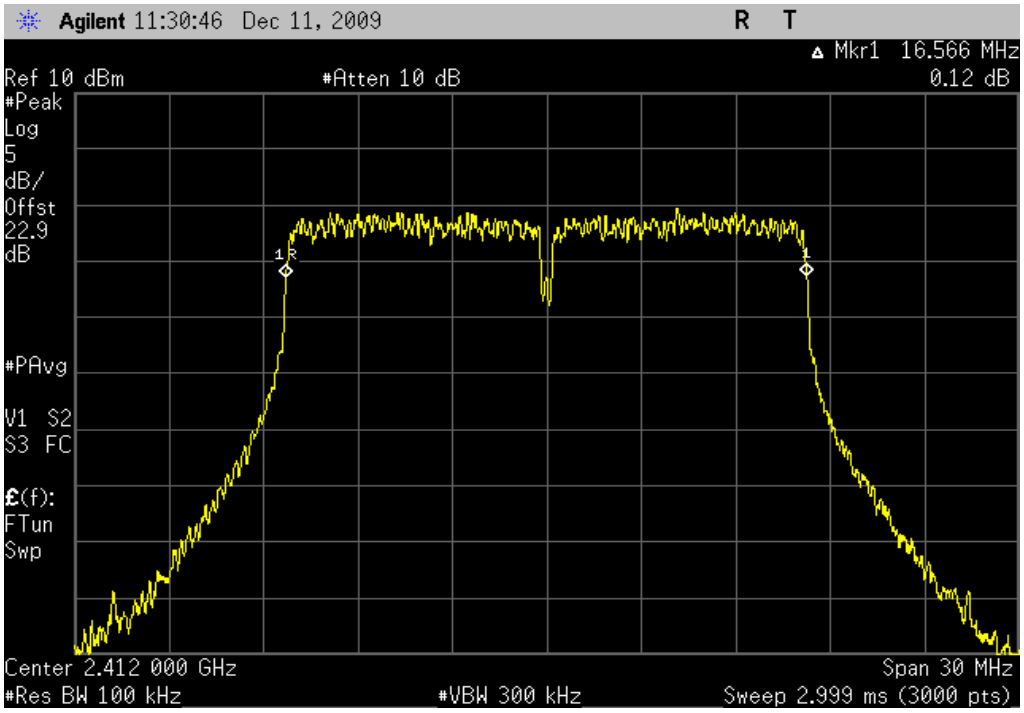
802.11(b) 11 Mbps, Mid Channel					
Result:	Pass	**Value:**	9.523 MHz	**Limit:**	> 500 kHz



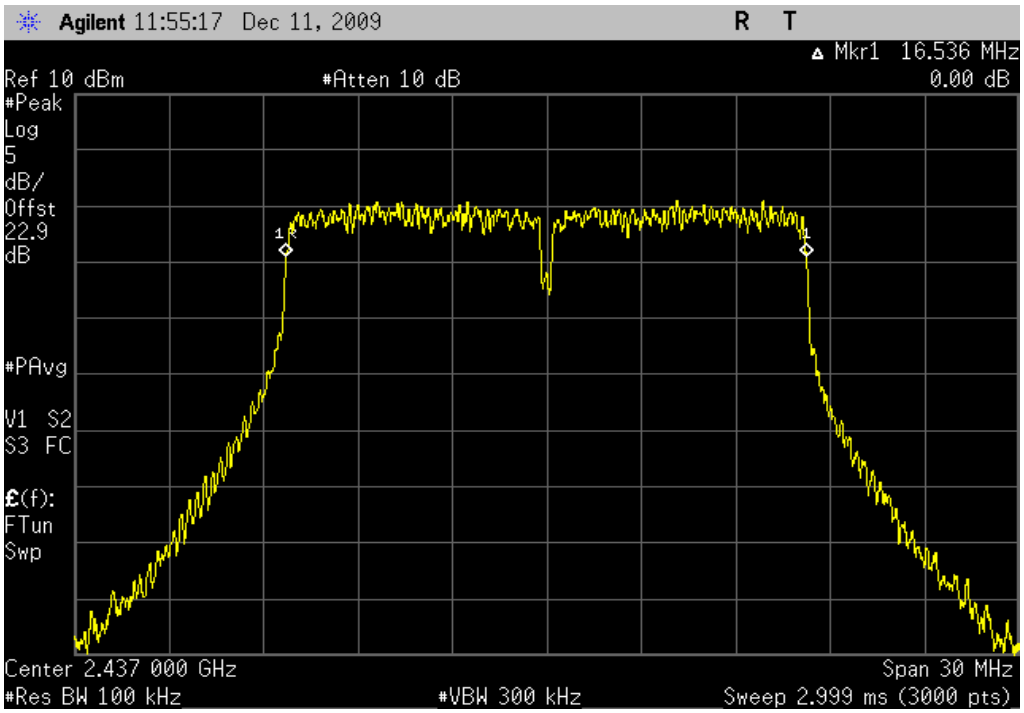
802.11(b) 11 Mbps, High Channel					
Result:	Pass	**Value:**	9.532 MHz	**Limit:**	> 500 kHz



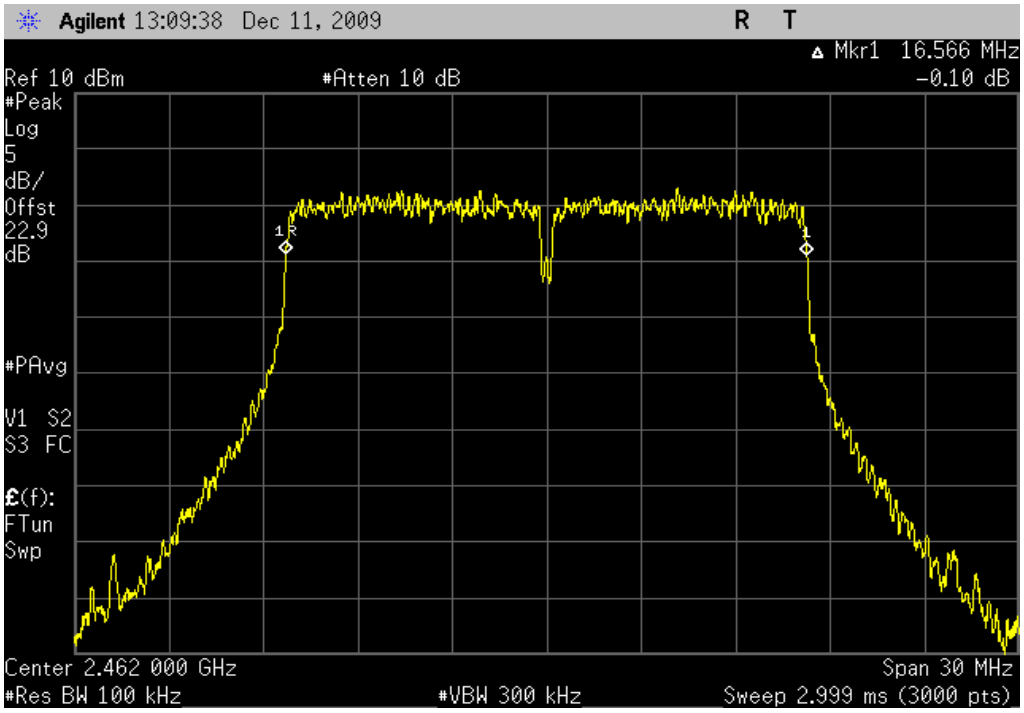
802.11(g) 6 Mbps, Low Channel					
Result:	Pass	**Value:**	16.566 MHz	**Limit:**	> 500 kHz



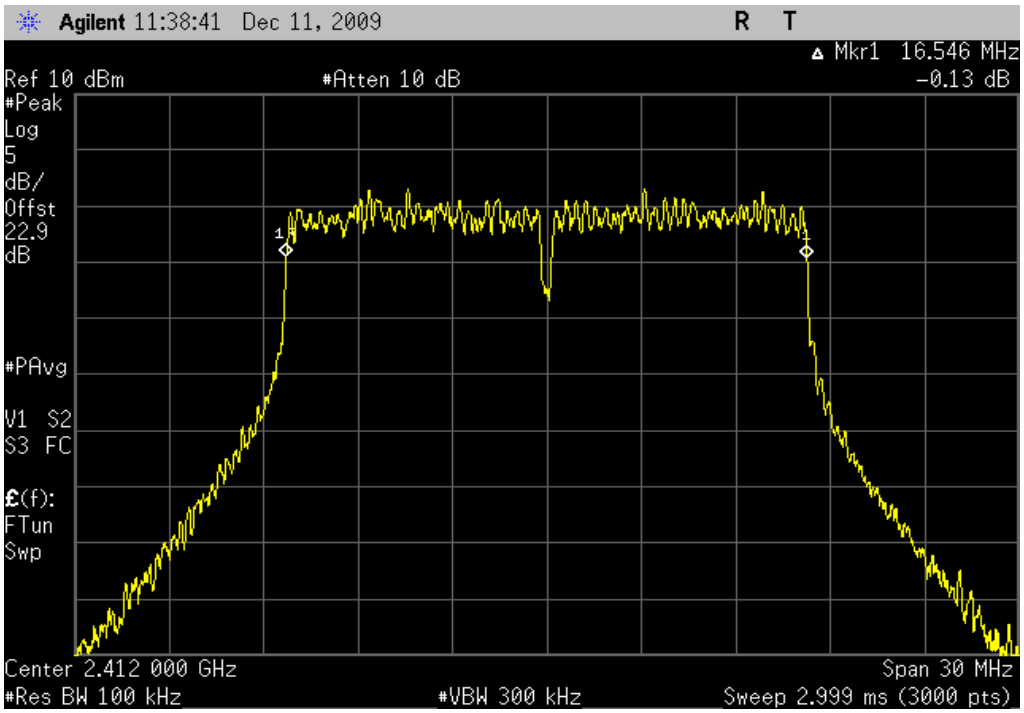
802.11(g) 6 Mbps, Mid Channel					
Result:	Pass	**Value:**	16.536 MHz	**Limit:**	> 500 kHz



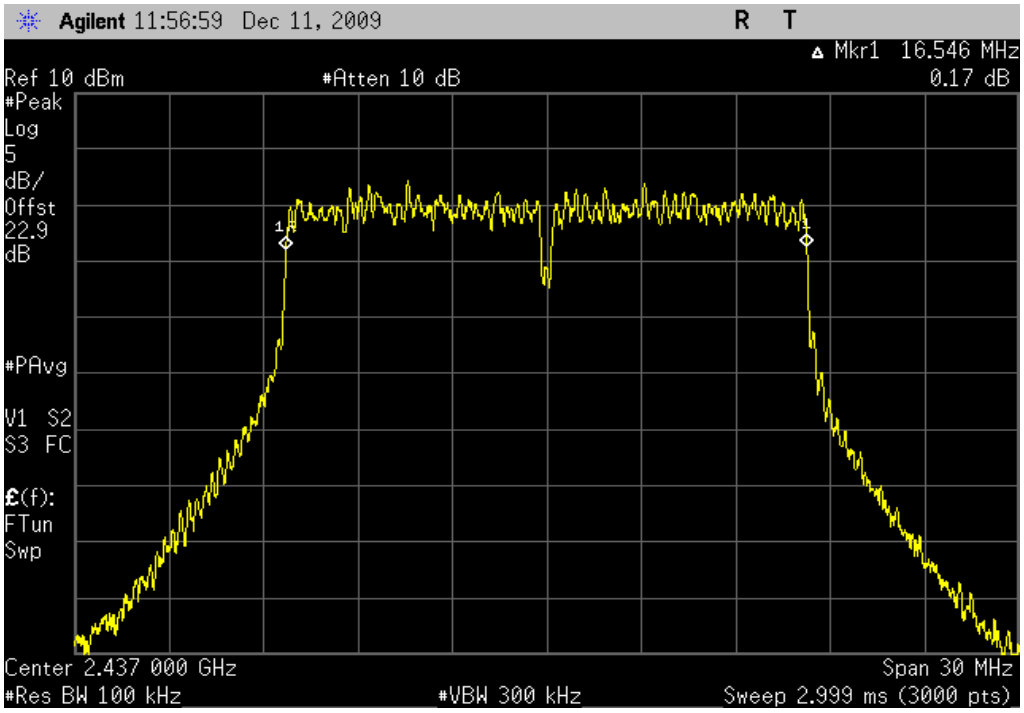
802.11(g) 6 Mbps, High Channel					
Result:	Pass	**Value:**	16.566 MHz	**Limit:**	> 500 kHz



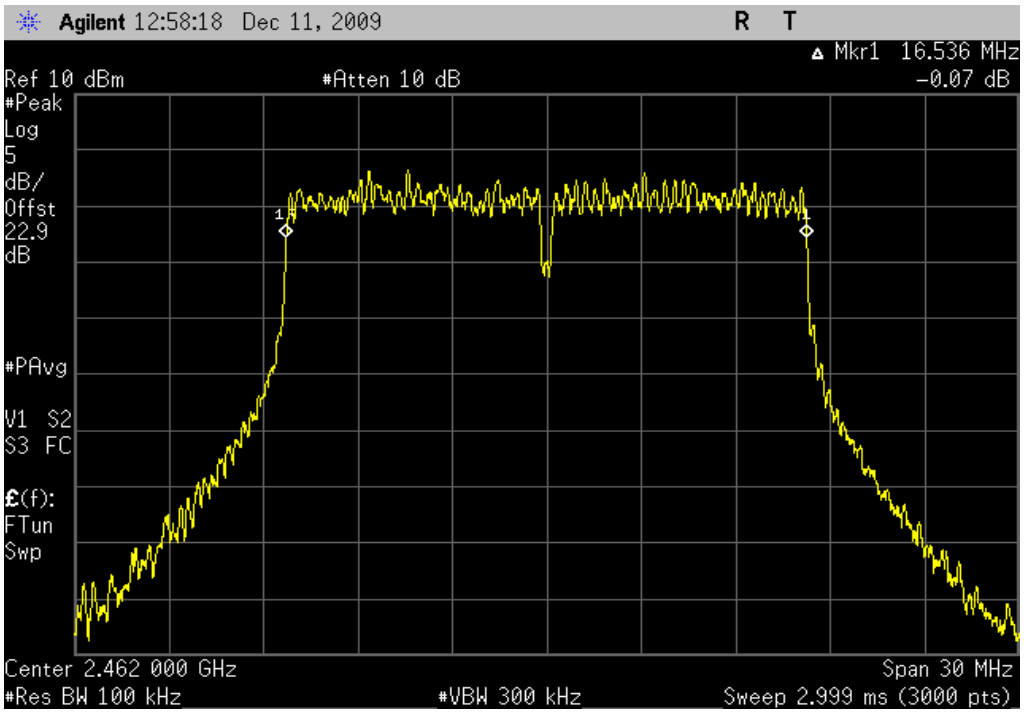
802.11(g) 36 Mbps, Low Channel					
Result:	Pass	**Value:**	16.546 MHz	**Limit:**	> 500 kHz



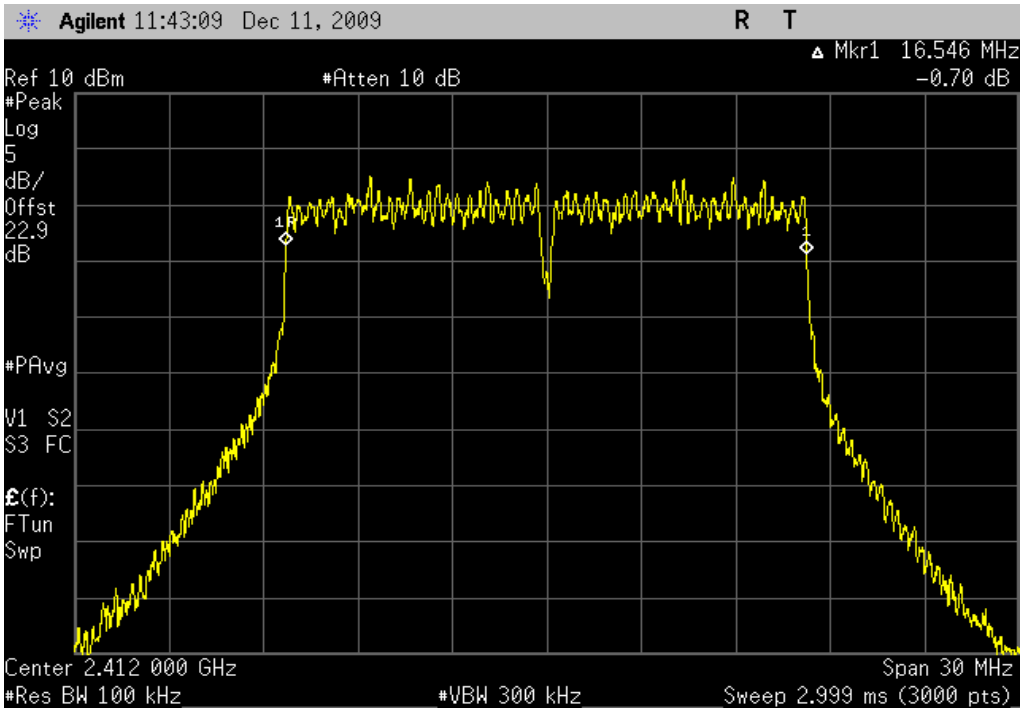
802.11(g) 36 Mbps, Mid Channel					
Result:	Pass	**Value:**	16.546 MHz	**Limit:**	> 500 kHz



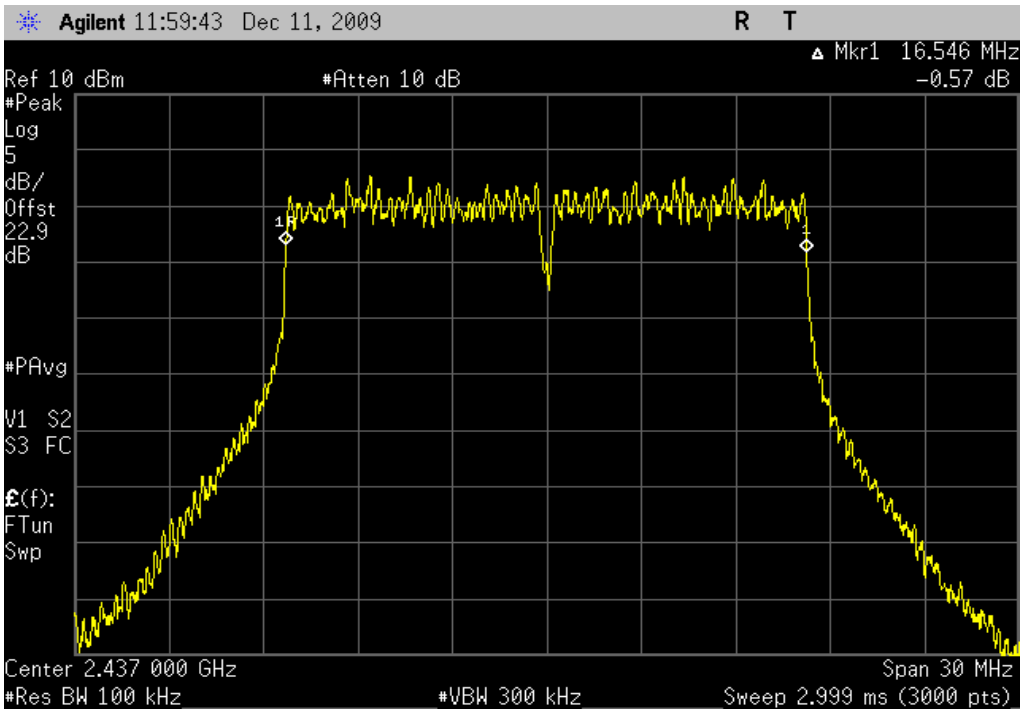
802.11(g) 36 Mbps, High Channel					
Result:	Pass	**Value:**	16.536 MHz	**Limit:**	> 500 kHz



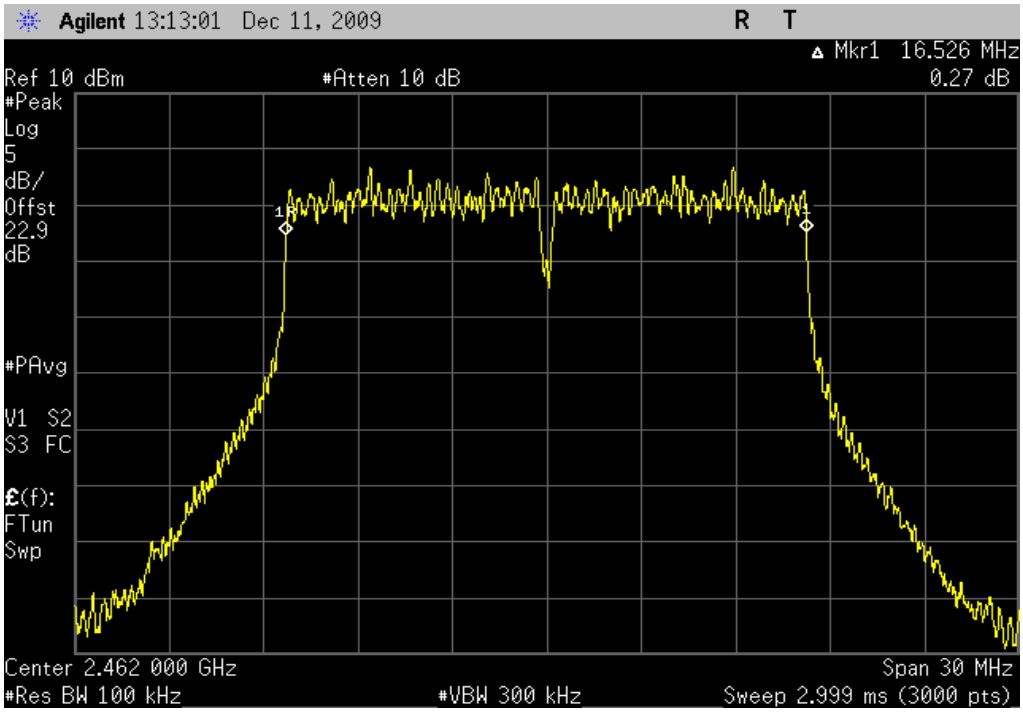
802.11(g) 54 Mbps, Low Channel					
Result:	Pass	**Value:**	16.546 MHz	**Limit:**	> 500 kHz



802.11(g) 54 Mbps, Mid Channel					
Result:	Pass	**Value:**	16.546 MHz	**Limit:**	> 500 kHz



802.11(g) 54 Mbps, High Channel					
Result:	Pass	**Value:**	16.526 MHz	**Limit:**	> 500 kHz



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
Pre-Amplifier (FOR REFERENCE ONLY)	Hewlett-Packard	83017A	APL	NCR	0
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	13

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input. The amplitude accuracy of the spectrum analyzer was further enhanced by calibrating the setup using the power meter and synthesized signal generator.

Prior to measuring peak transmit power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

Method #1 found in ANSI C63.10 section 6.10.3.1 was used because the analyzer sweep time was less than T for the operating mode which has the shortest transmission pulse duration and the Emission Bandwidth was greater than the largest RBW on the analyzer.

The spectrum analyzer settings were as follows:

- The span was set to encompass entire emission bandwidth (B), centered on the transmit channel.
- The RBW = 1 MHz, VBW = 3 MHz
- Sample detector mode because the bin width (span / number of spectral points) < 0.5 RBW.
- Trace averaging across 100 sweeps in power averaging mode
- Power was integrated across “B”, by using the channel power function of the analyzer.

NORTHWEST EMC

OUTPUT POWER

XMit 2009.03.05

EUT:	Ranger/TSC3 802.11 radio			Work Order:	TRPO0054
Serial Number:	Unknown			Date:	01/04/10
Customer:	Trimble Navigation Limited			Temperature:	20°C
Attendees:	None			Humidity:	38%
Project:	None			Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power:	120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

COMMENTS

0.75 dB added to analyzer offset for adapter cable loss.

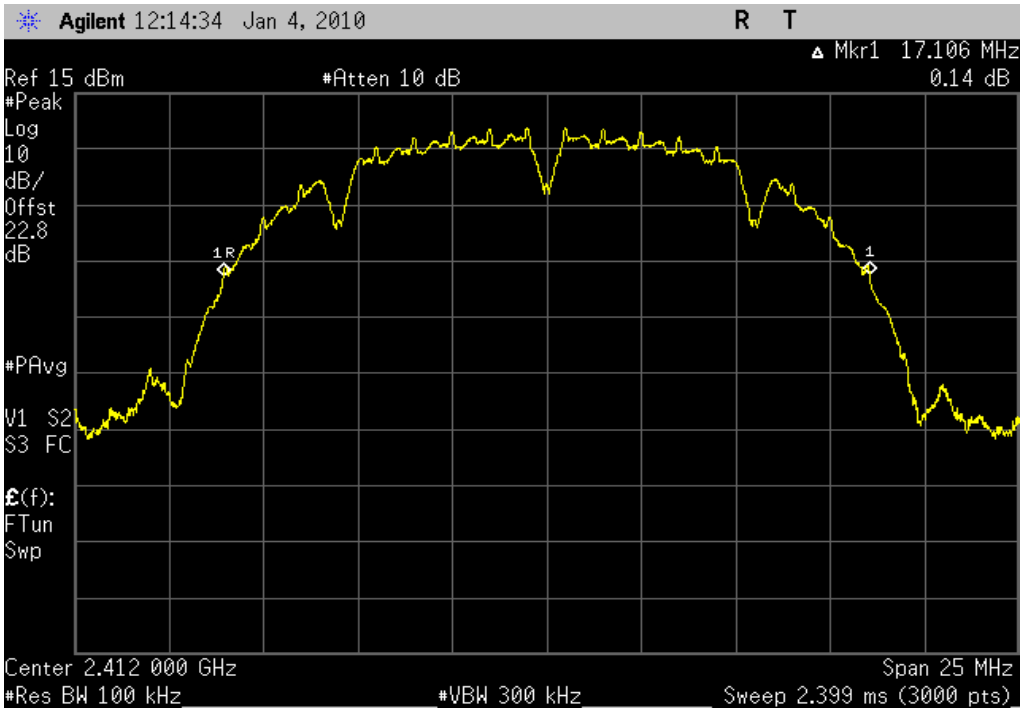
DEVIATIONS FROM TEST STANDARD

No Deviations

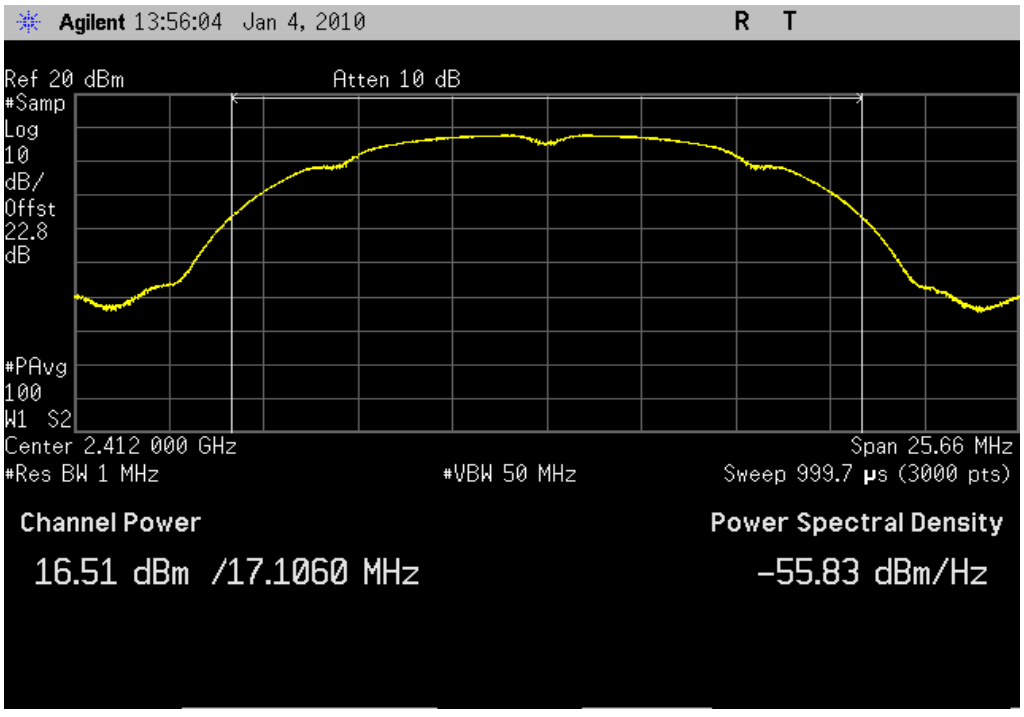
Configuration #	1	Signature

		Value	Limit	Results
802.11(b) 1 Mbps				
	Low Channel			
	-26dB Emission Bandwidth	17.106 MHz		
	Output Power	16.5 dBm	30 dBm	Pass
	Mid Channel			
	-26dB Emission Bandwidth	17.072 MHz		
	Output Power	16.6 dBm	30 dBm	Pass
	High Channel			
	-26dB Emission Bandwidth	17.089 MHz		
	Output Power	16.6 dBm	30 dBm	Pass
802.11(b) 11 Mbps				
	Low Channel			
	-26dB Emission Bandwidth	16.739 MHz		
	Output Power	16.7 dBm	30 dBm	Pass
	Mid Channel			
	-26dB Emission Bandwidth	16.731 MHz		
	Output Power	16.4 dBm	30 dBm	Pass
	High Channel			
	-26dB Emission Bandwidth	16.739 MHz		
	Output Power	16.6 dBm	30 dBm	Pass
802.11(g) 6 Mbps				
	Low Channel			
	-26dB Emission Bandwidth	21.207 MHz		
	Output Power	12.9 dBm	30 dBm	Pass
	Mid Channel			
	-26dB Emission Bandwidth	21.547 MHz		
	Output Power	12.9 dBm	30 dBm	Pass
	High Channel			
	-26dB Emission Bandwidth	21.667 MHz		
	Output Power	13.0 dBm	30 dBm	Pass
802.11(g) 36 Mbps				
	Low Channel			
	-26dB Emission Bandwidth	20.677 MHz		
	Output Power	13.0 dBm	30 dBm	Pass
	Mid Channel			
	-26dB Emission Bandwidth	20.887 MHz		
	Output Power	13.0 dBm	30 dBm	Pass
	High Channel			
	-26dB Emission Bandwidth	20.557 MHz		
	Output Power	13.1 dBm	30 dBm	Pass
802.11(g) 54 Mbps				
	Low Channel			
	-26dB Emission Bandwidth	20.637 MHz		
	Output Power	12.9 dBm	30 dBm	Pass
	Mid Channel			
	-26dB Emission Bandwidth	20.437 MHz		
	Output Power	13.0 dBm	30 dBm	Pass
	High Channel			
	-26dB Emission Bandwidth	20.627 MHz		
	Output Power	12.9 dBm	30 dBm	Pass

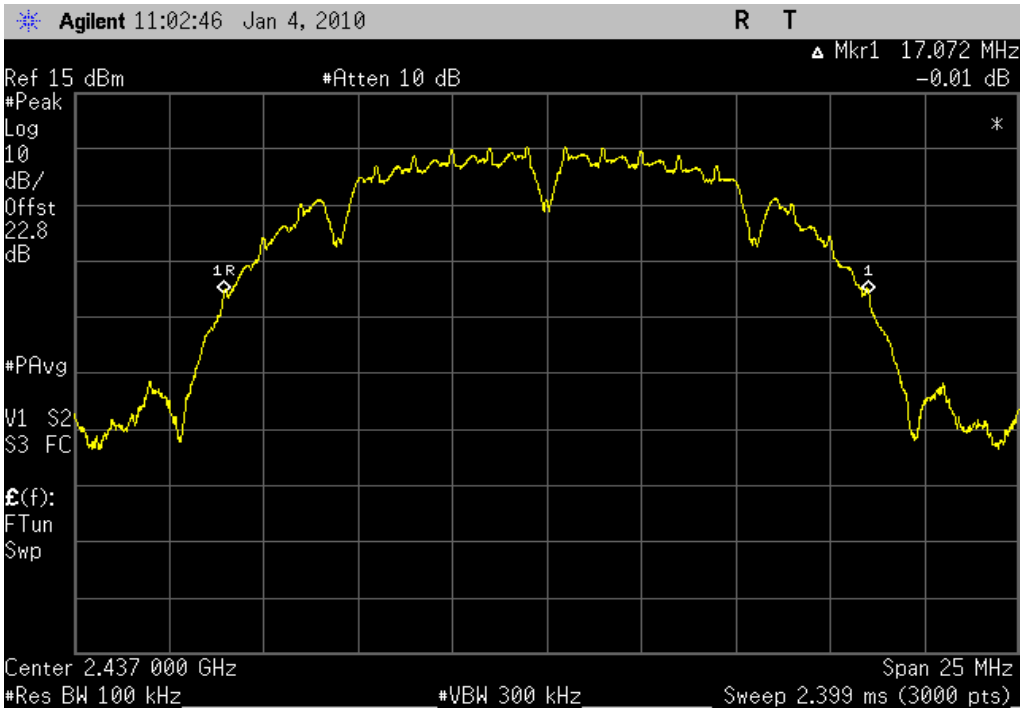
802.11(b) 1 Mbps, Low Channel, -26dB Emission Bandwidth
Value: 17.106 MHz



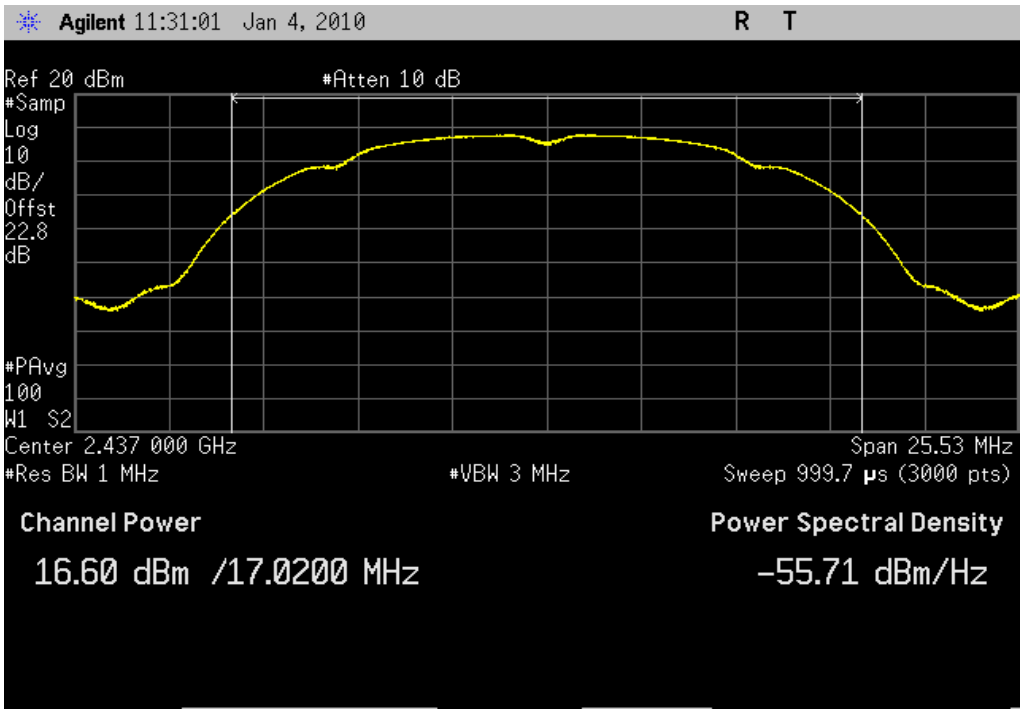
802.11(b) 1 Mbps, Low Channel, Output Power					
Result:	Pass	**Value:**	16.5 dBm	**Limit:**	30 dBm



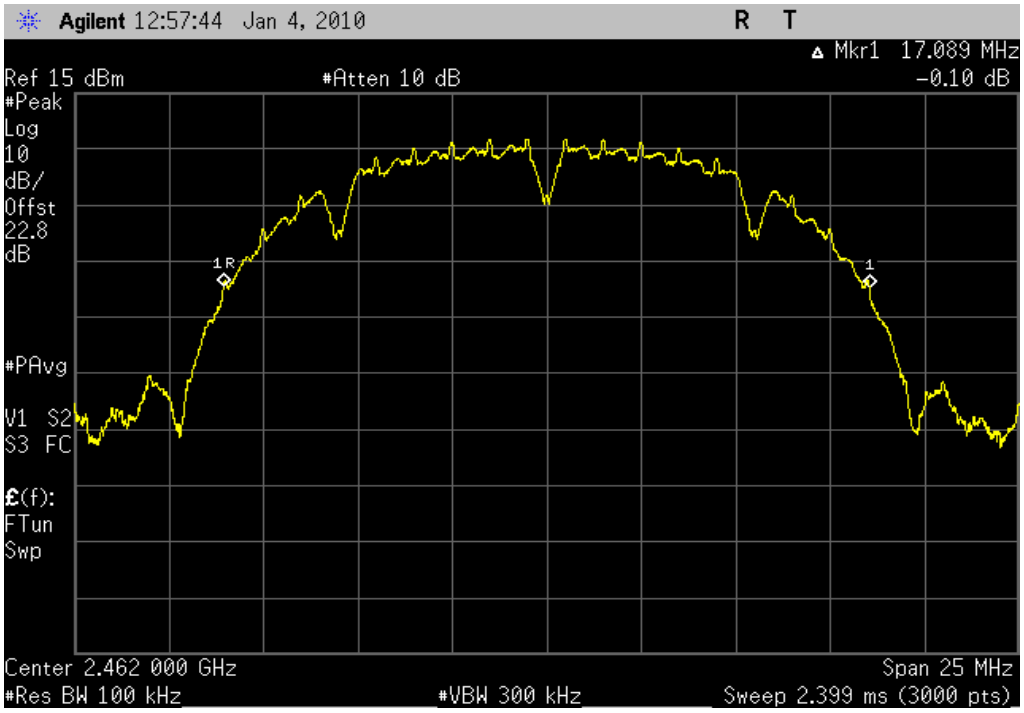
802.11(b) 1 Mbps, Mid Channel, -26dB Emission Bandwidth
Value: 17.072 MHz



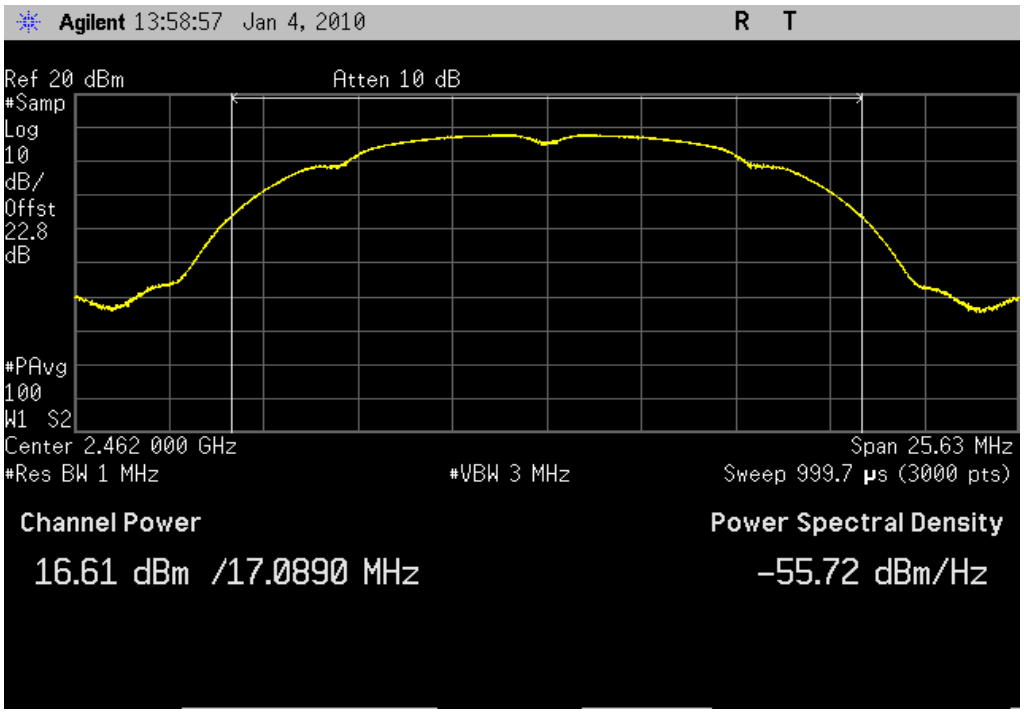
802.11(b) 1 Mbps, Mid Channel, Output Power					
Result:	Pass	**Value:**	16.6 dBm	**Limit:**	30 dBm



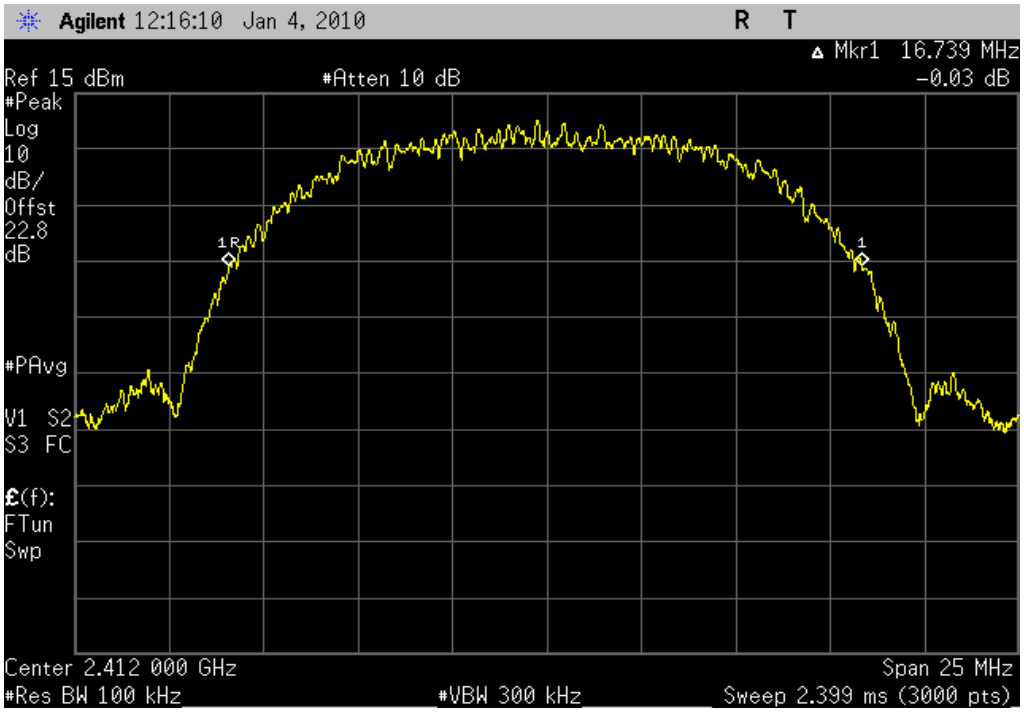
802.11(b) 1 Mbps, High Channel, -26dB Emission Bandwidth
Value: 17.089 MHz



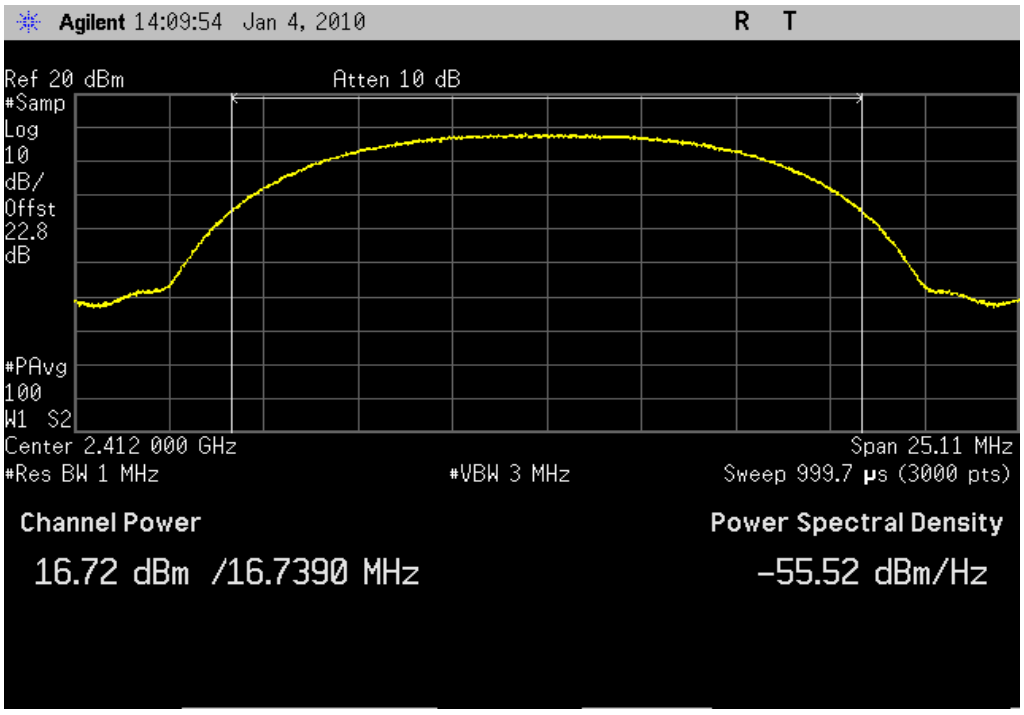
802.11(b) 1 Mbps, High Channel, Output Power					
Result:	Pass	**Value:**	16.6 dBm	**Limit:**	30 dBm



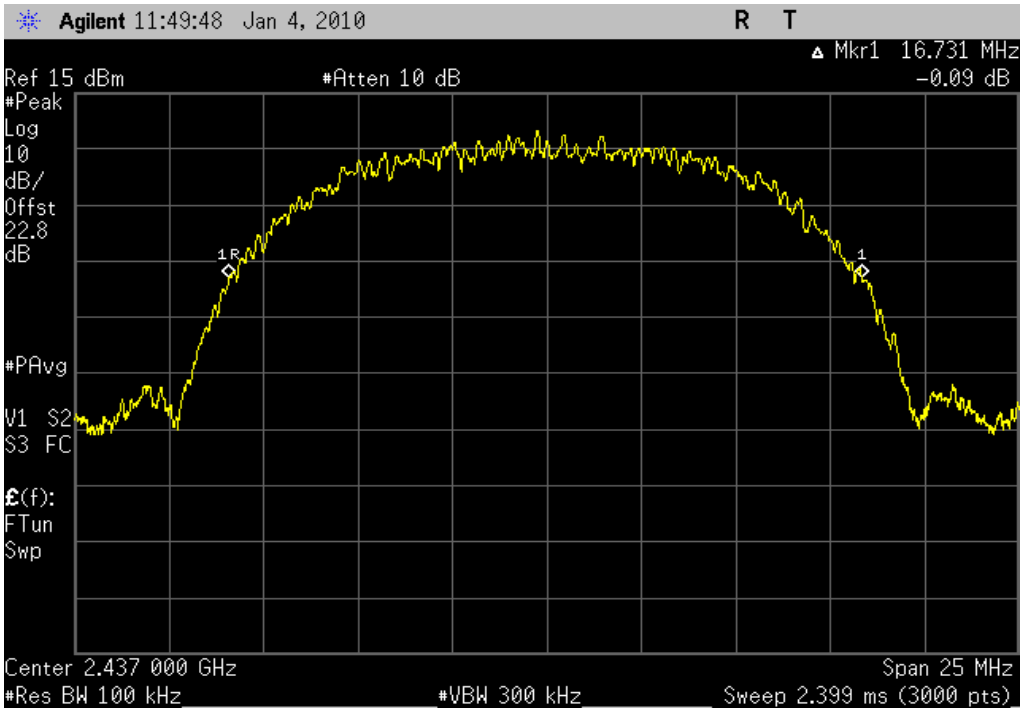
802.11(b) 11 Mbps, Low Channel, -26dB Emission Bandwidth
Value: 16.739 MHz



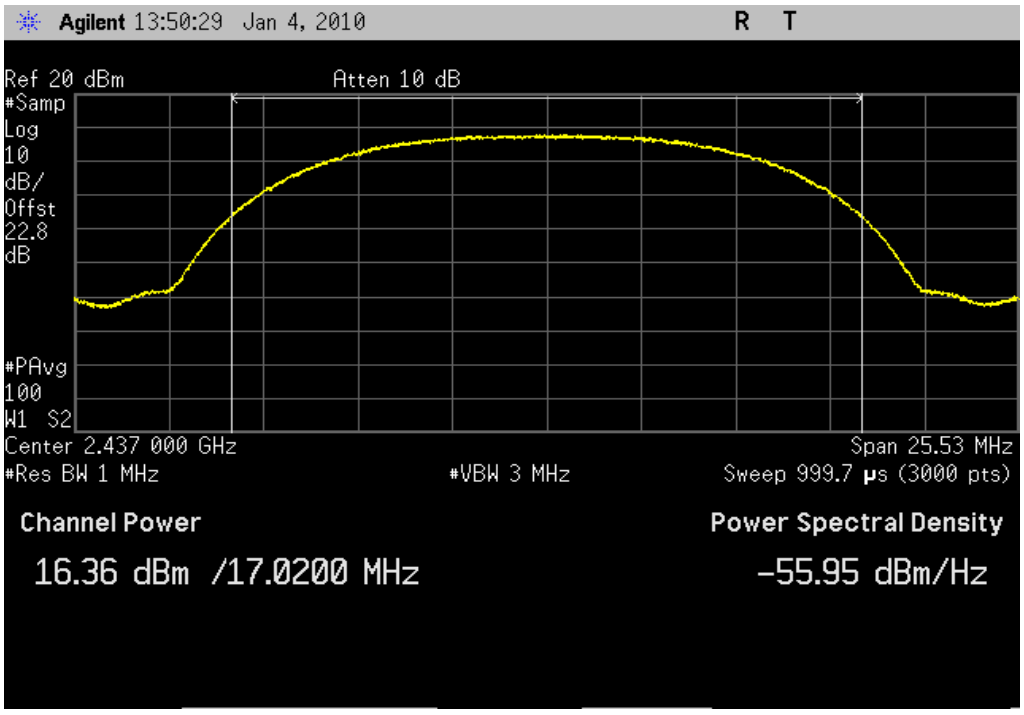
802.11(b) 11 Mbps, Low Channel, Output Power					
Result:	Pass	**Value:**	16.7 dBm	**Limit:**	30 dBm



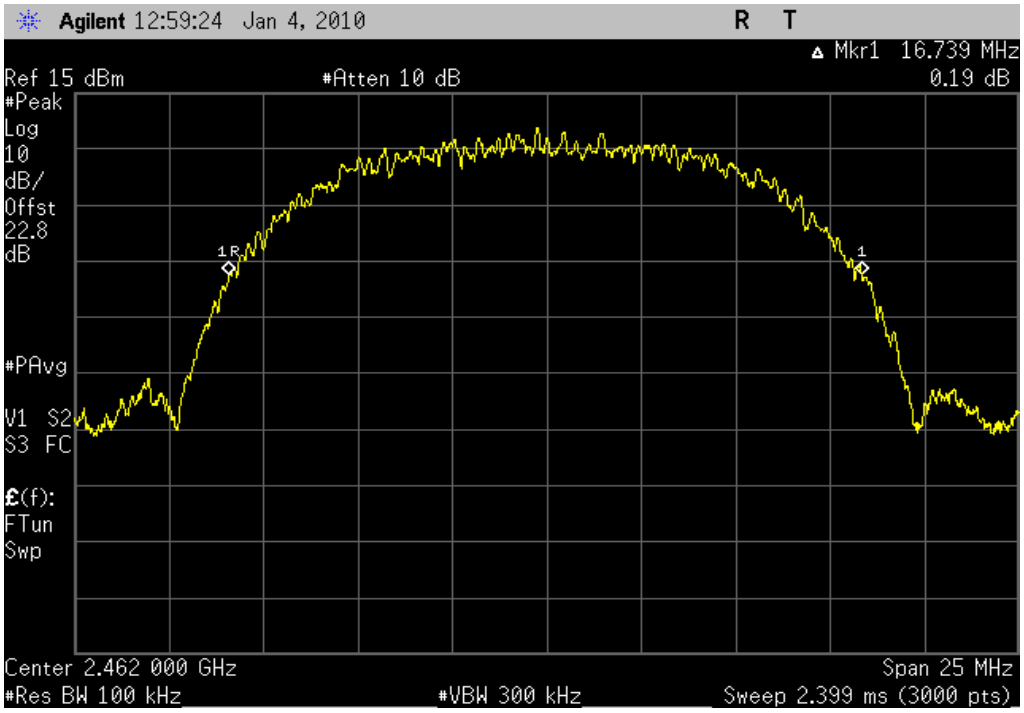
802.11(b) 11 Mbps, Mid Channel, -26dB Emission Bandwidth
Value: 16.731 MHz



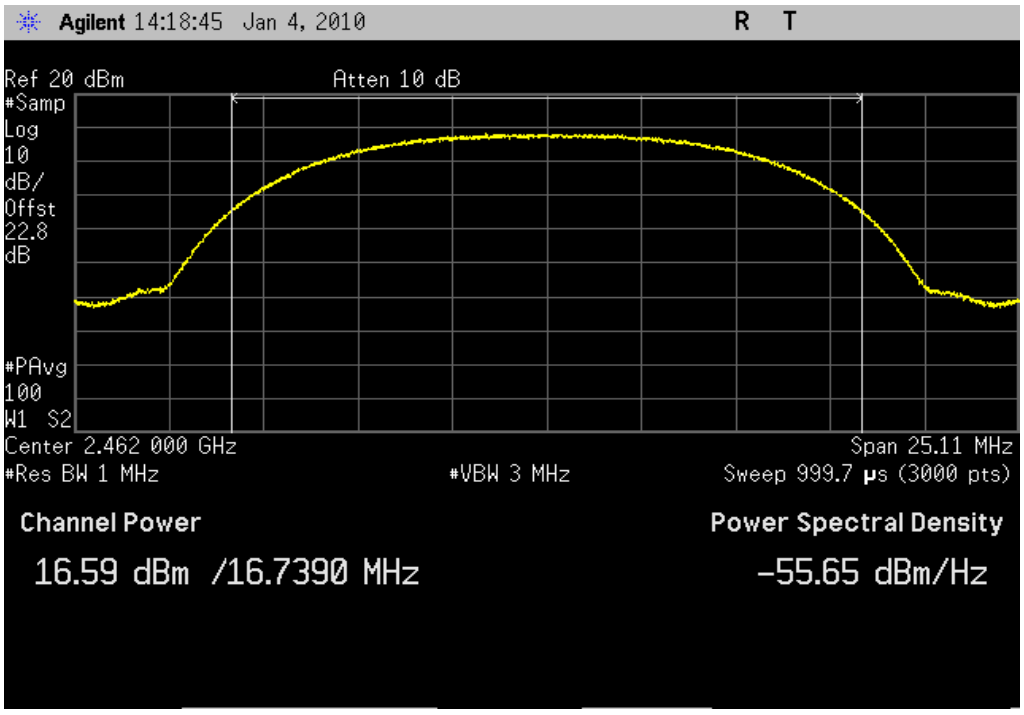
802.11(b) 11 Mbps, Mid Channel, Output Power					
Result:	Pass	**Value:**	16.4 dBm	**Limit:**	30 dBm



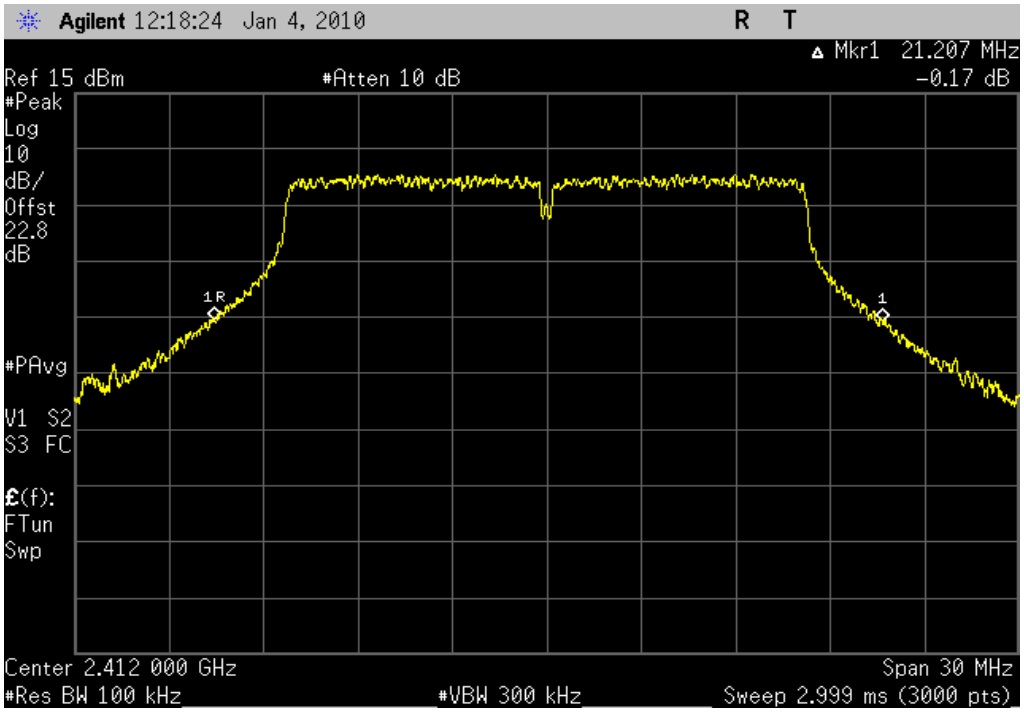
802.11(b) 11 Mbps, High Channel, -26dB Emission Bandwidth
Value: 16.739 MHz



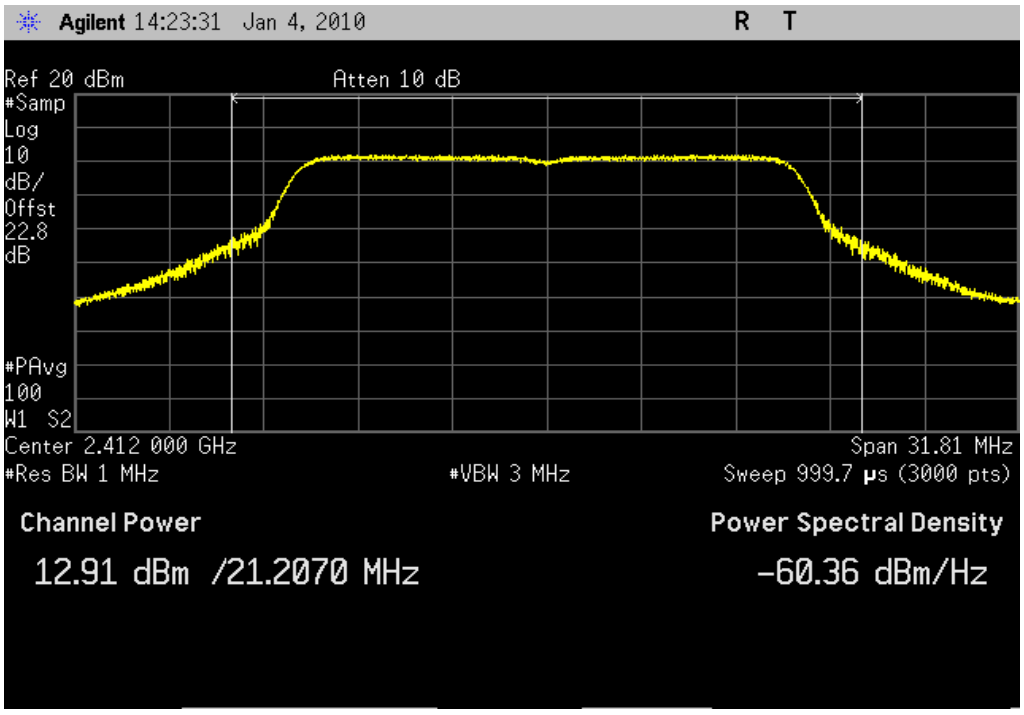
802.11(b) 11 Mbps, High Channel, Output Power					
Result:	Pass	**Value:**	16.6 dBm	**Limit:**	30 dBm



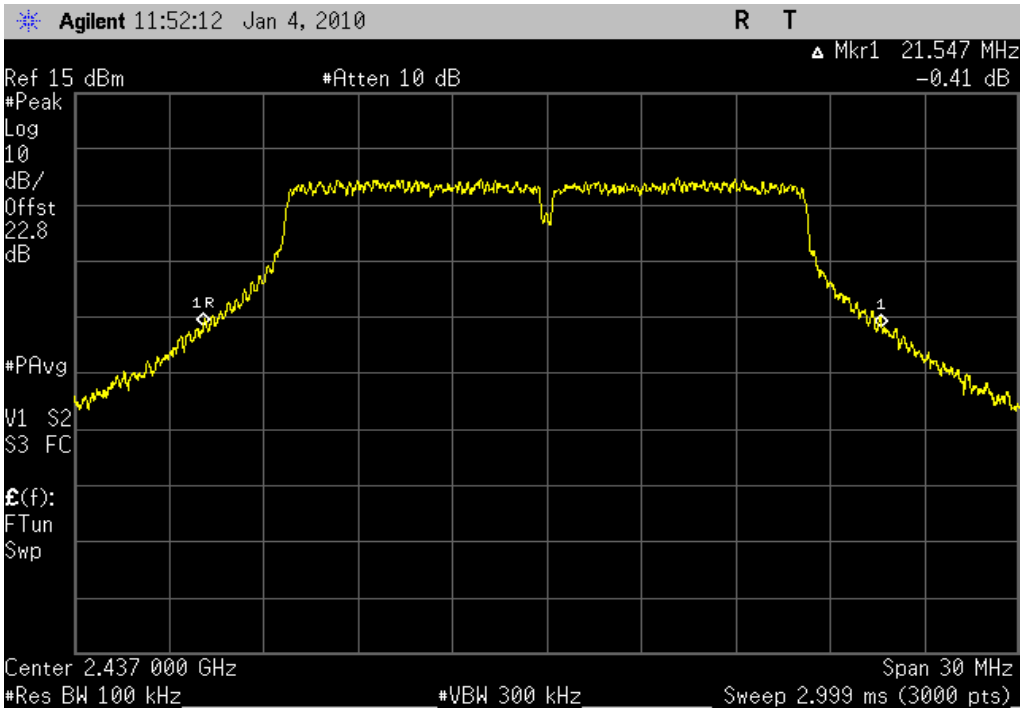
802.11(g) 6 Mbps, Low Channel, -26dB Emission Bandwidth
Value: 21.207 MHz



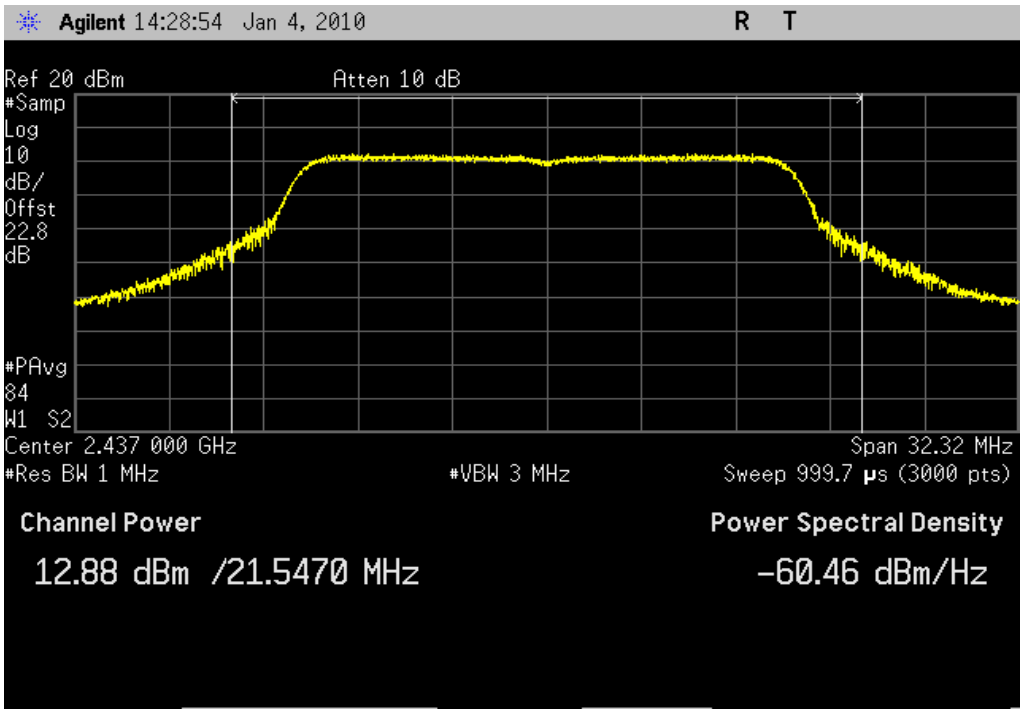
802.11(g) 6 Mbps, Low Channel, Output Power					
Result:	Pass	**Value:**	12.9 dBm	**Limit:**	30 dBm



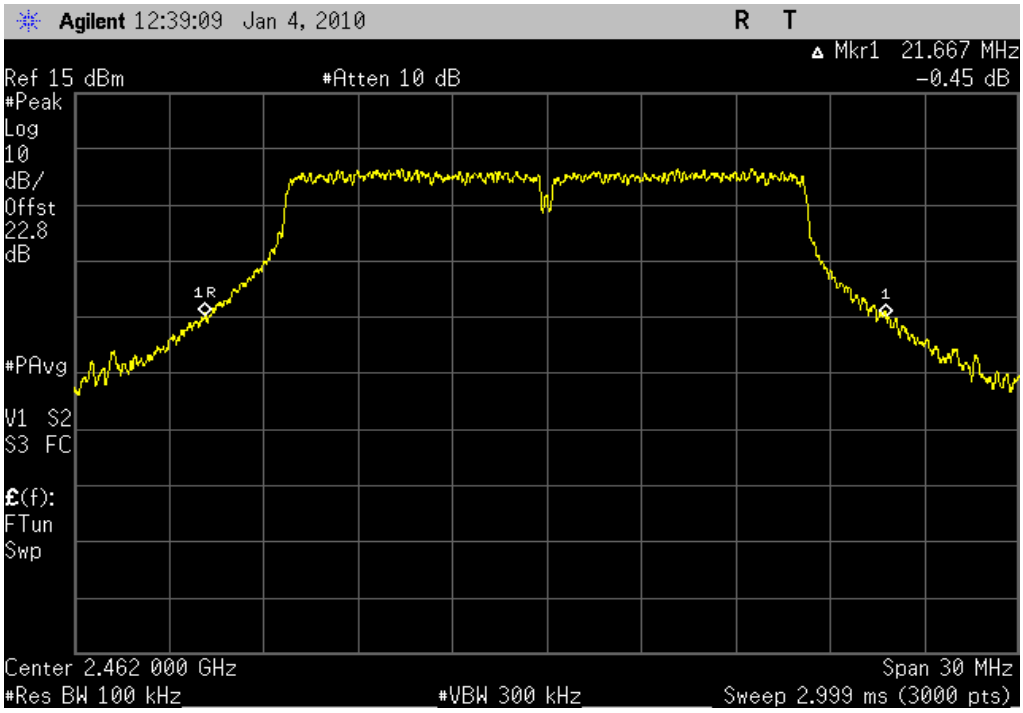
802.11(g) 6 Mbps, Mid Channel, -26dB Emission Bandwidth
Value: 21.547 MHz



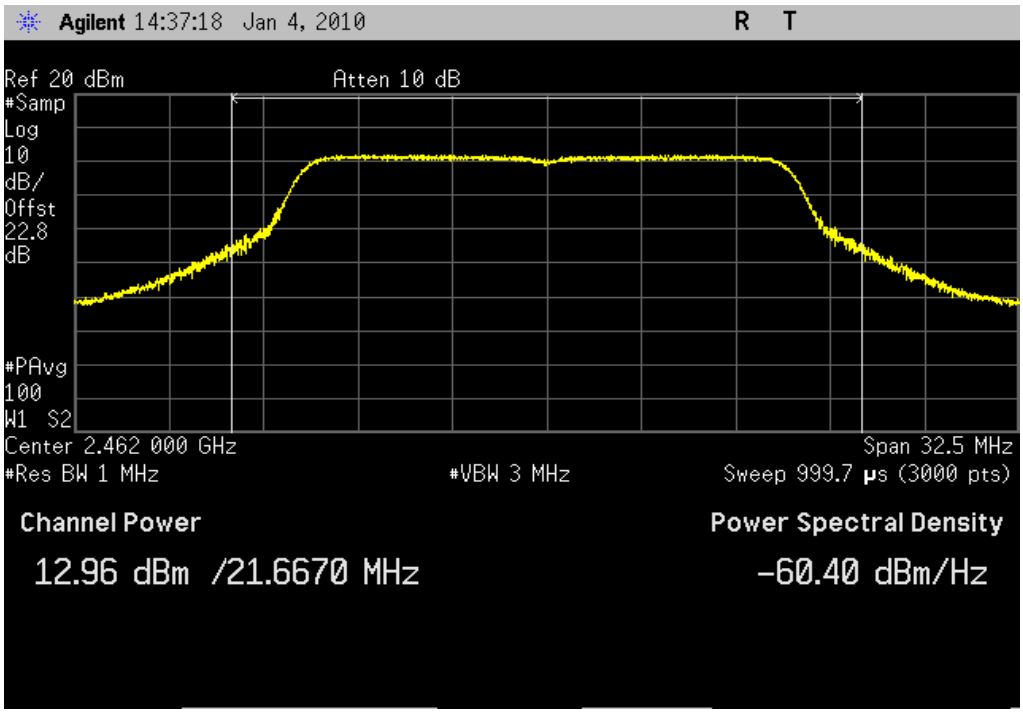
802.11(g) 6 Mbps, Mid Channel, Output Power					
Result:	Pass	**Value:**	12.9 dBm	**Limit:**	30 dBm



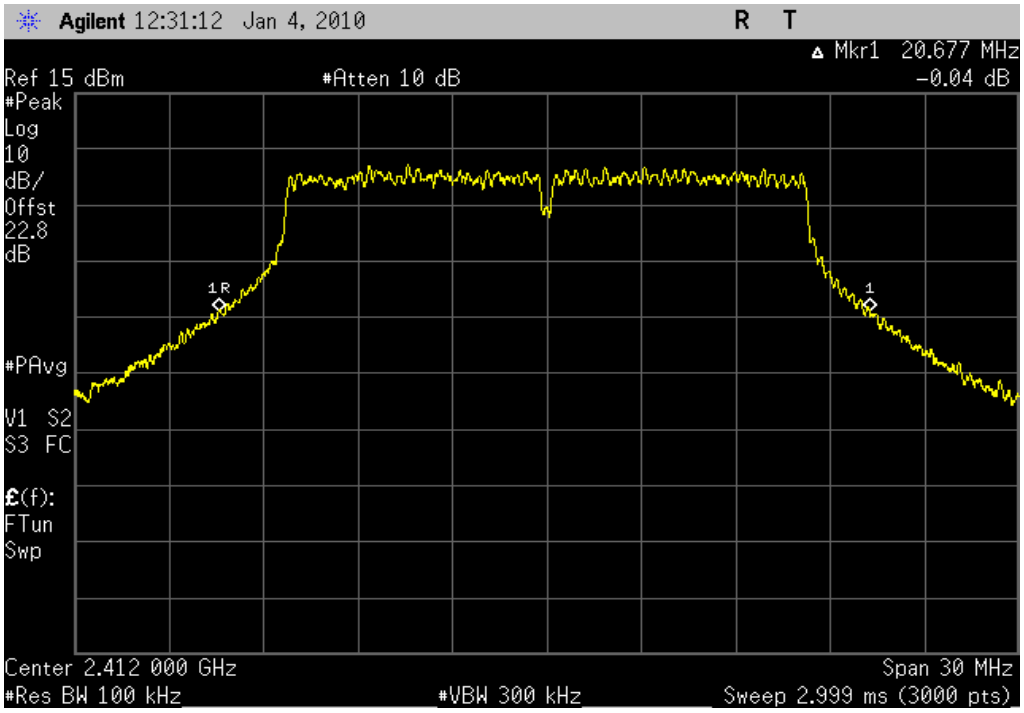
802.11(g) 6 Mbps, High Channel, -26dB Emission Bandwidth
Value: 21.667 MHz



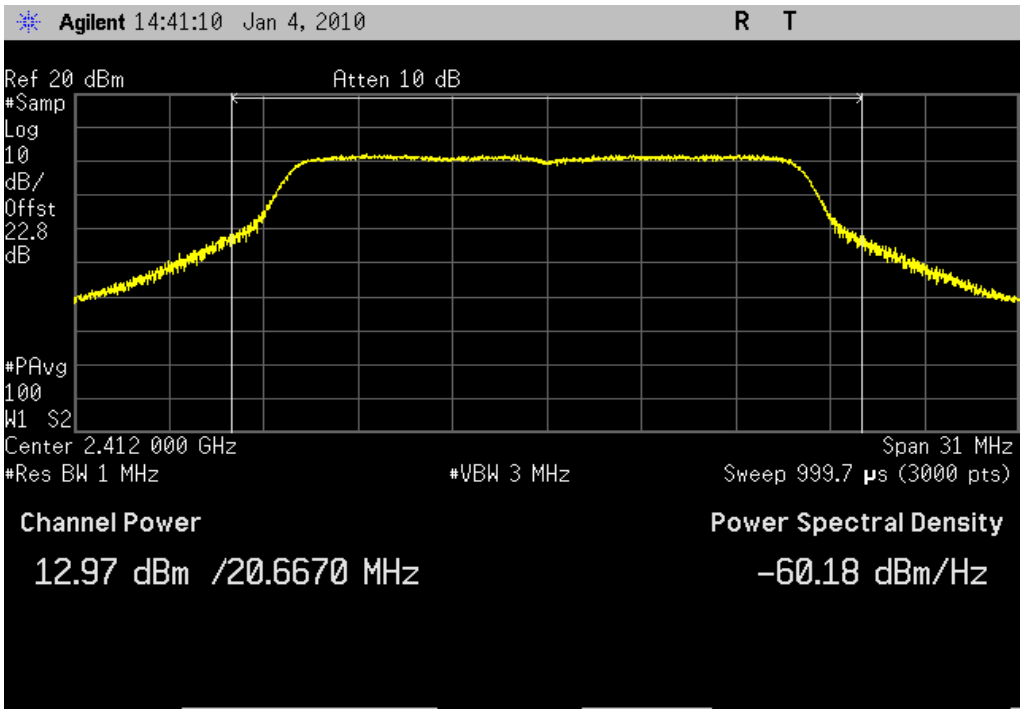
802.11(g) 6 Mbps, High Channel, Output Power					
Result:	Pass	**Value:**	13.0 dBm	**Limit:**	30 dBm



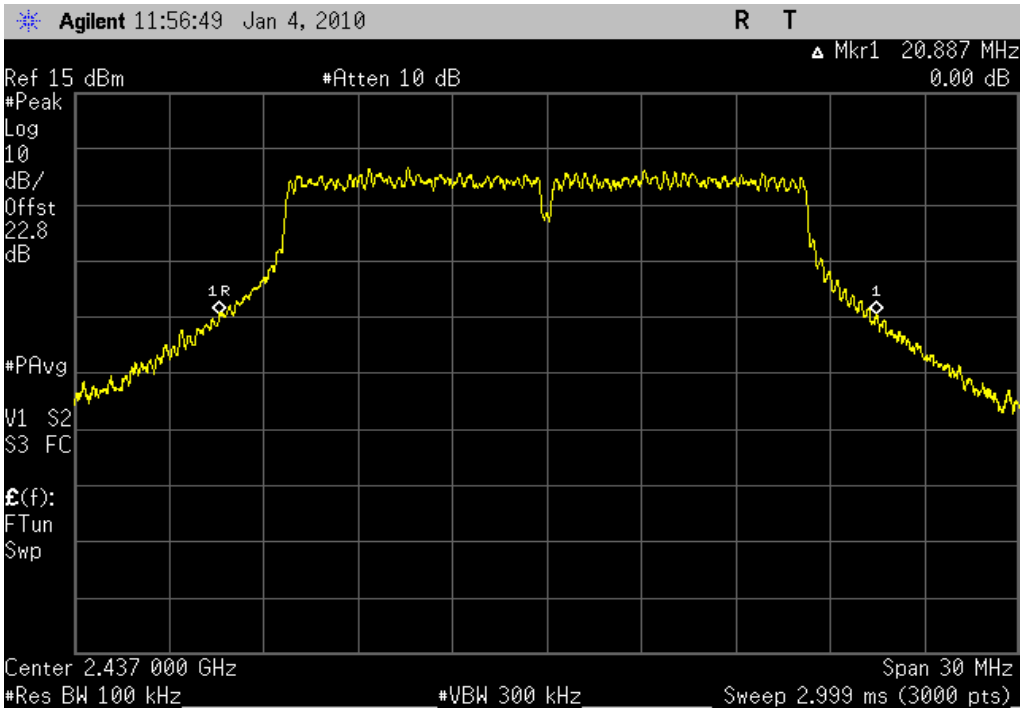
802.11(g) 36 Mbps, Low Channel, -26dB Emission Bandwidth
Value: 20.677 MHz



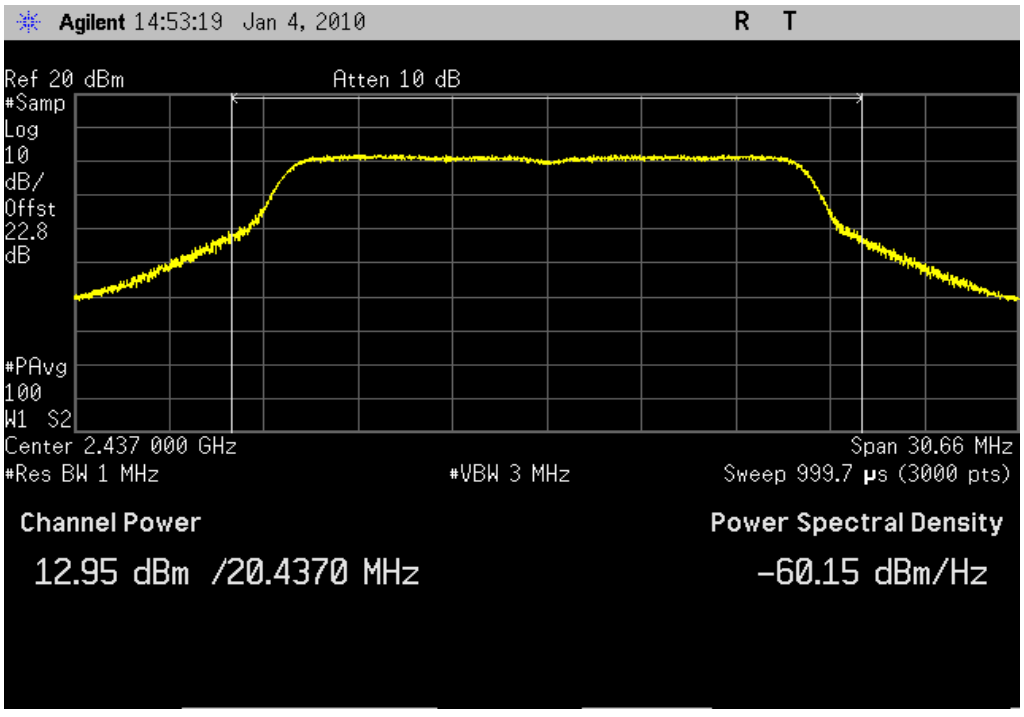
802.11(g) 36 Mbps, Low Channel, Output Power					
Result:	Pass	**Value:**	13.0 dBm	**Limit:**	30 dBm



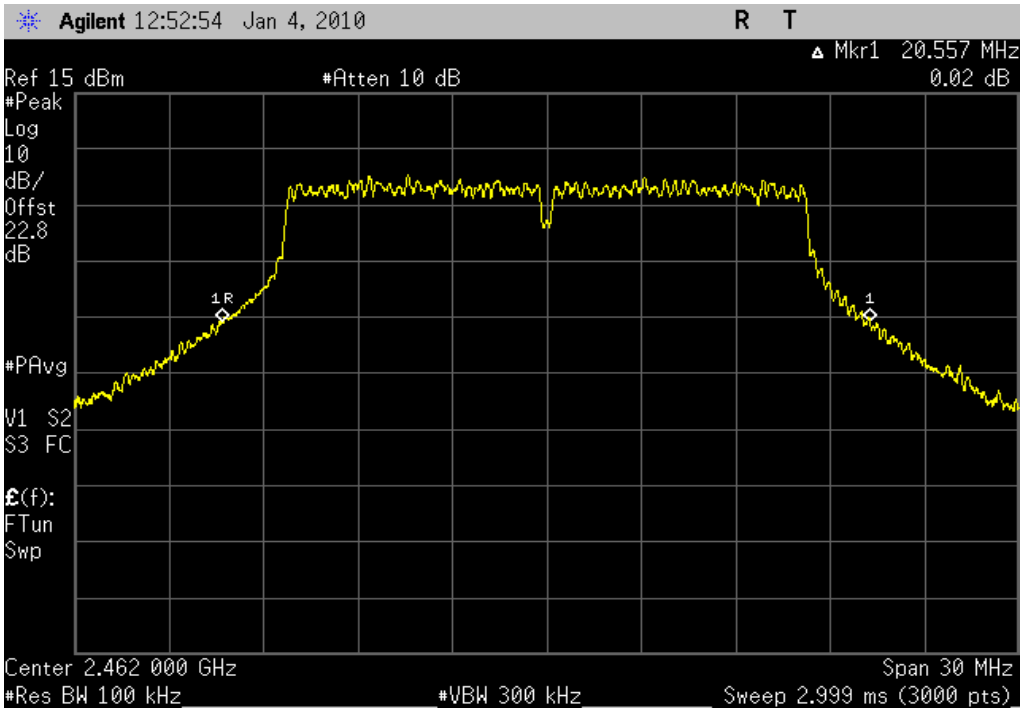
802.11(g) 36 Mbps, Mid Channel, -26dB Emission Bandwidth
Value: 20.887 MHz



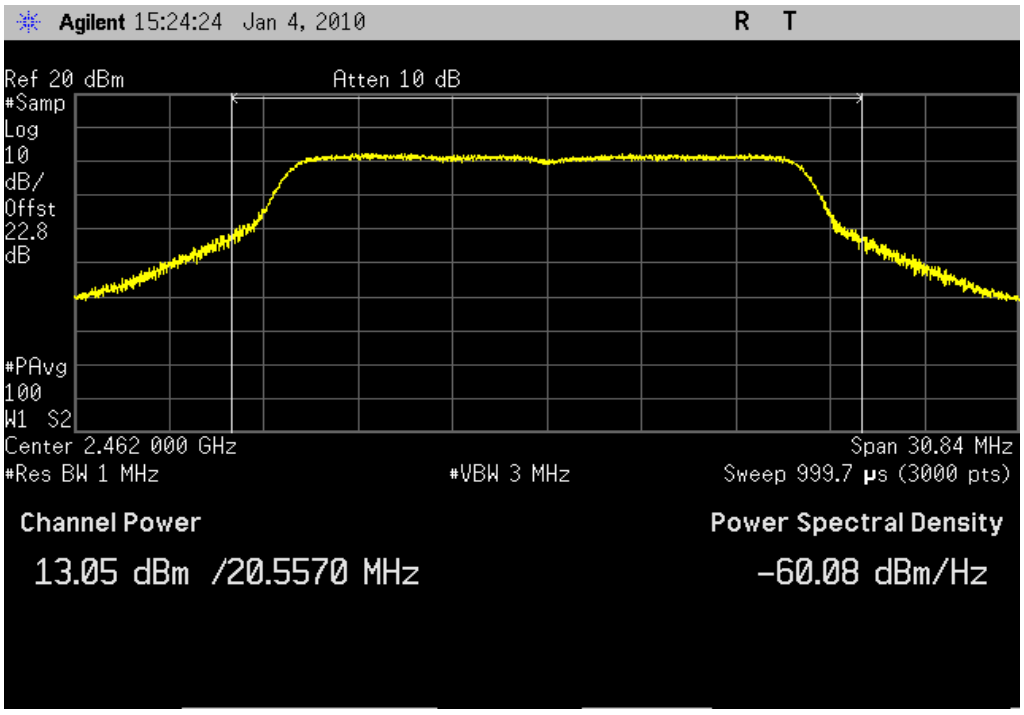
802.11(g) 36 Mbps, Mid Channel, Output Power					
Result:	Pass	**Value:**	13.0 dBm	**Limit:**	30 dBm



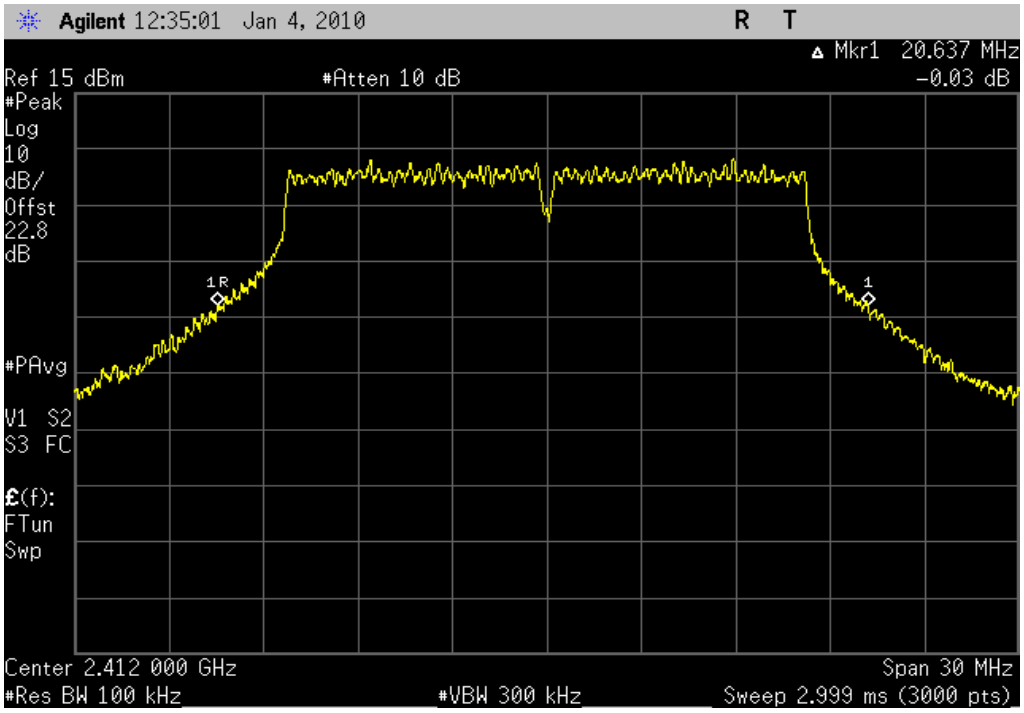
802.11(g) 36 Mbps, High Channel, -26dB Emission Bandwidth
Value: 20.557 MHz



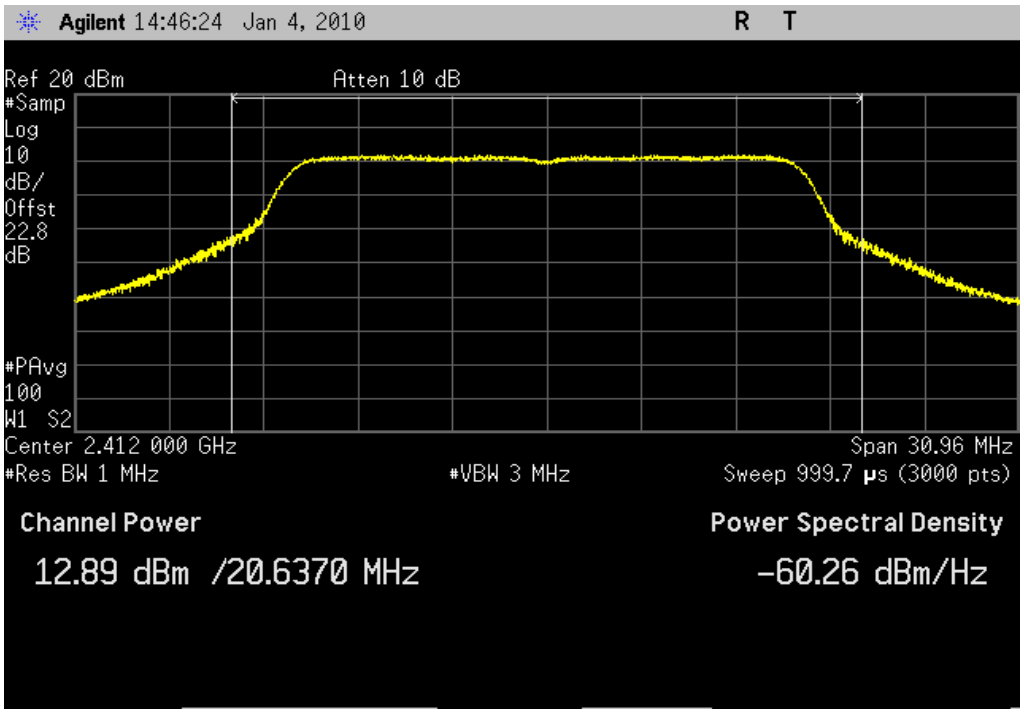
802.11(g) 36 Mbps, High Channel, Output Power					
Result:	Pass	**Value:**	13.1 dBm	**Limit:**	30 dBm



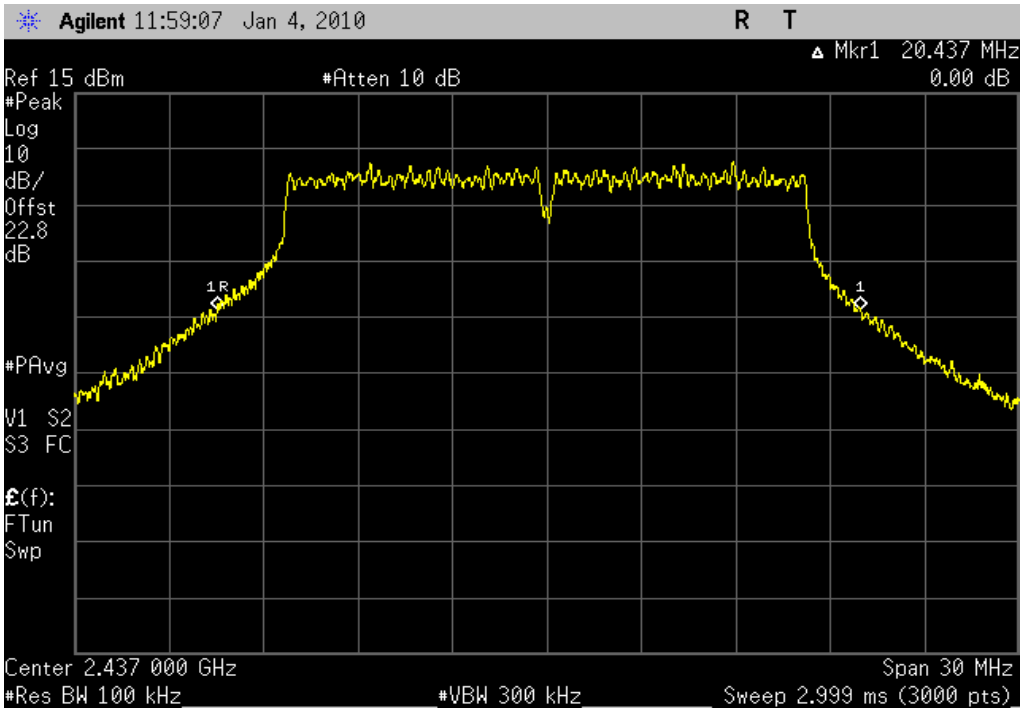
802.11(g) 54 Mbps, Low Channel, -26dB Emission Bandwidth
Value: 20.637 MHz



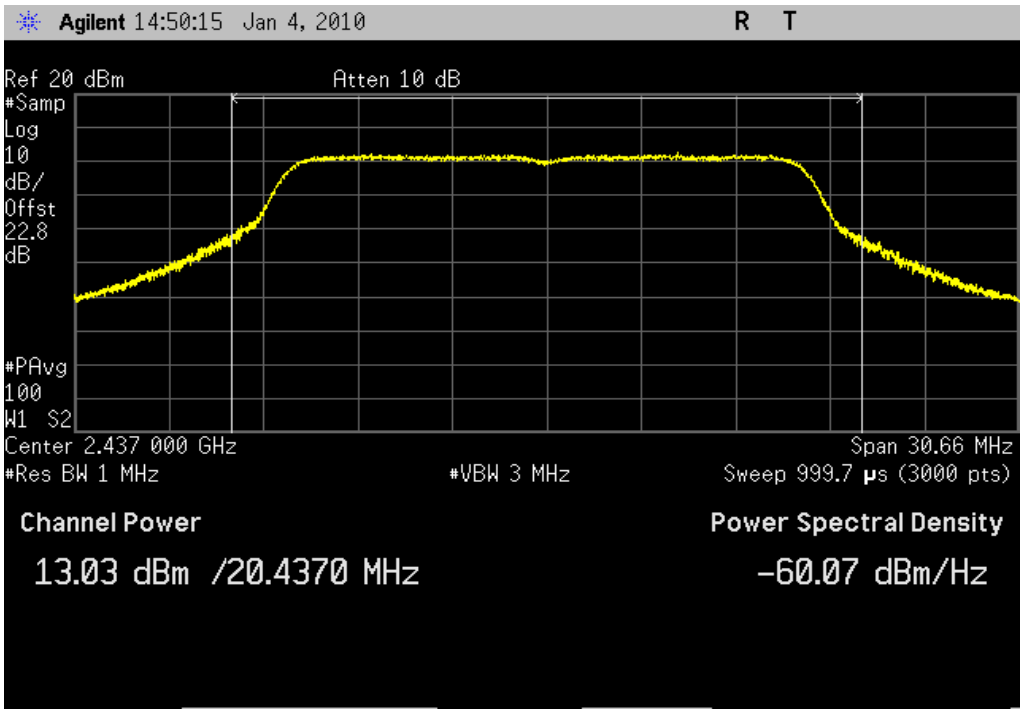
802.11(g) 54 Mbps, Low Channel, Output Power					
Result:	Pass	**Value:**	12.9 dBm	**Limit:**	30 dBm



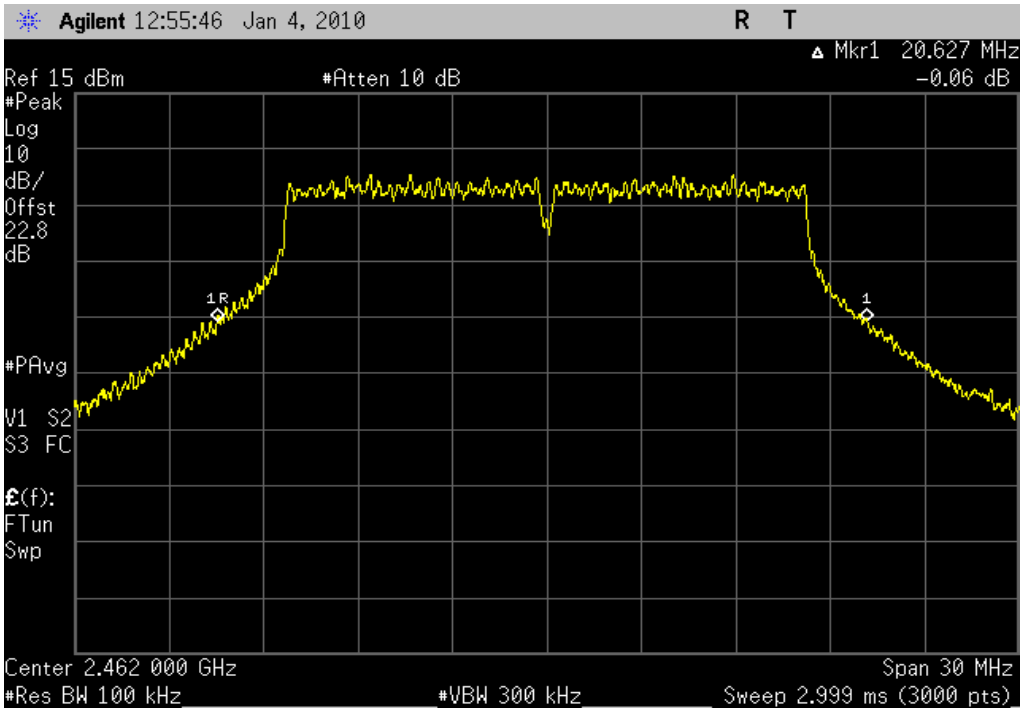
802.11(g) 54 Mbps, Mid Channel, -26dB Emission Bandwidth
Value: 20.437 MHz



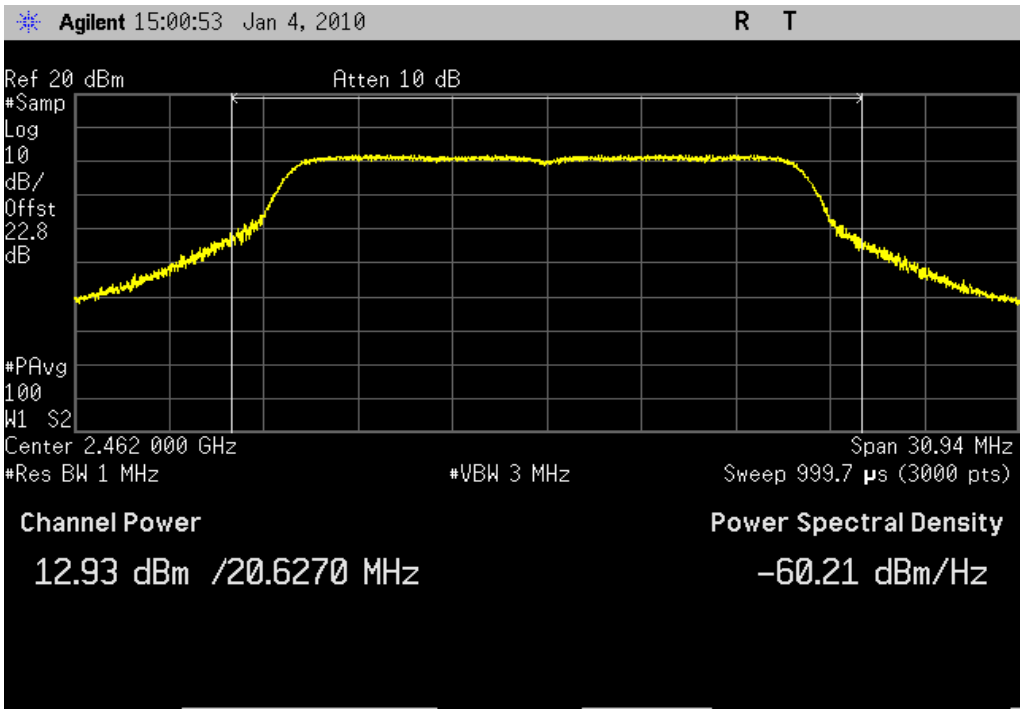
802.11(g) 54 Mbps, Mid Channel, Output Power					
Result:	Pass	**Value:**	13.0 dBm	**Limit:**	30 dBm



802.11(g) 54 Mbps, High Channel, -26dB Emission Bandwidth
Value: 20.627 MHz



802.11(g) 54 Mbps, High Channel, Output Power					
Result:	Pass	**Value:**	12.9 dBm	**Limit:**	30 dBm



BAND EDGE COMPLIANCE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its lowest, middle, and maximum data rate available.

The spectrum was scanned across each band edge from at least 25 MHz below the band edge to 25 MHz above the band edge.

NORTHWEST EMC

BAND EDGE COMPLIANCE

XMit 2009.03.05

EUT:	Ranger/TSC3 802.11 radio			Work Order:	TRPO0054
Serial Number:	Unknown			Date:	12/07/09
Customer:	Trimble Navigation Limited			Temperature:	20°C
Attendees:	none			Humidity:	38%
Project:	None			Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power:	120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

COMMENTS

0.75 dB added to analyzer offset for adapter cable loss.

DEVIATIONS FROM TEST STANDARD

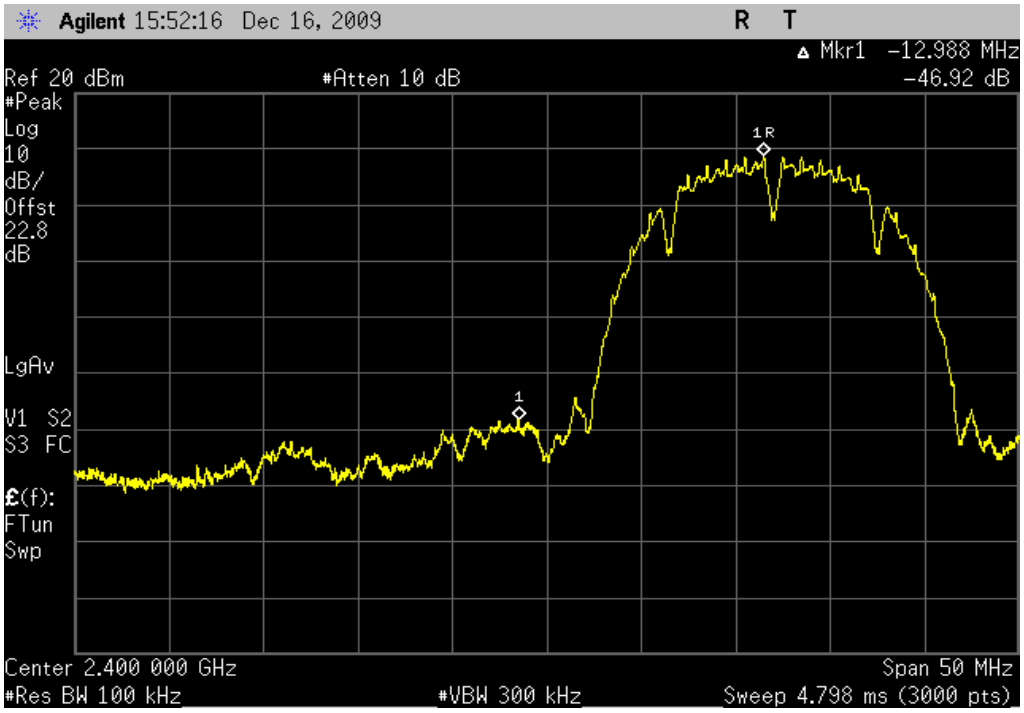
No Deviations

Configuration #	1	Signature

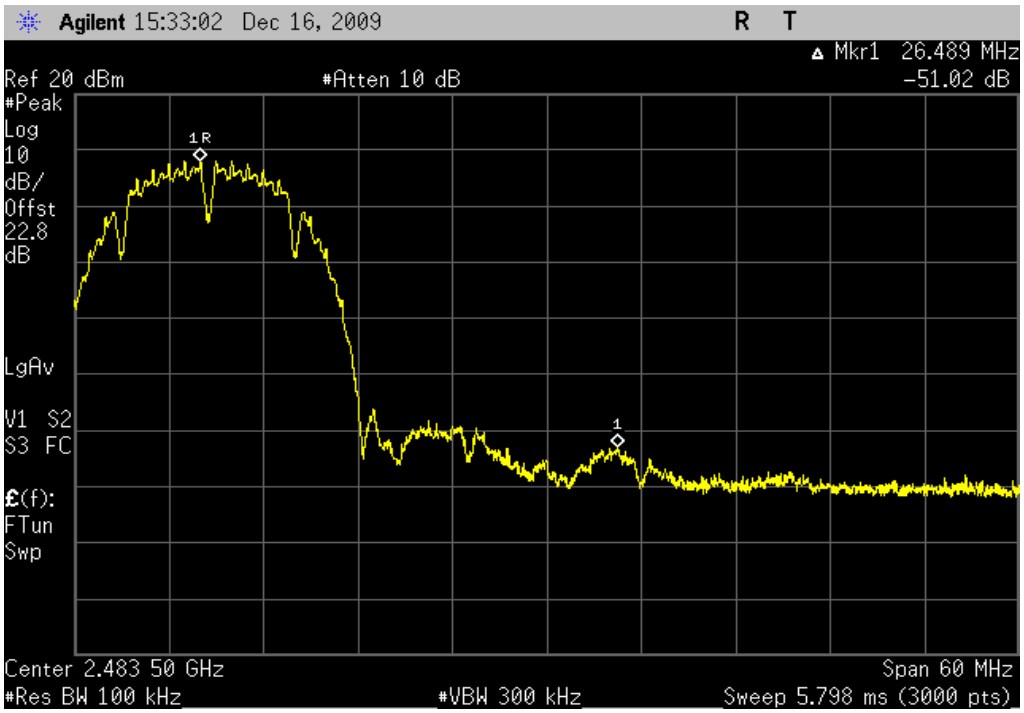
		Value	Limit	Results
802.11(b) 1 Mbps				
	Low Channel	-46.9 dBc	≤ -30 dBc	Pass
	High Channel	-51.0 dBc	≤ -30 dBc	Pass
802.11(b) 11 Mbps				
	Low Channel	-48.6 dBc	≤ -30 dBc	Pass
	High Channel	-53.7 dBc	≤ -30 dBc	Pass
802.11(g) 6 Mbps				
	Low Channel	-31.5 dBc	≤ -30 dBc	Pass
	High Channel	-43.6 dBc	≤ -30 dBc	Pass
802.11(g) 36 Mbps				
	Low Channel	-31.9 dBc	≤ -30 dBc	Pass
	High Channel	-46.0 dBc	≤ -30 dBc	Pass
802.11(g) 54 Mbps				
	Low Channel	-32.3 dBc	≤ -30 dBc	Pass
	High Channel	-45.7 dBc	≤ -30 dBc	Pass

BAND EDGE COMPLIANCE

802.11(b) 1 Mbps, Low Channel					
Result:	Pass	**Value:**	-46.9 dBc	**Limit:**	≤ -30 dBc

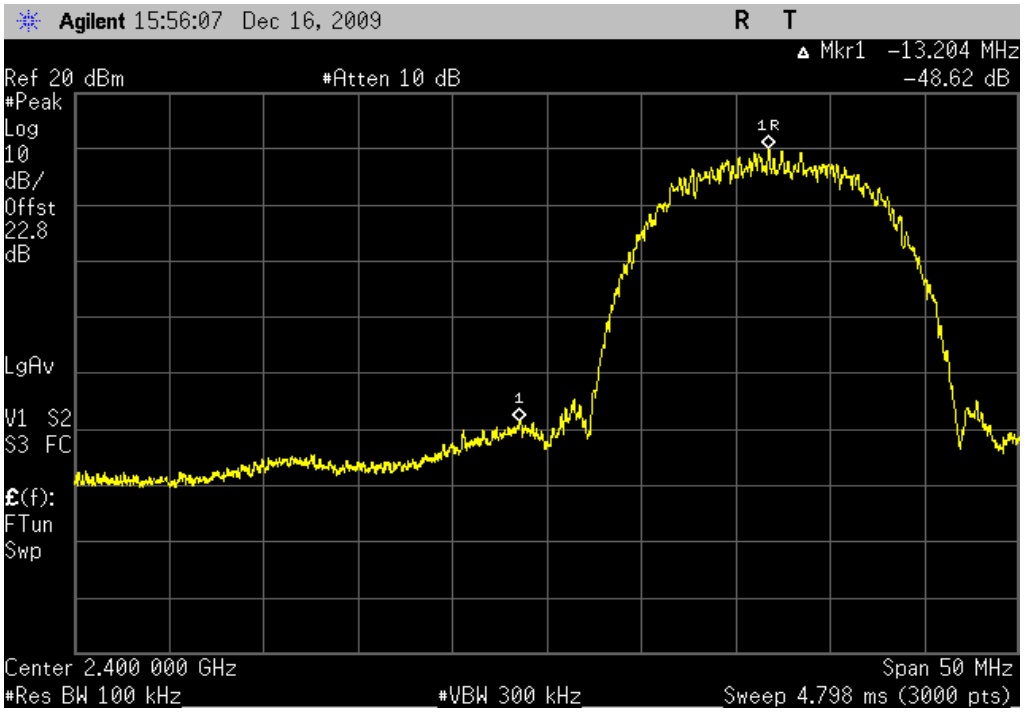


802.11(b) 1 Mbps, High Channel					
Result:	Pass	**Value:**	-51.0 dBc	**Limit:**	≤ -30 dBc

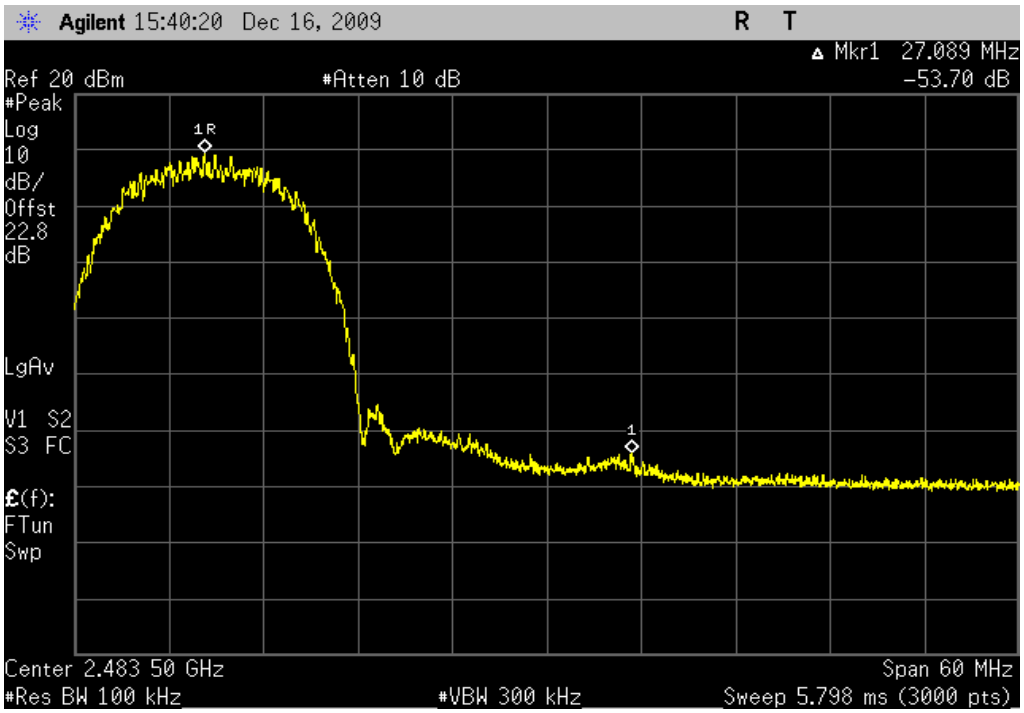


BAND EDGE COMPLIANCE

802.11(b) 11 Mbps, Low Channel					
Result:	Pass	**Value:**	-48.6 dBc	**Limit:**	≤ -30 dBc

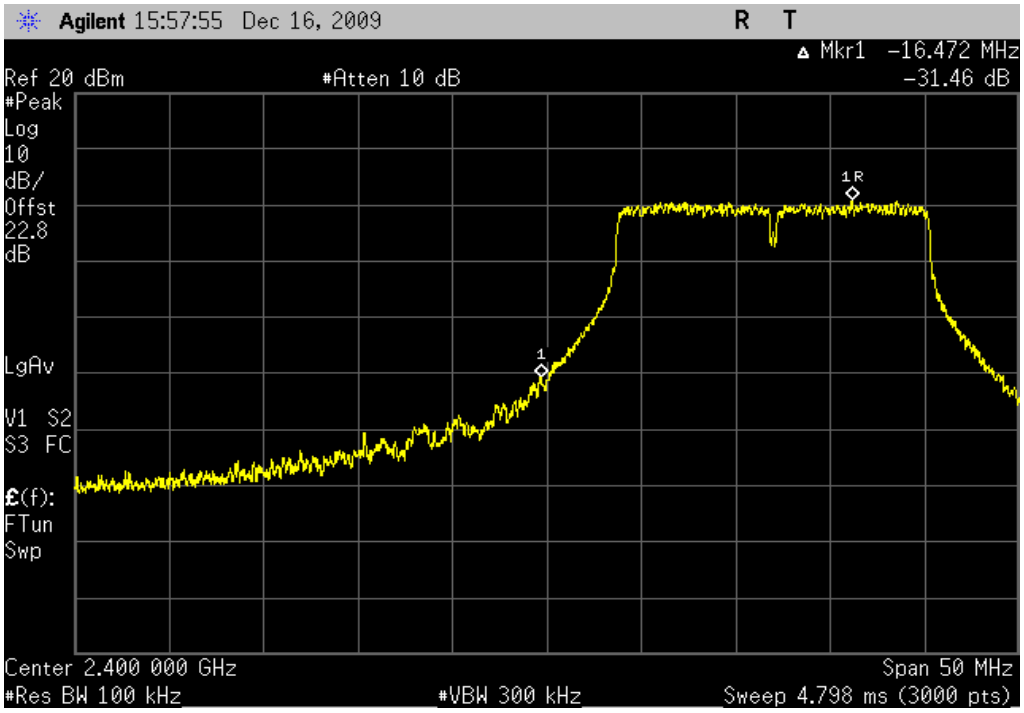


802.11(b) 11 Mbps, High Channel					
Result:	Pass	**Value:**	-53.7 dBc	**Limit:**	≤ -30 dBc

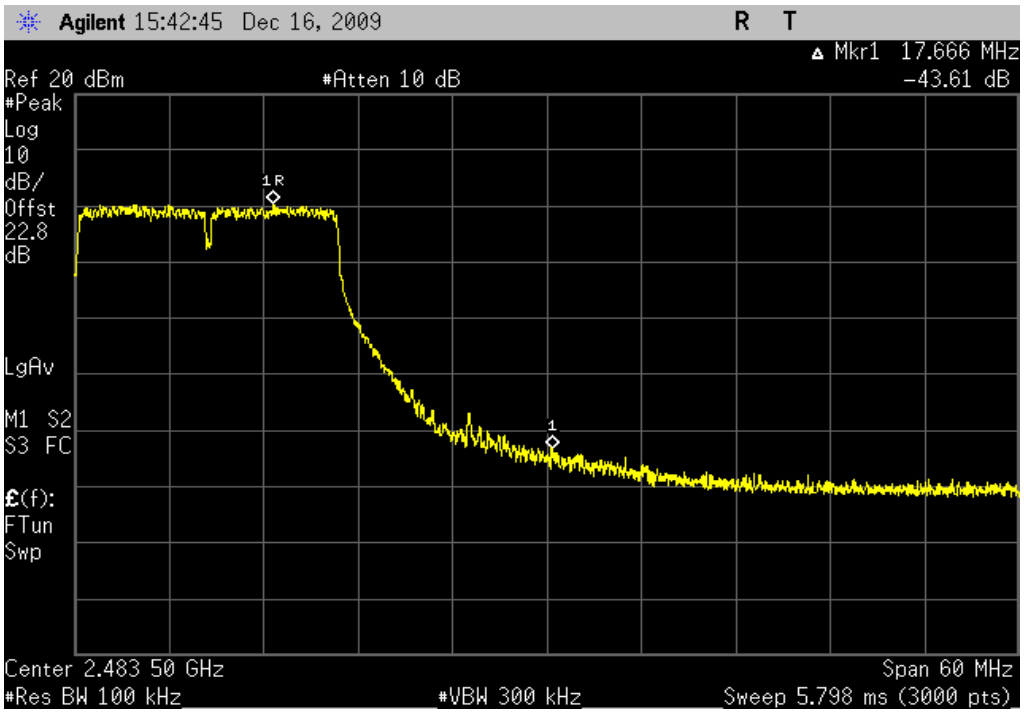


BAND EDGE COMPLIANCE

802.11(g) 6 Mbps, Low Channel					
Result:	Pass	**Value:**	-31.5 dBc	**Limit:**	≤ -30 dBc

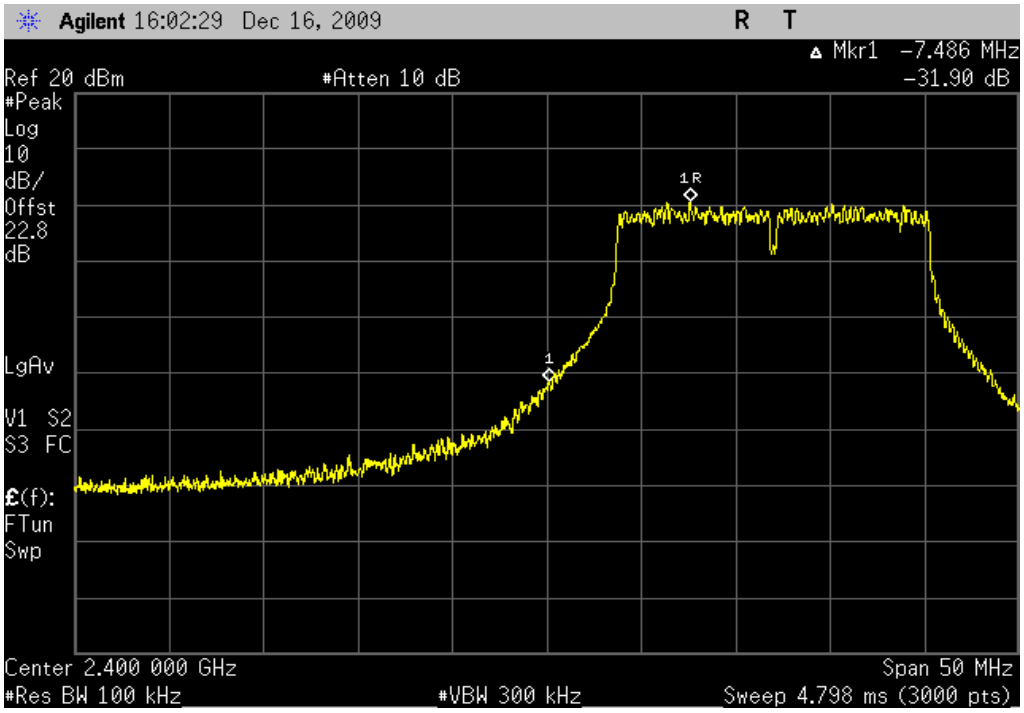


802.11(g) 6 Mbps, High Channel					
Result:	Pass	**Value:**	-43.6 dBc	**Limit:**	≤ -30 dBc

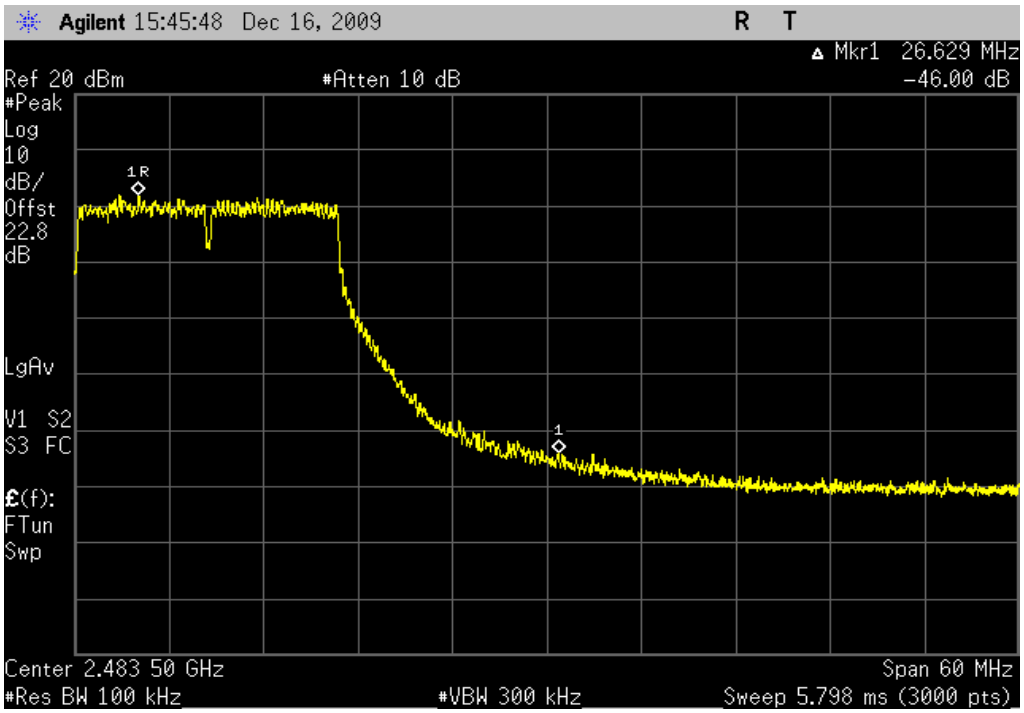


BAND EDGE COMPLIANCE

802.11(g) 36 Mbps, Low Channel					
Result:	Pass	**Value:**	-31.9 dBc	**Limit:**	≤ -30 dBc

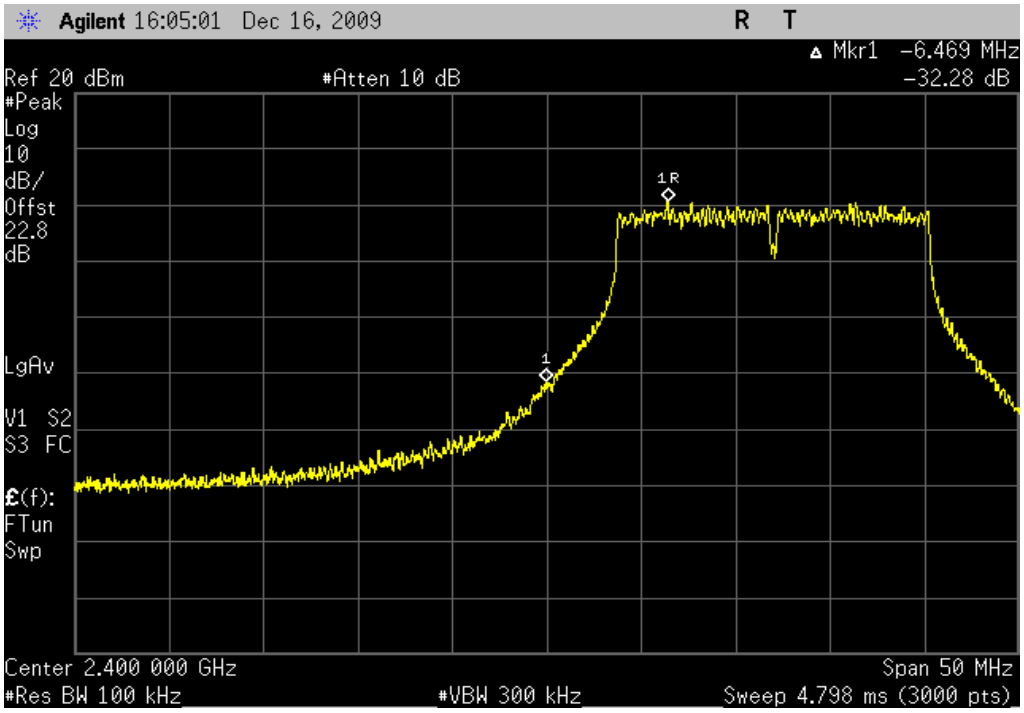


802.11(g) 36 Mbps, High Channel					
Result:	Pass	**Value:**	-46.0 dBc	**Limit:**	≤ -30 dBc

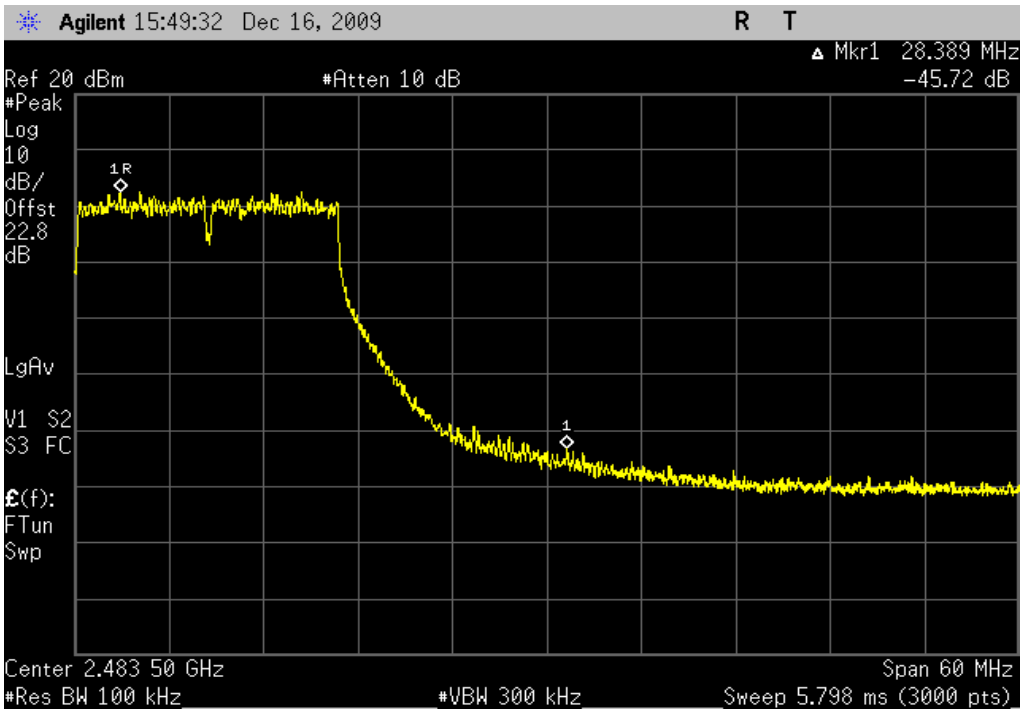


BAND EDGE COMPLIANCE

802.11(g) 54 Mbps, Low Channel					
Result:	Pass	**Value:**	-32.3 dBc	**Limit:**	≤ -30 dBc



802.11(g) 54 Mbps, High Channel					
Result:	Pass	**Value:**	-45.7 dBc	**Limit:**	≤ -30 dBc



SPURIOUS CONDUCTED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	24

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

NORTHWEST EMC

SPURIOUS CONDUCTED EMISSIONS

XMit 2009.03.05

EUT:	Ranger/TSC3 802.11 radio			**Work Order:**	TRPO0054
Serial Number:	Unknown			**Date:**	12/07/09
Customer:	Trimble Navigation Limited			**Temperature:**	20°C
Attendees:	None			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	30.15
Tested by:	Rod Peloquin	**Power:**	120VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

COMMENTS

0.75 dB added to analyzer offset for adapter cable loss.

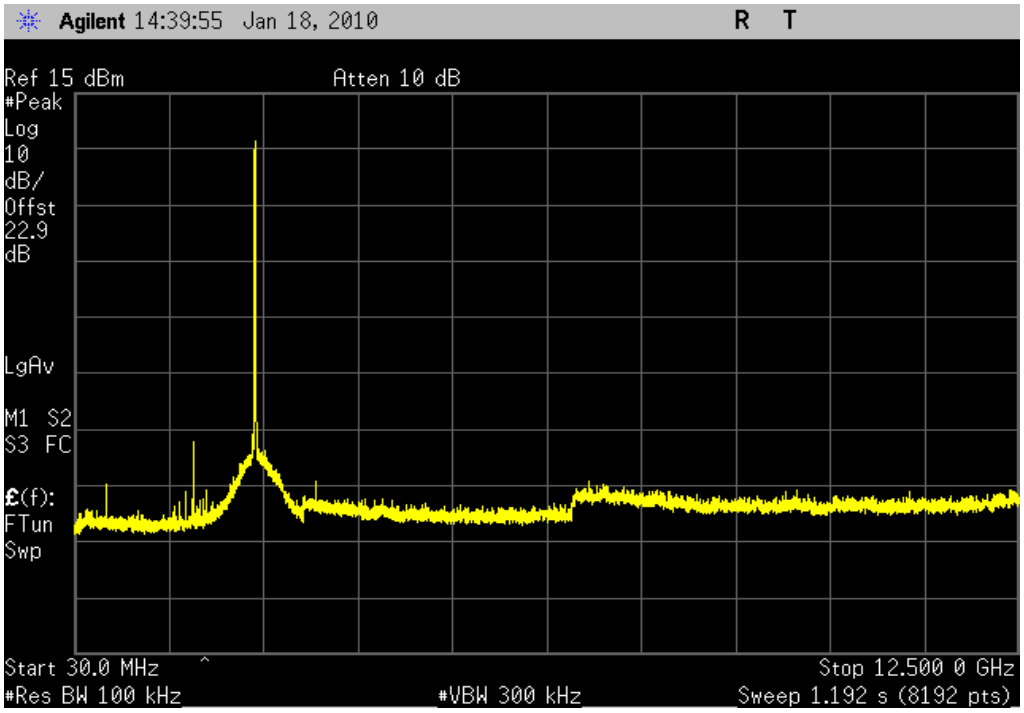
DEVIATIONS FROM TEST STANDARD

No Deviations

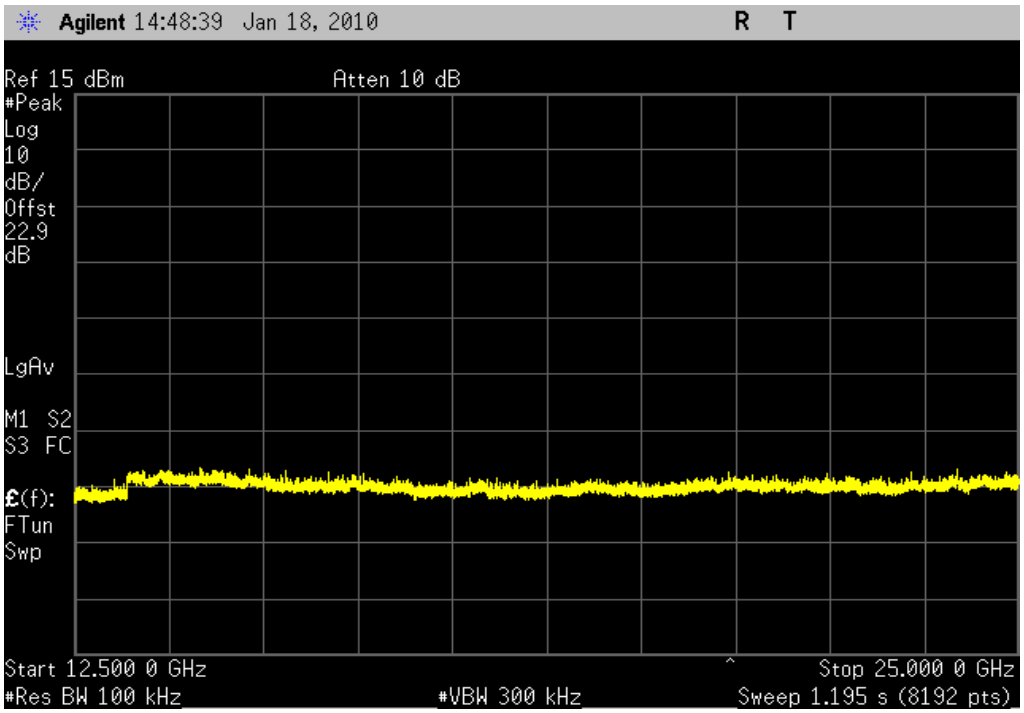
Configuration #	1	Signature

		Value	Limit	Results
802.11(b) 1 Mbps				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
802.11(b) 11 Mbps				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
802.11(g) 6 Mbps				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
802.11(g) 36 Mbps				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
802.11(g) 54 Mbps				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -30 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -30 dBc	Pass

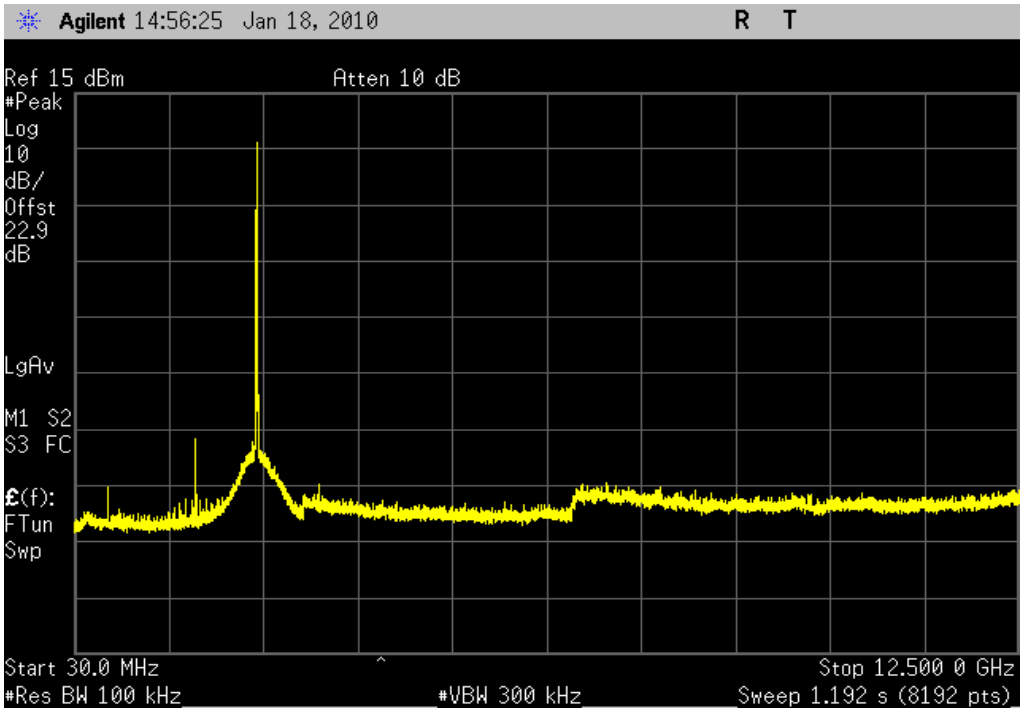
802.11(b) 1 Mbps, Low Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



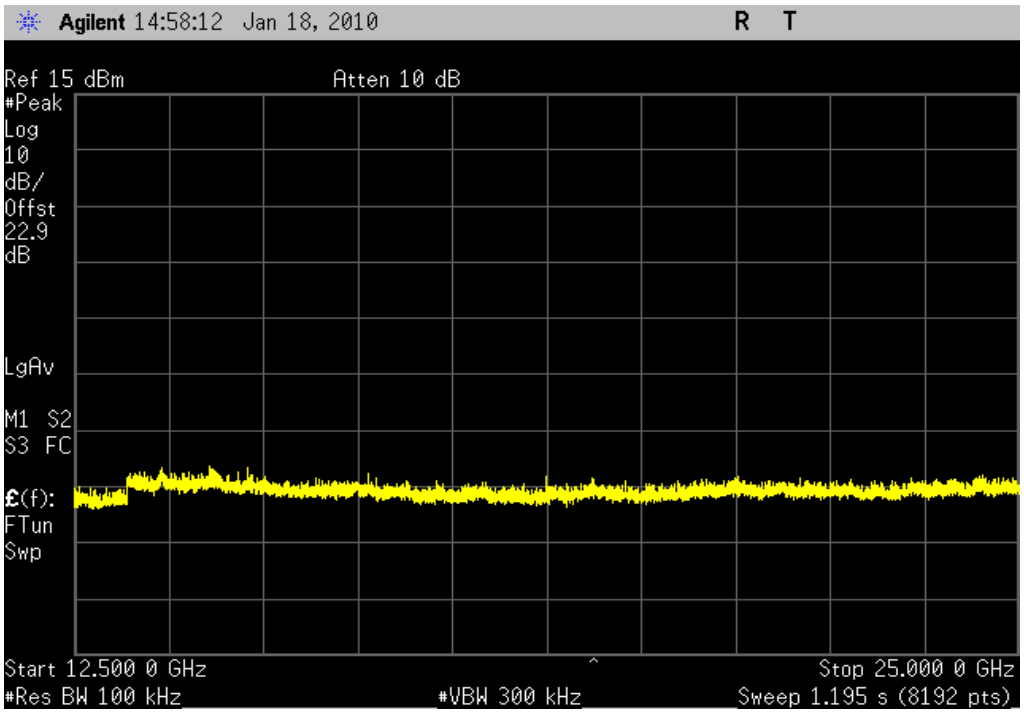
802.11(b) 1 Mbps, Low Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



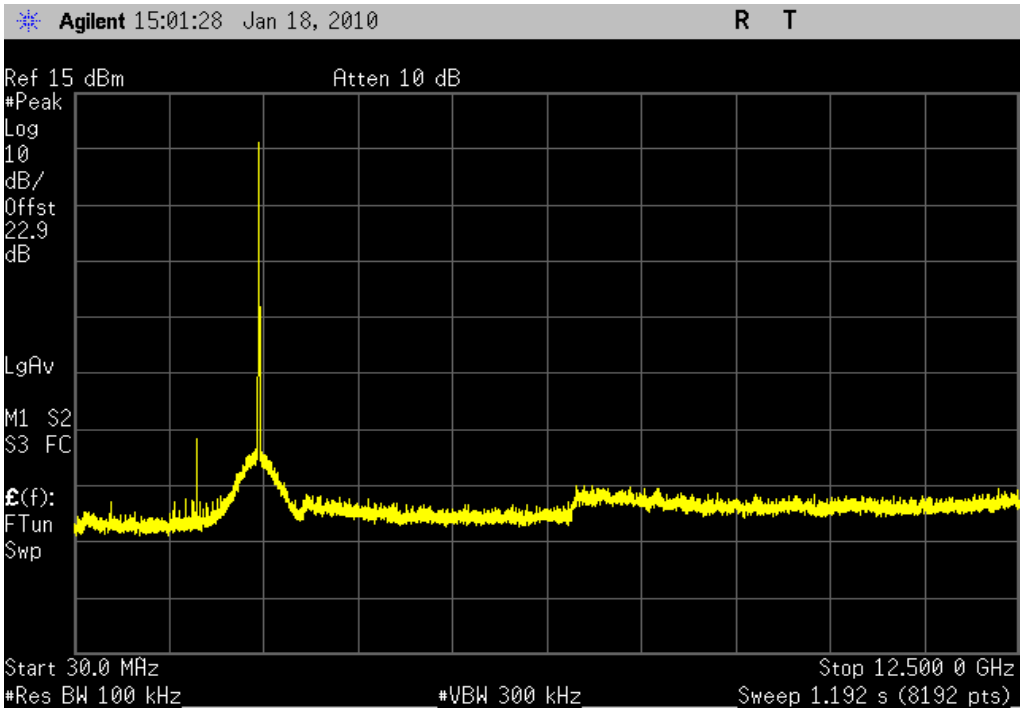
802.11(b) 1 Mbps, Mid Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



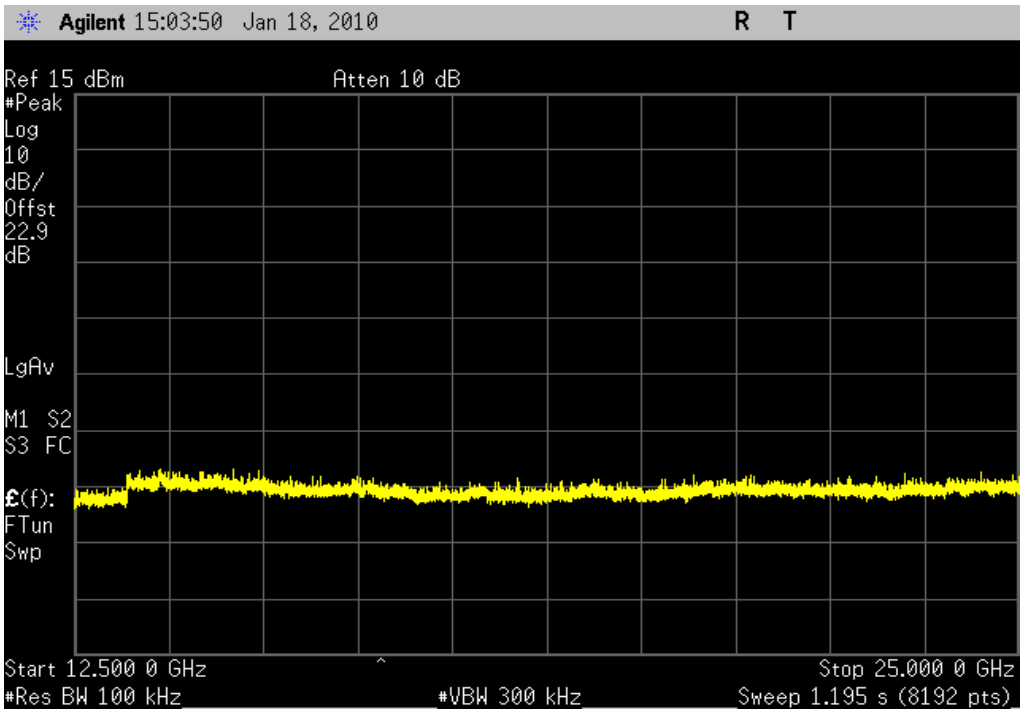
802.11(b) 1 Mbps, Mid Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



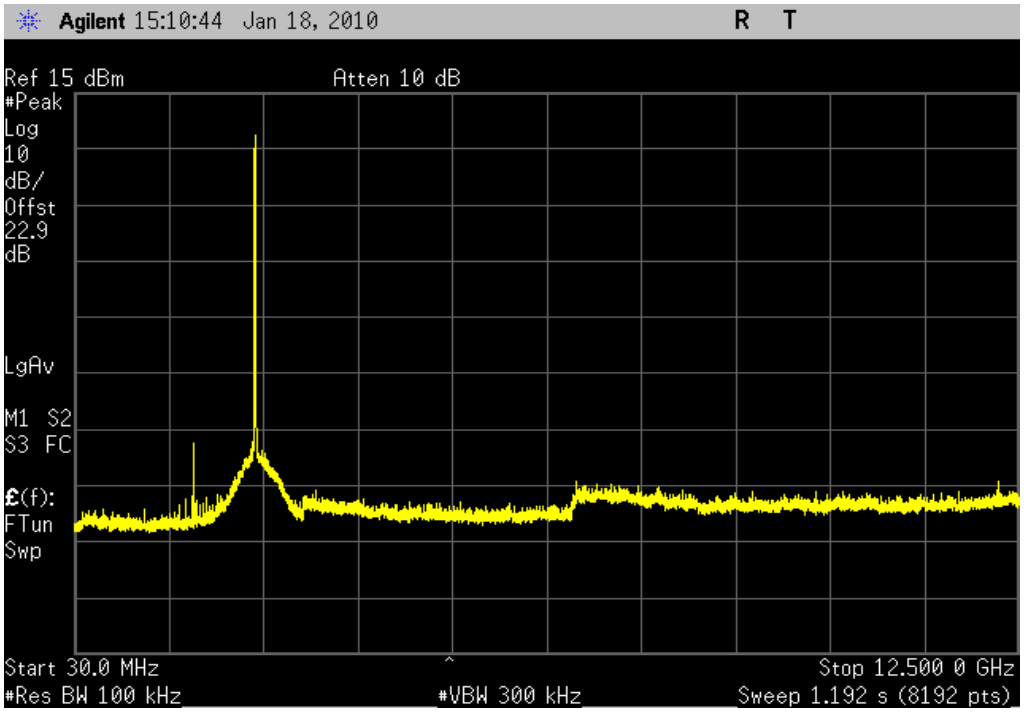
802.11(b) 1 Mbps, High Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



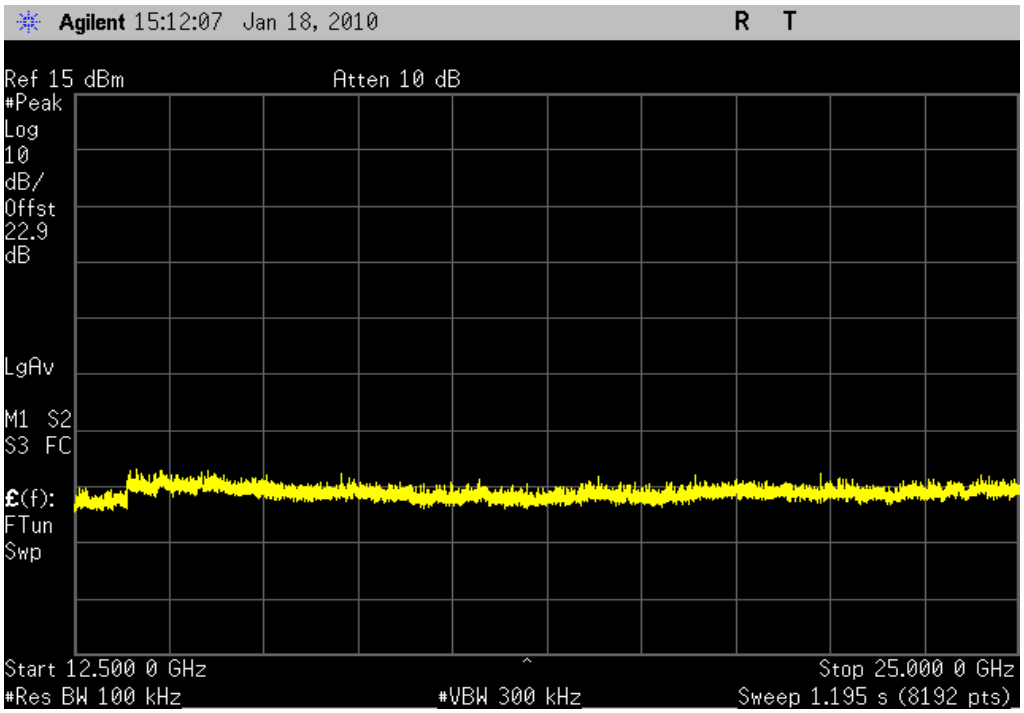
802.11(b) 1 Mbps, High Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



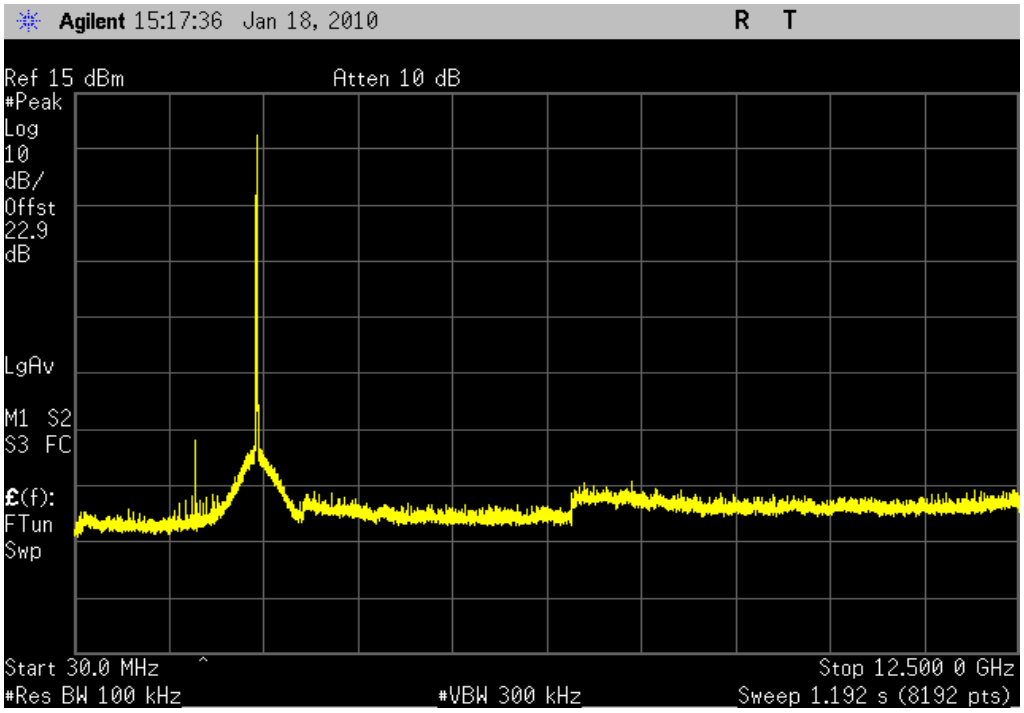
802.11(b) 11 Mbps, Low Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



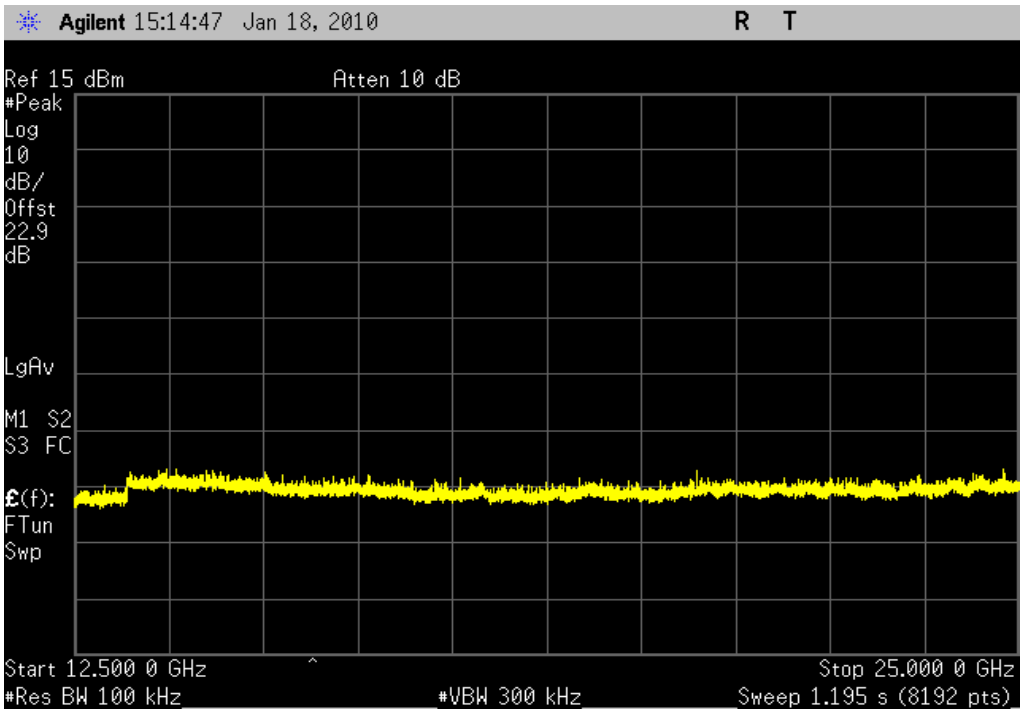
802.11(b) 11 Mbps, Low Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



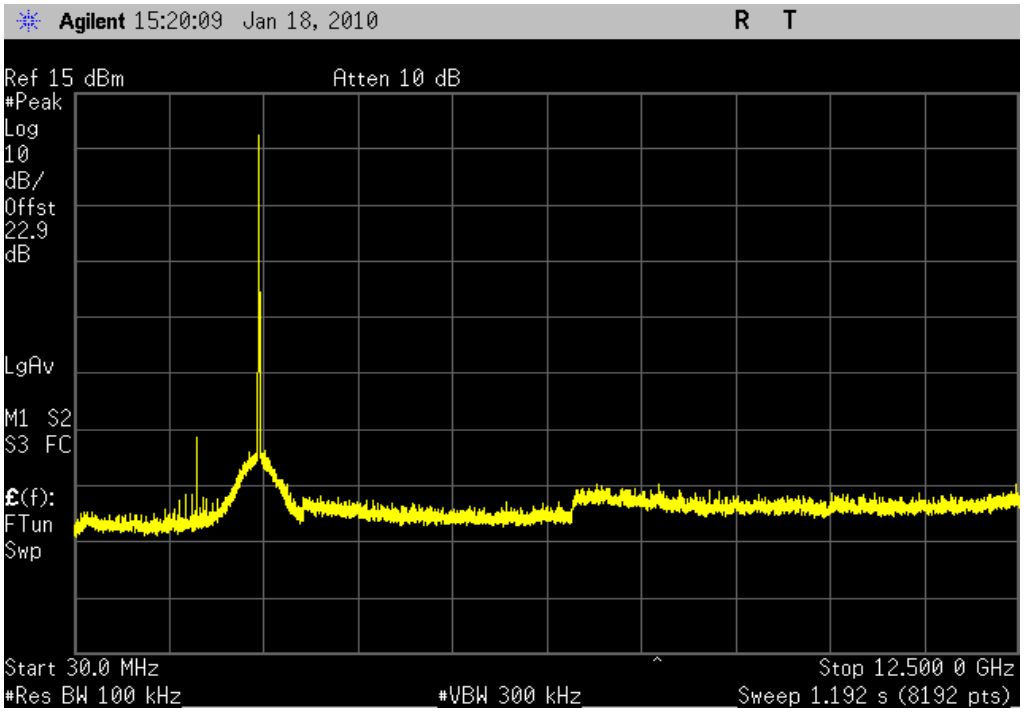
802.11(b) 11 Mbps, Mid Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



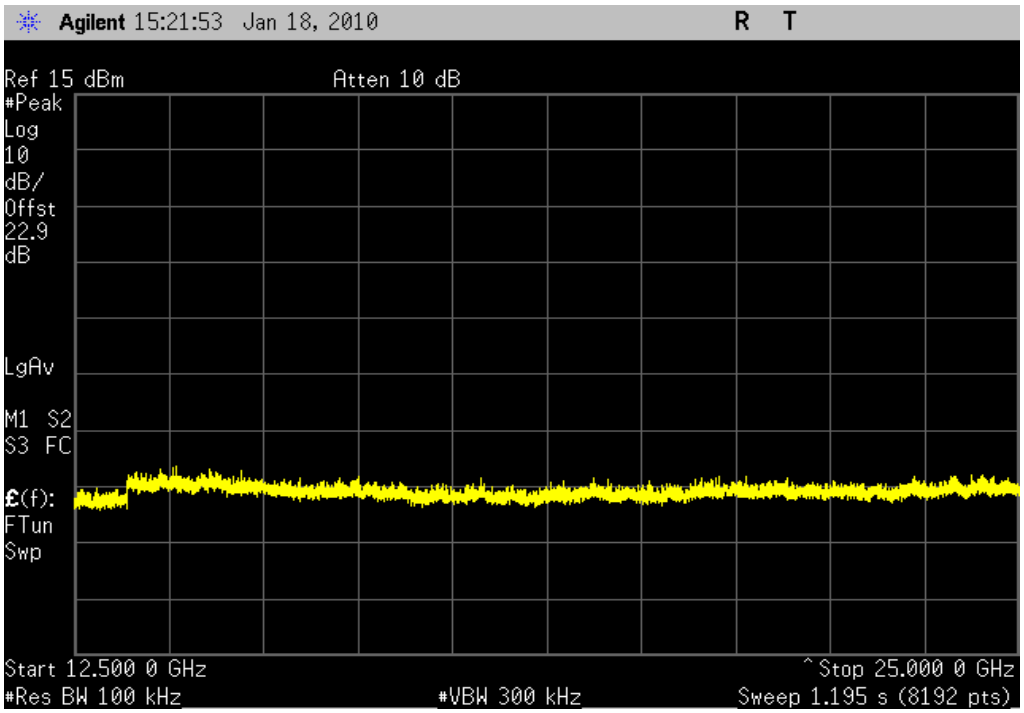
802.11(b) 11 Mbps, Mid Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



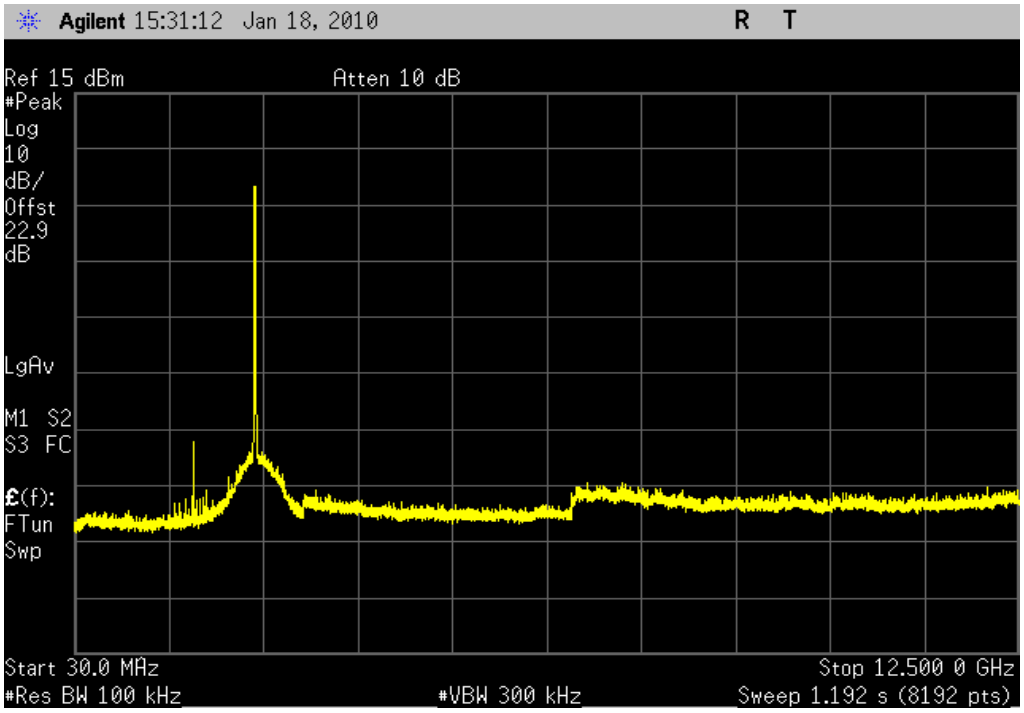
802.11(b) 11 Mbps, High Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



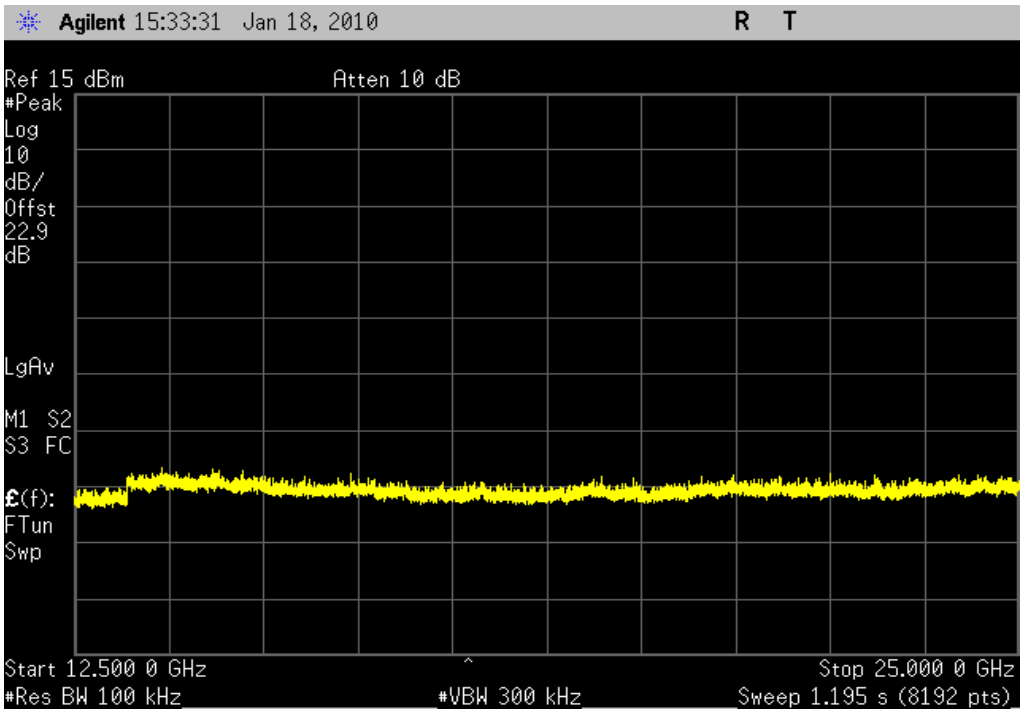
802.11(b) 11 Mbps, High Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



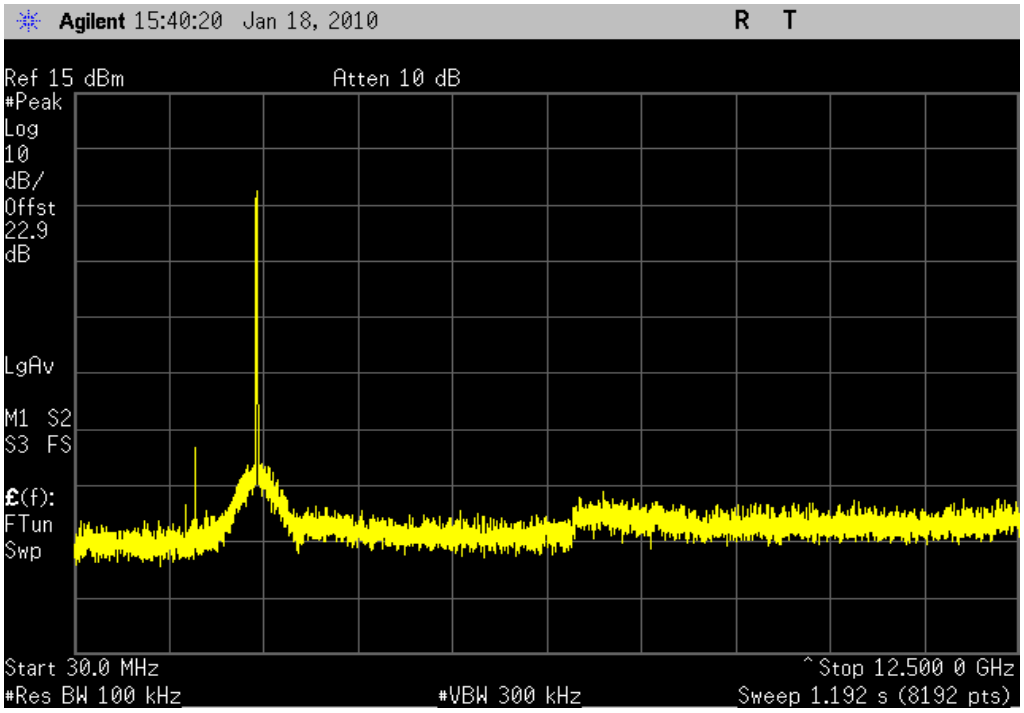
802.11(g) 6 Mbps, Low Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



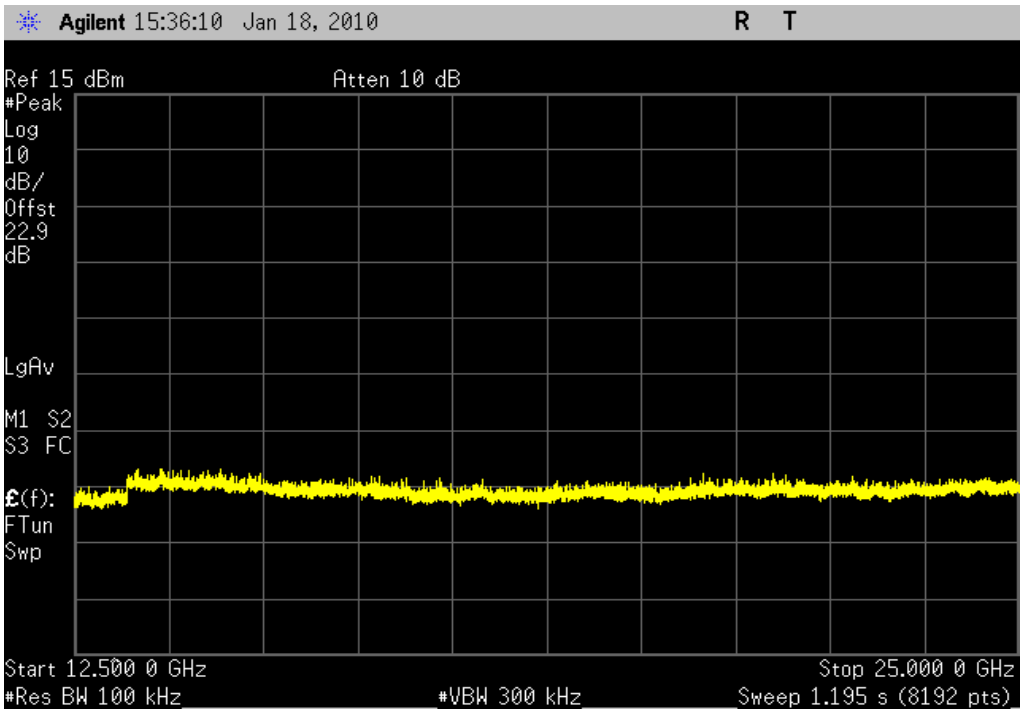
802.11(g) 6 Mbps, Low Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



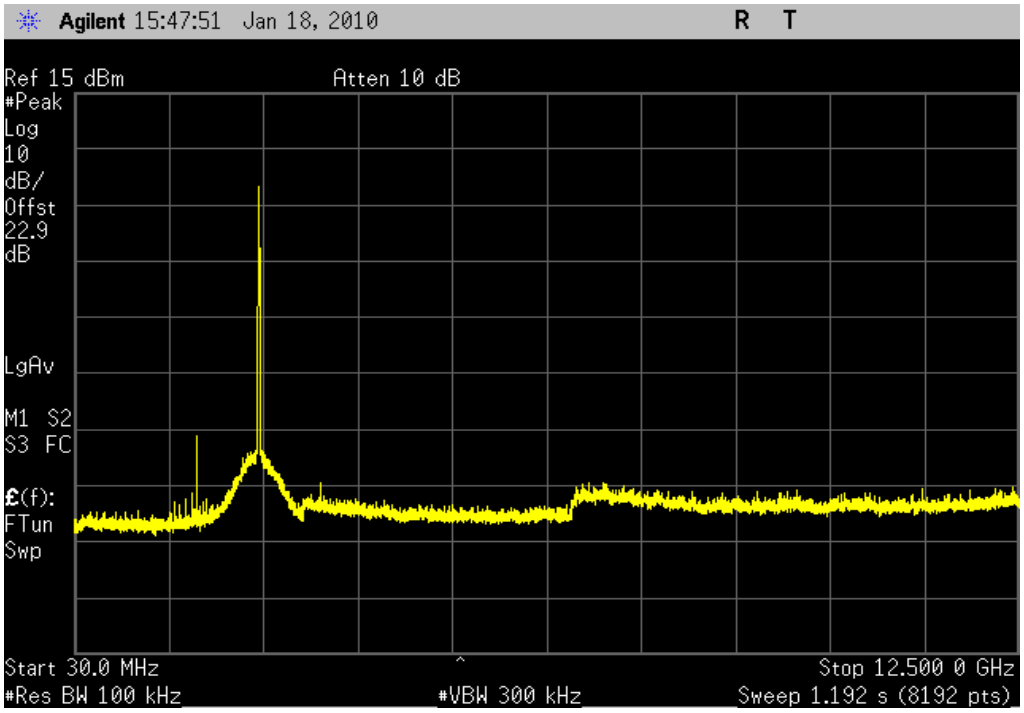
802.11(g) 6 Mbps, Mid Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



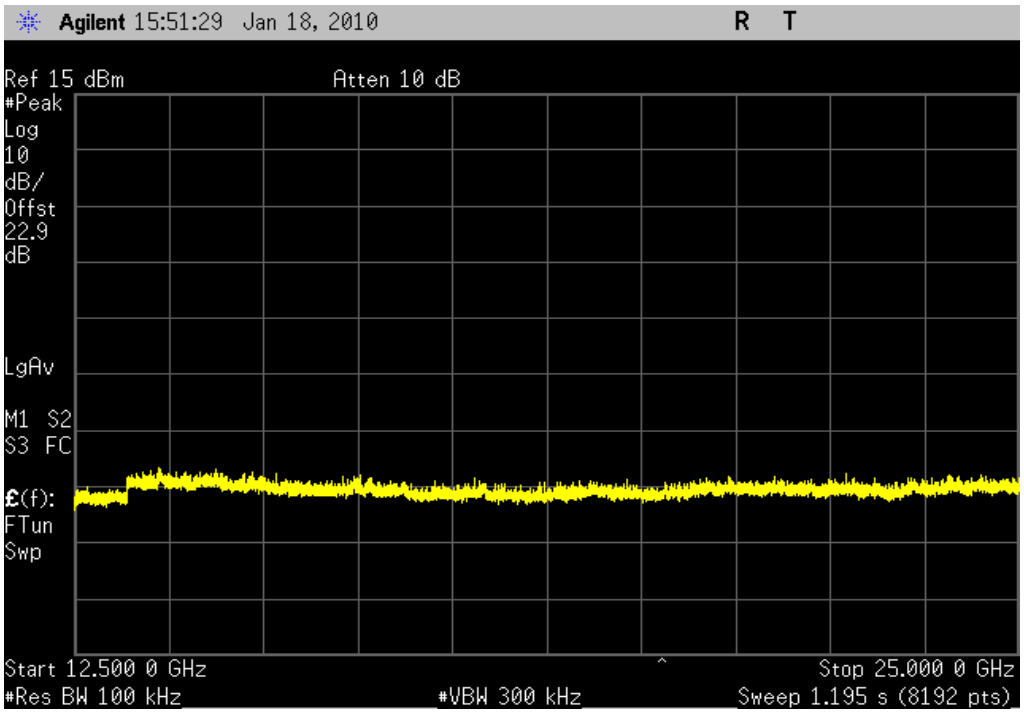
802.11(g) 6 Mbps, Mid Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



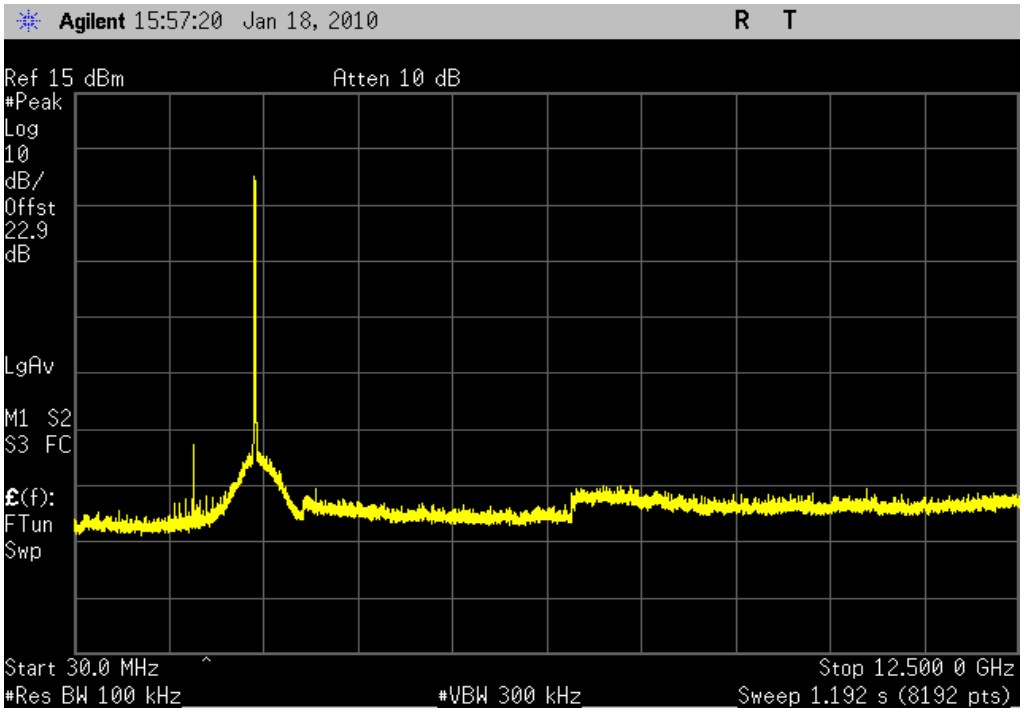
802.11(g) 6 Mbps, High Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



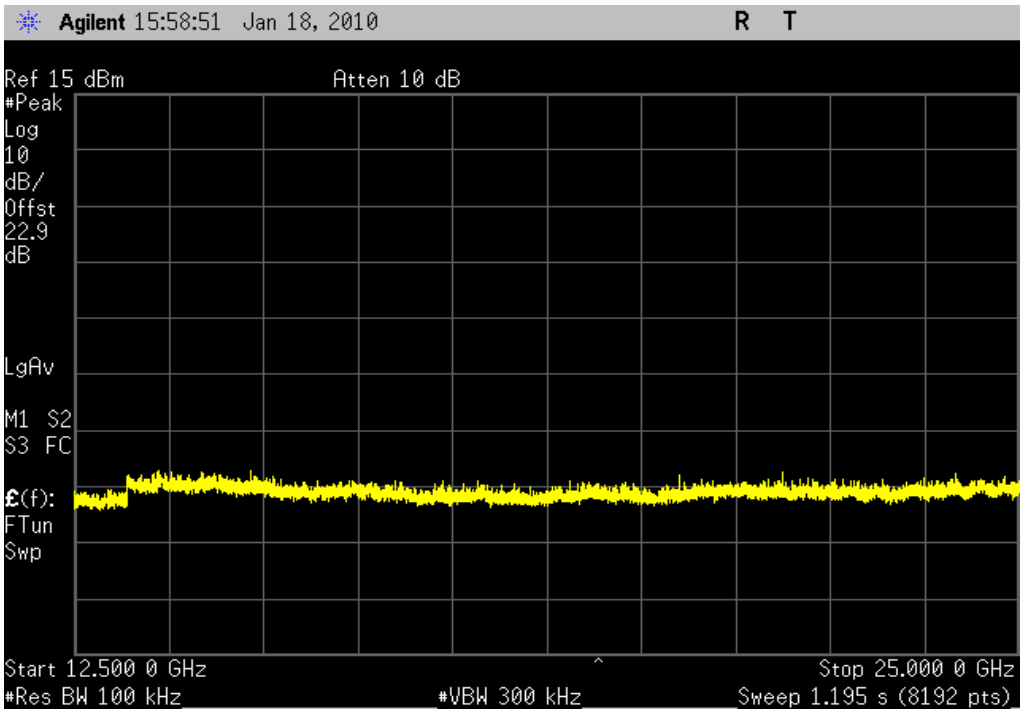
802.11(g) 6 Mbps, High Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



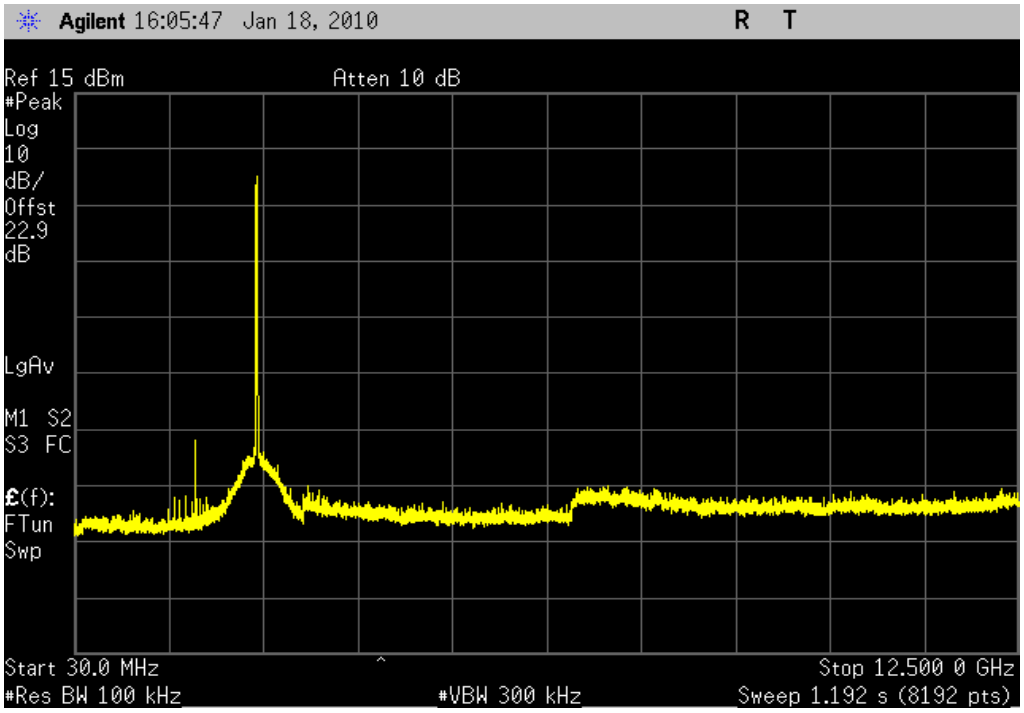
802.11(g) 36 Mbps, Low Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



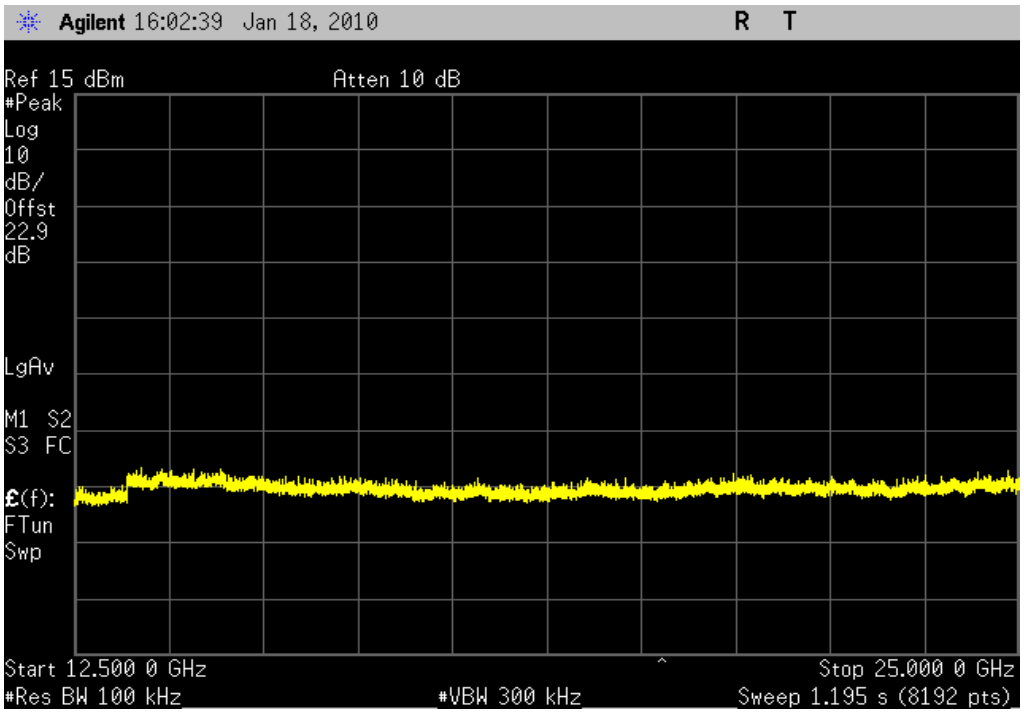
802.11(g) 36 Mbps, Low Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



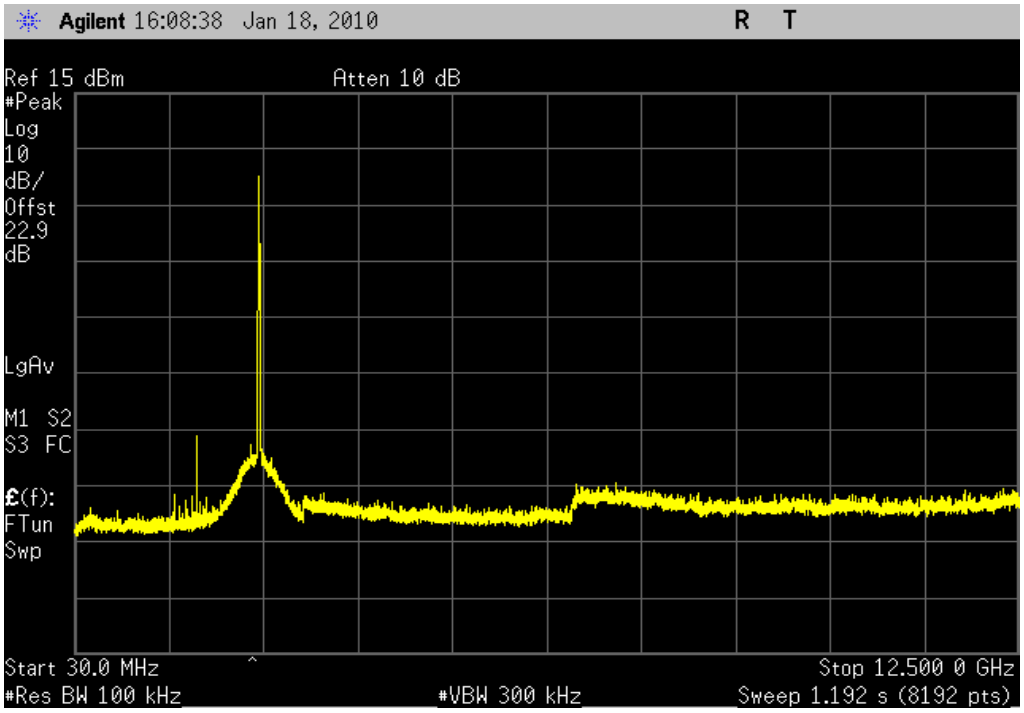
802.11(g) 36 Mbps, Mid Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



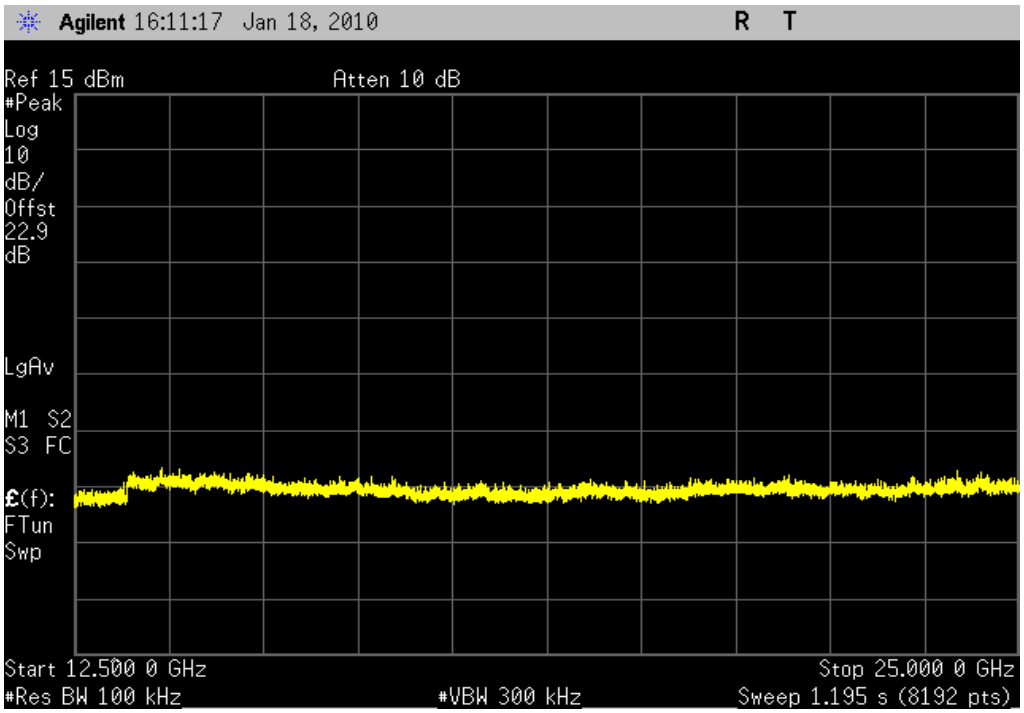
802.11(g) 36 Mbps, Mid Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



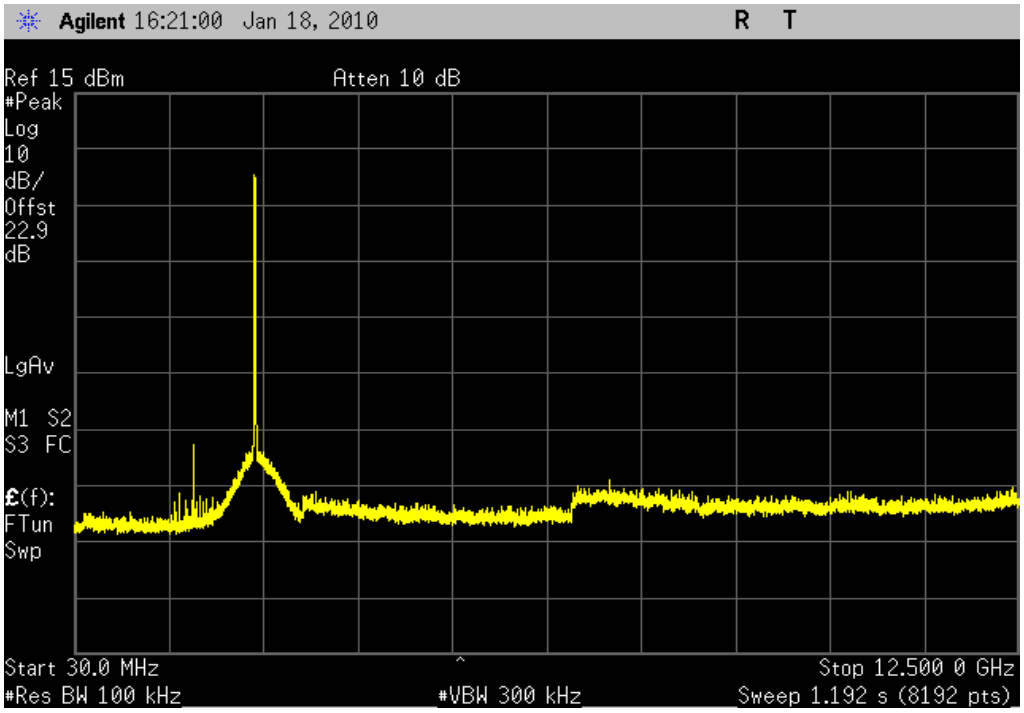
802.11(g) 36 Mbps, High Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



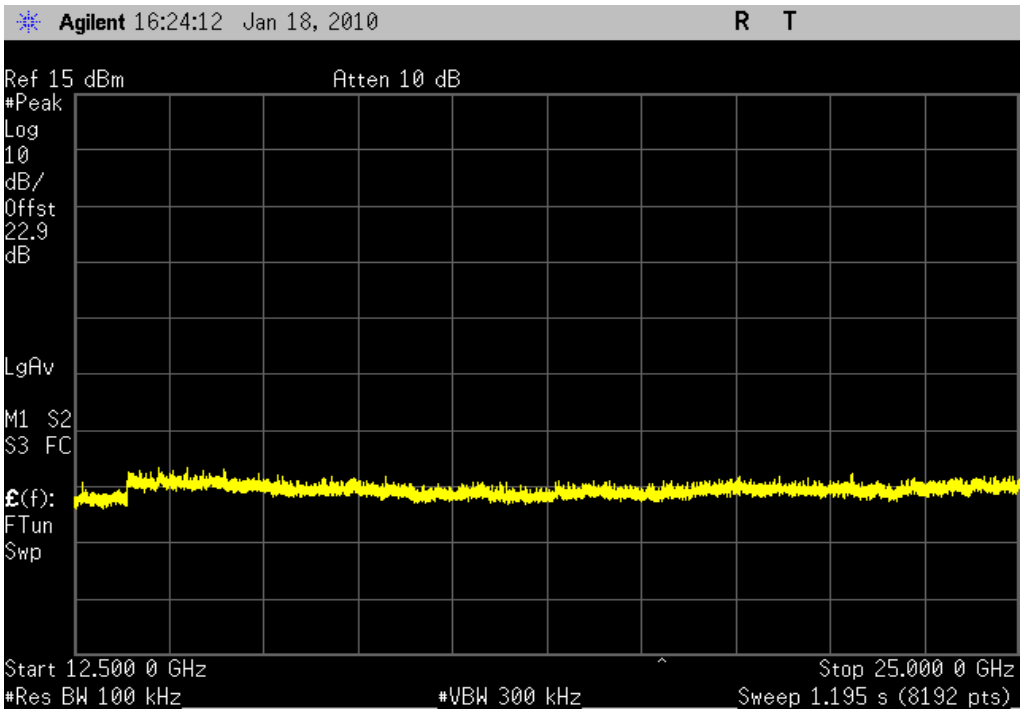
802.11(g) 36 Mbps, High Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



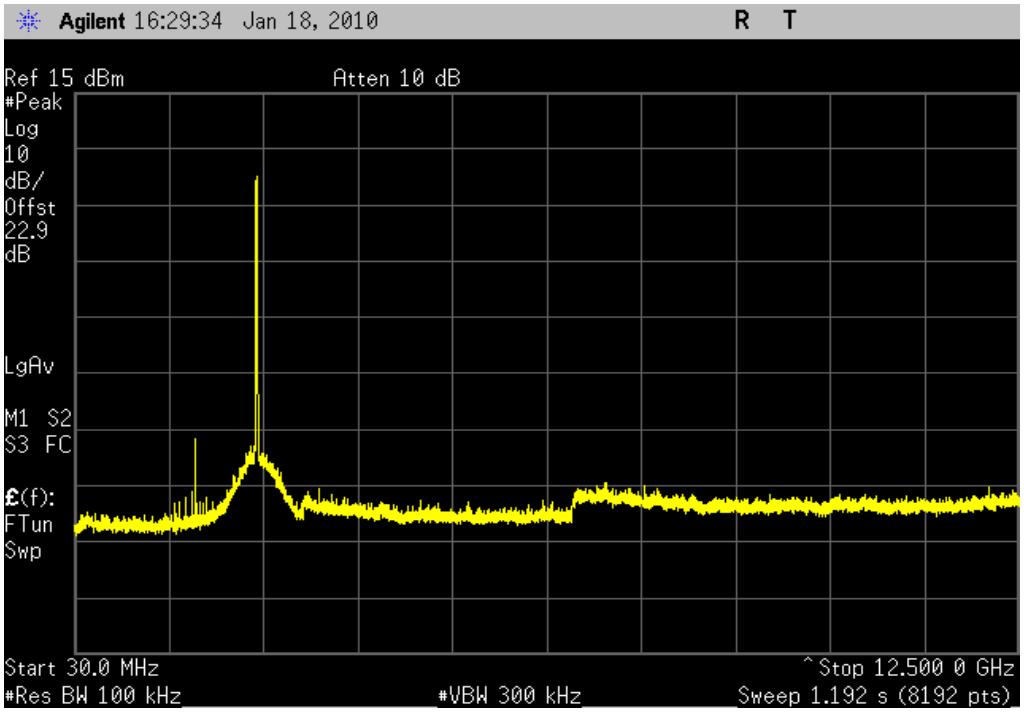
802.11(g) 54 Mbps, Low Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



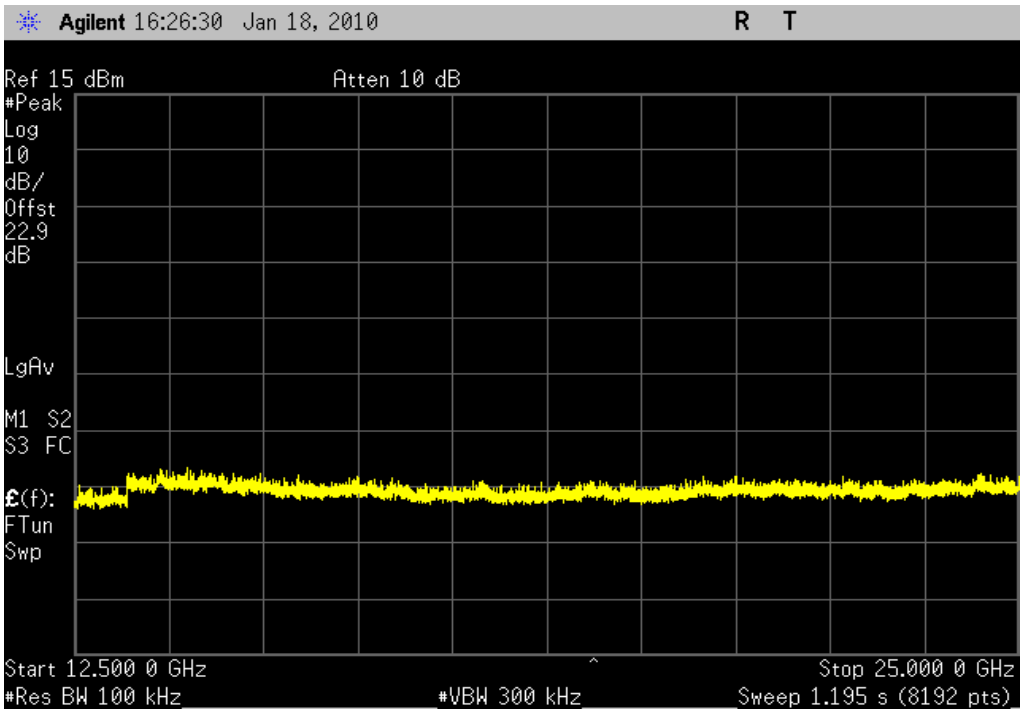
802.11(g) 54 Mbps, Low Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



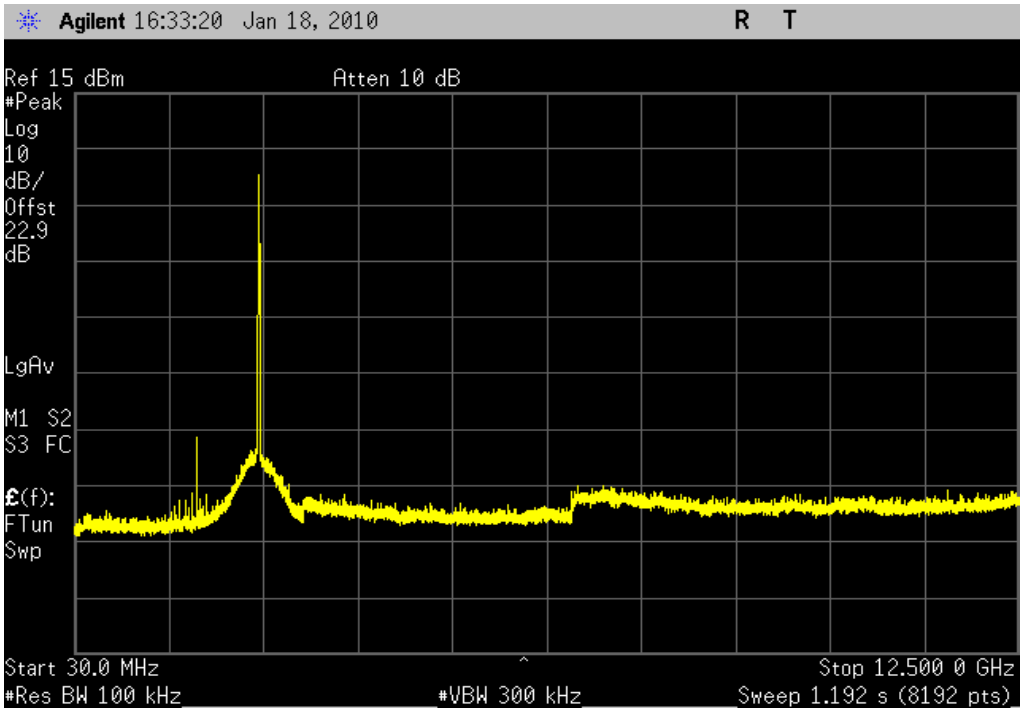
802.11(g) 54 Mbps, Mid Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



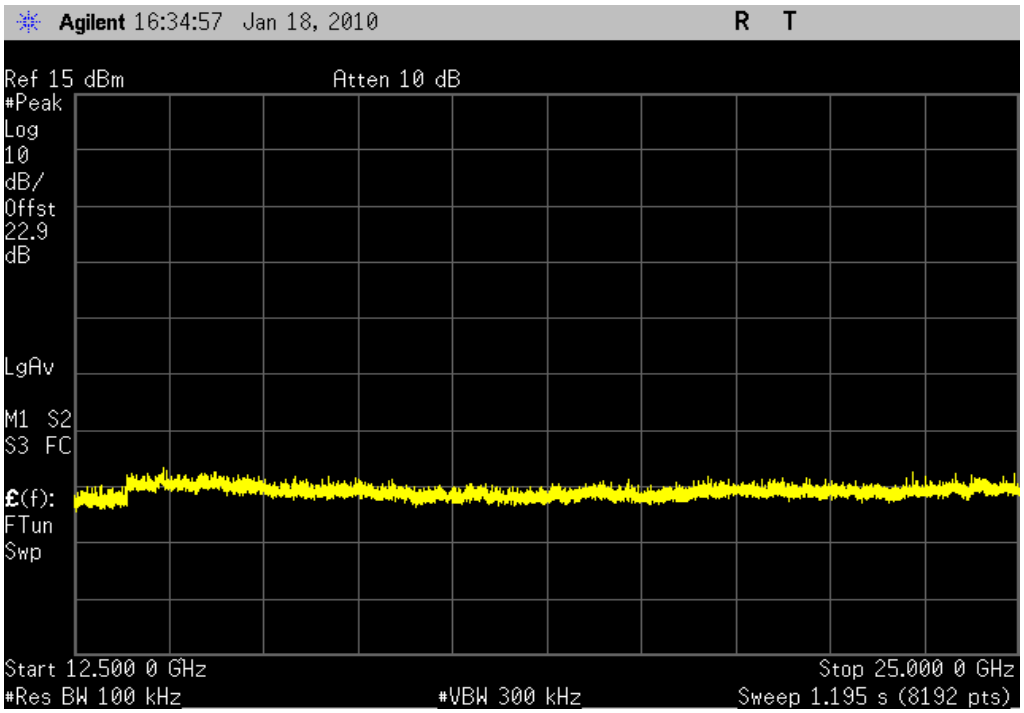
802.11(g) 54 Mbps, Mid Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



802.11(g) 54 Mbps, High Channel, 30MHz - 12.5GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



802.11(g) 54 Mbps, High Channel, 12.4GHz-25GHz					
Result:	Pass	**Value:**	< -40 dBc	**Limit:**	≤ -30 dBc



POWER SPECTRAL DENSITY

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
Power Meter	Gigatronics	8651A	SPM	12/10/2008	13
Power Sensor	Gigatronics	80701A	SPL	12/10/2008	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/9/2008	13

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate for each modulation type available. Since the average output power was measured as defined in section ANSI C63.10:2009, section 6.10.2.2, the procedure outlined in section 6.11.2.4 was used. The the spectrum analyzer was set as follows:

Locate and zoom in on emission peak(s) within the passband.

a) Set RBW = 3 kHz

b) Set VBW _ 9 kHz

c) Set Sweep time to Automatic

d) Use a peak detector. A sample detector mode can be used only if the following conditions can be achieved with automatic sweep time and adjusting the bin width.

1) Bin width (i.e., span/number of points in spectrum display) < 0.5 RBW.

2) The transmission pulse or sequence of pulses remains at maximum transmit power throughout each of the 100 sweeps of averaging and that the interval between pulses is not included in any of the sweeps.

e) Use a video trigger (or RF gating) with the trigger level set to enable the sweep only during full power pulses. Transmitter shall 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 “free run.”

f) Trace average 100 traces in power averaging mode. Do not use video averaging mode.

NORTHWEST EMC

POWER SPECTRAL DENSITY

XMit 2009.03.05

EUT:	Ranger/TSC3 802.11 radio			**Work Order:**	TRPO0054
Serial Number:	Unknown			**Date:**	01/05/10
Customer:	Tripod Data Systems, Inc.			**Temperature:**	20°C
Attendees:	None			**Humidity:**	38%
Project:	None			**Barometric Pres.:**	30.15
Tested by:	Rod Peloquin	**Power:**	120VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

COMMENTS

0.75 dB added to analyzer offset for adapter cable loss.

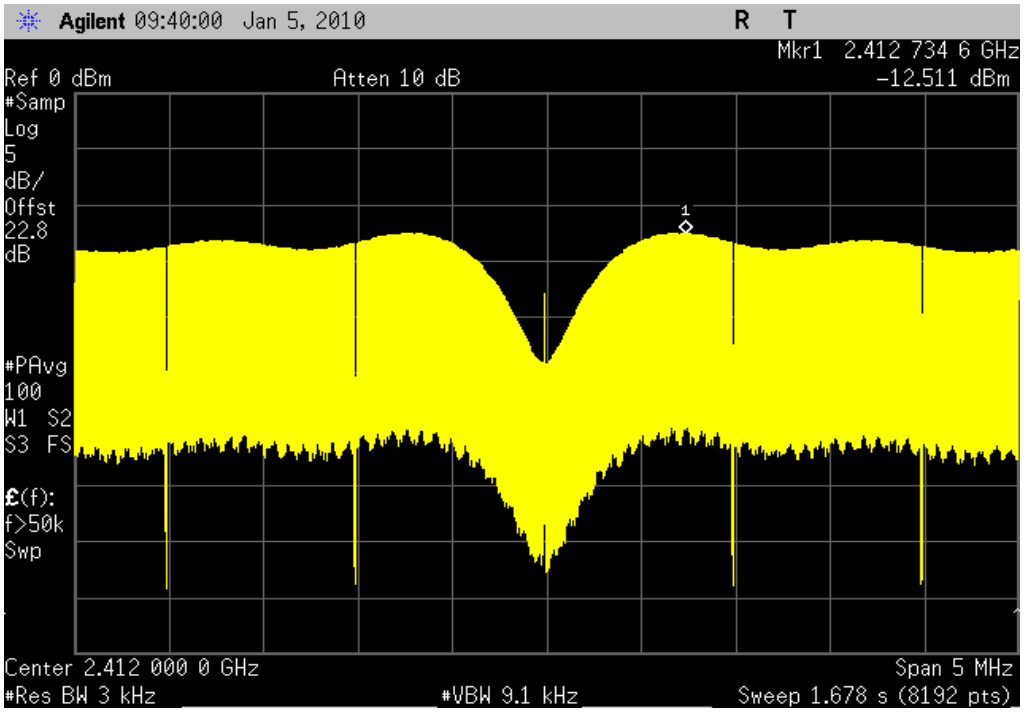
DEVIATIONS FROM TEST STANDARD

No Deviations

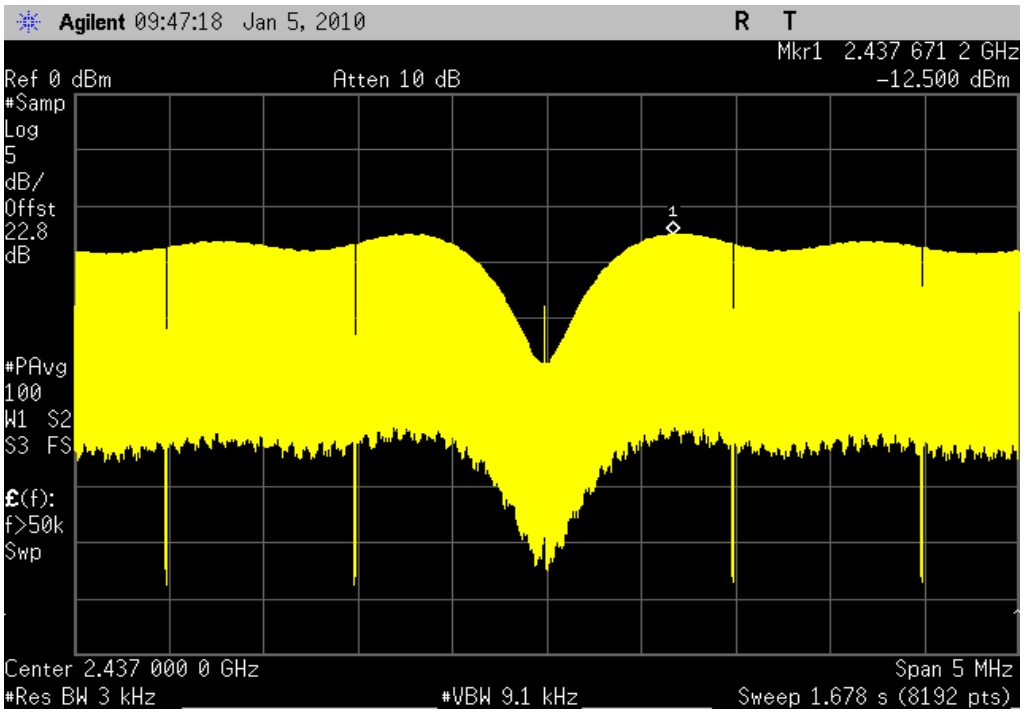
Configuration #	1	Signature

		Value	Limit	Results
802.11(b) 1 Mbps				
	Low Channel	-12.5 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-12.5 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-12.6 dBm / 3 kHz	8 dBm / 3 kHz	Pass
802.11(b) 11 Mbps				
	Low Channel	-7.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-7.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-6.9 dBm / 3 kHz	8 dBm / 3 kHz	Pass
802.11(g) 6 Mbps				
	Low Channel	-14.6 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-14.6 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-14.6 dBm / 3 kHz	8 dBm / 3 kHz	Pass
802.11(g) 36 Mbps				
	Low Channel	-14.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-14.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-14.8 dBm / 3 kHz	8 dBm / 3 kHz	Pass
802.11(g) 54 Mbps				
	Low Channel	-14.9 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-14.6 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-14.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass

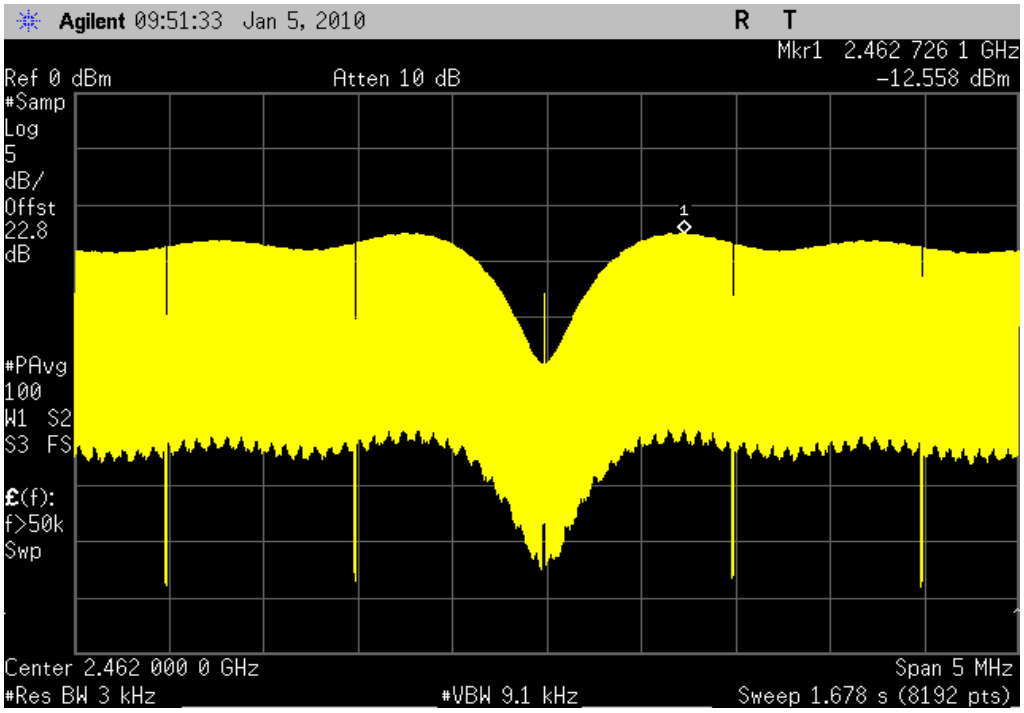
802.11(b) 1 Mbps, Low Channel					
Result:	Pass	**Value:**	-12.5 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



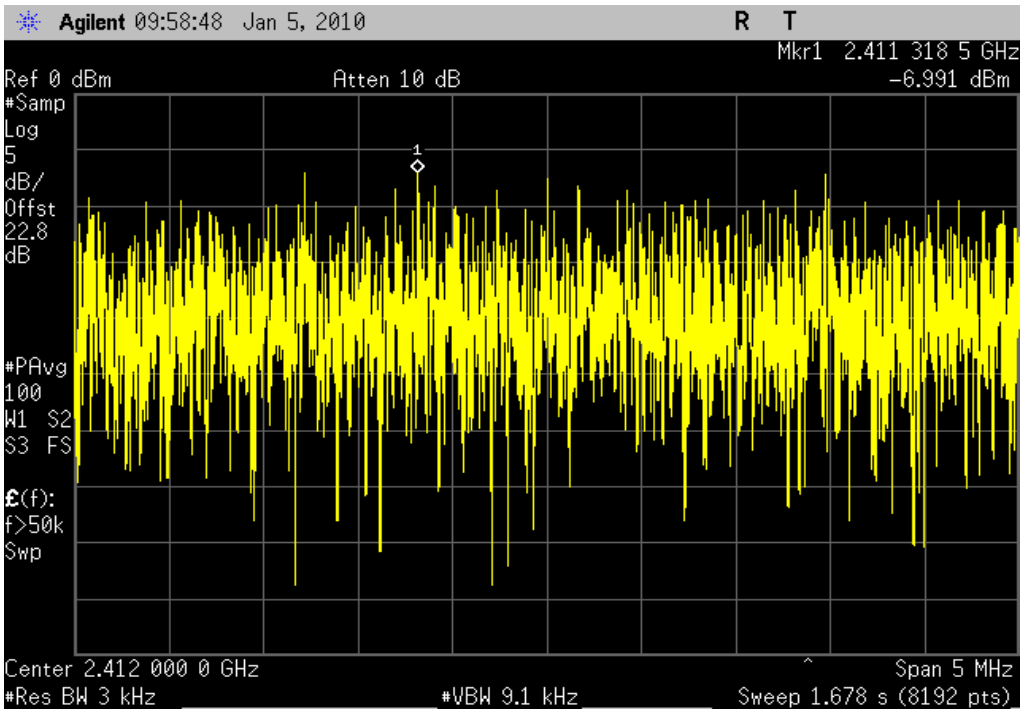
802.11(b) 1 Mbps, Mid Channel					
Result:	Pass	**Value:**	-12.5 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



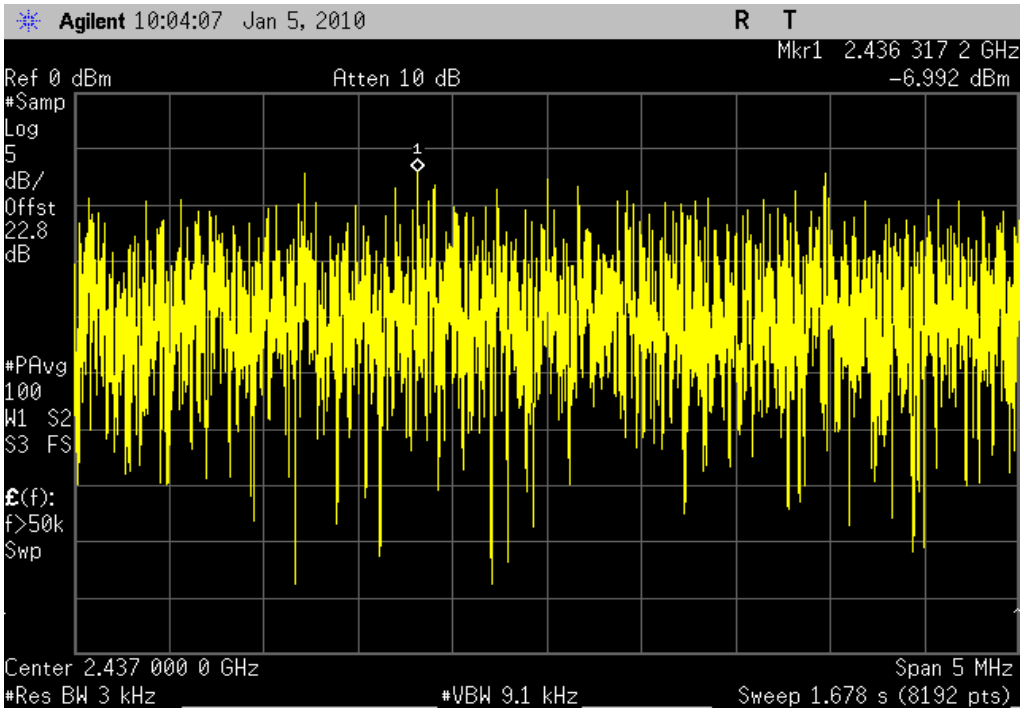
802.11(b) 1 Mbps, High Channel					
Result:	Pass	**Value:**	-12.6 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



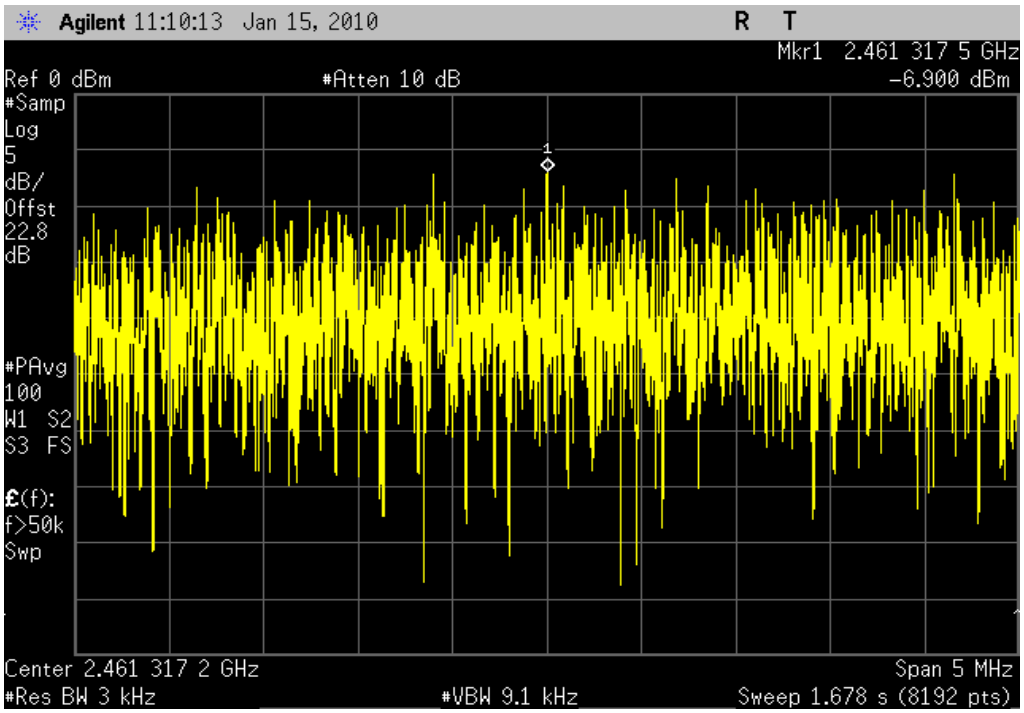
802.11(b) 11 Mbps, Low Channel					
Result:	Pass	**Value:**	-7.0 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



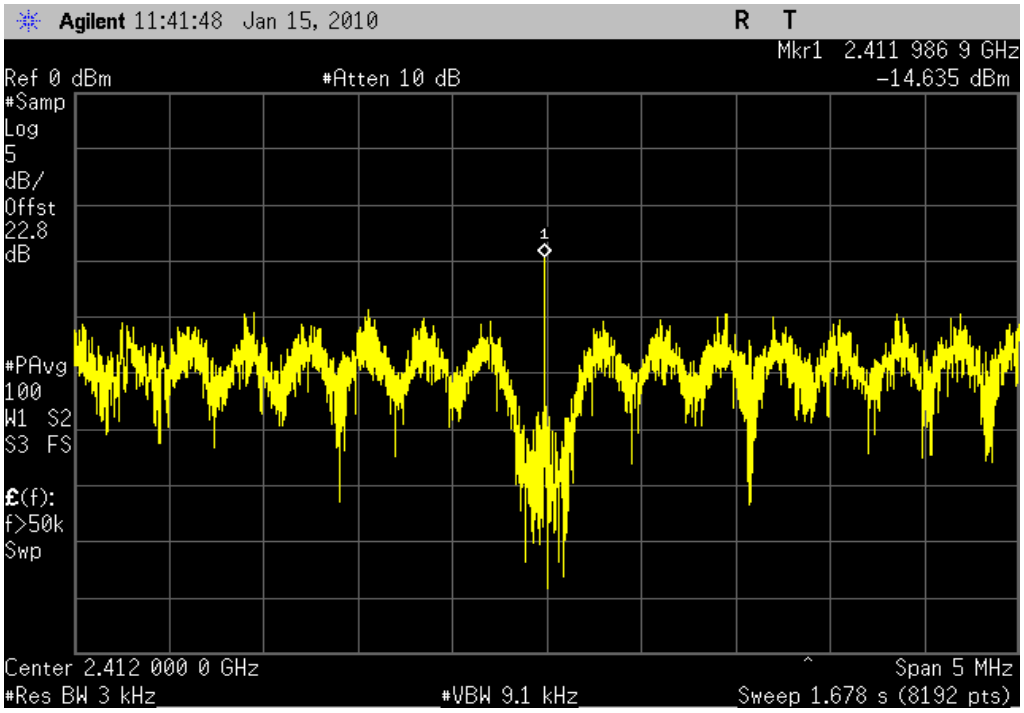
802.11(b) 11 Mbps, Mid Channel					
Result:	Pass	**Value:**	-7.0 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



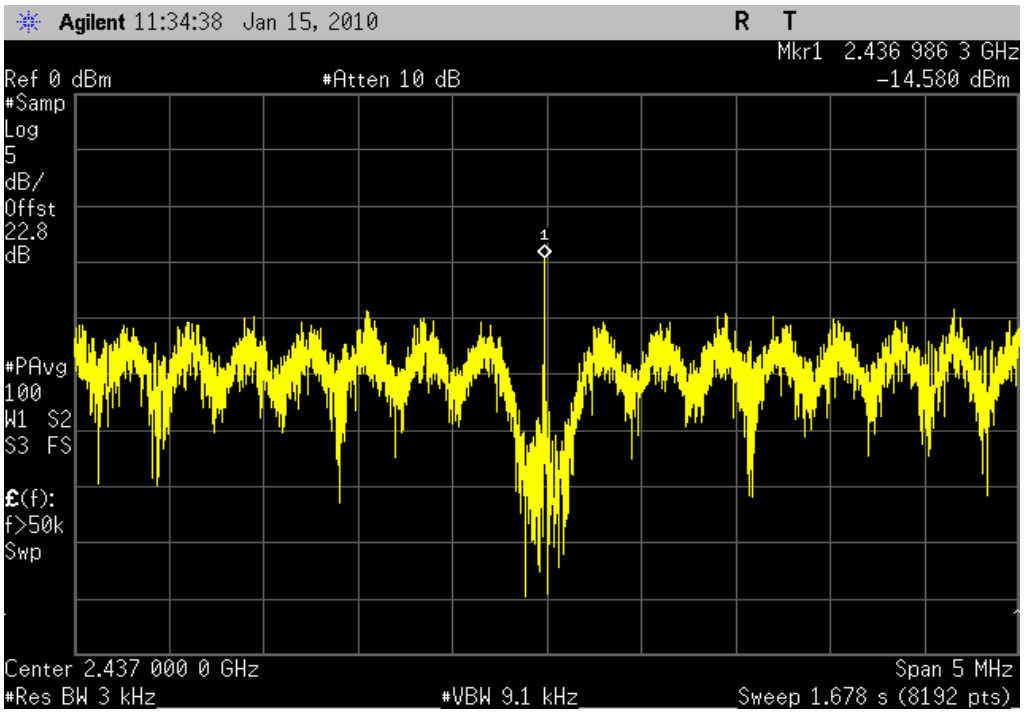
802.11(b) 11 Mbps, High Channel					
Result:	Pass	**Value:**	-6.9 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



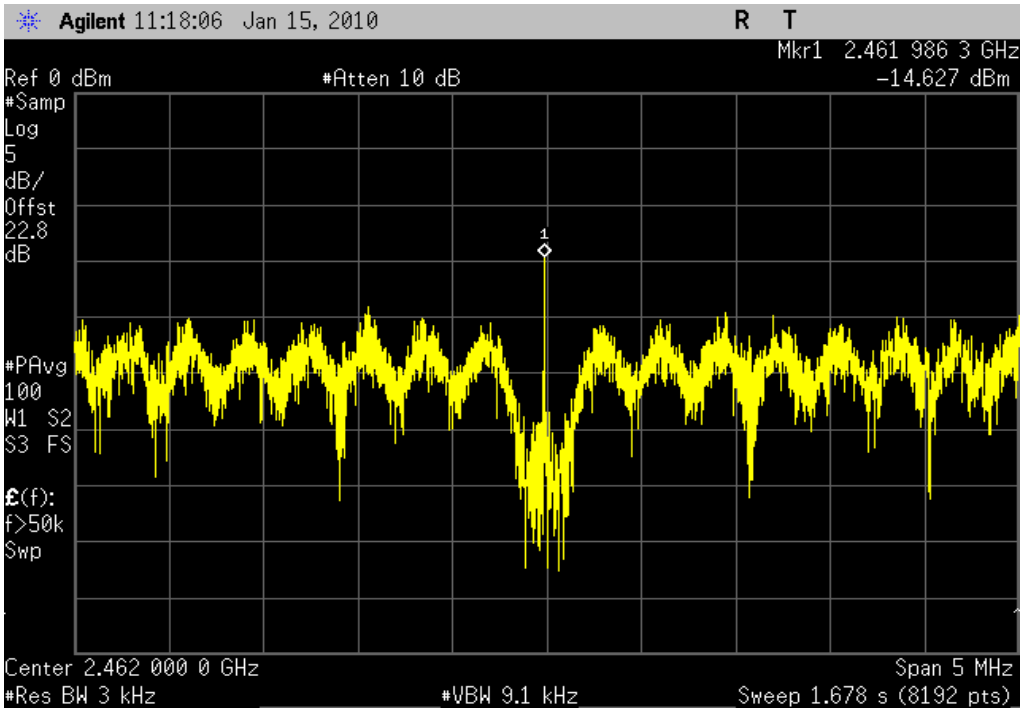
802.11(g) 6 Mbps, Low Channel					
Result:	Pass	**Value:**	-14.6 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



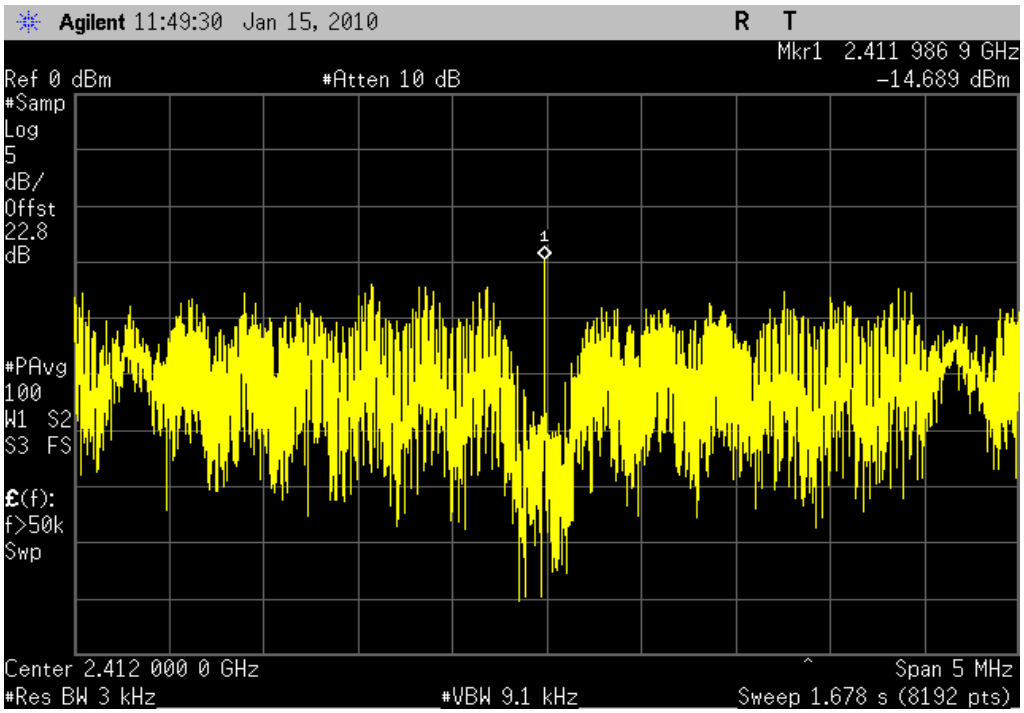
802.11(g) 6 Mbps, Mid Channel					
Result:	Pass	**Value:**	-14.6 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



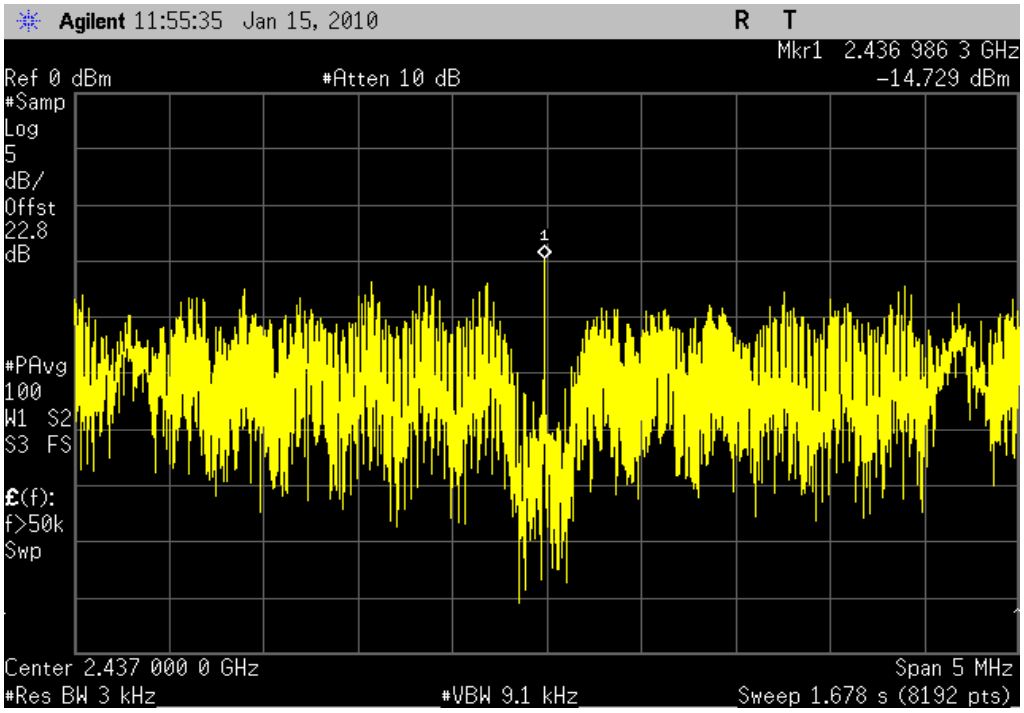
802.11(g) 6 Mbps, High Channel					
Result:	Pass	**Value:**	-14.6 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



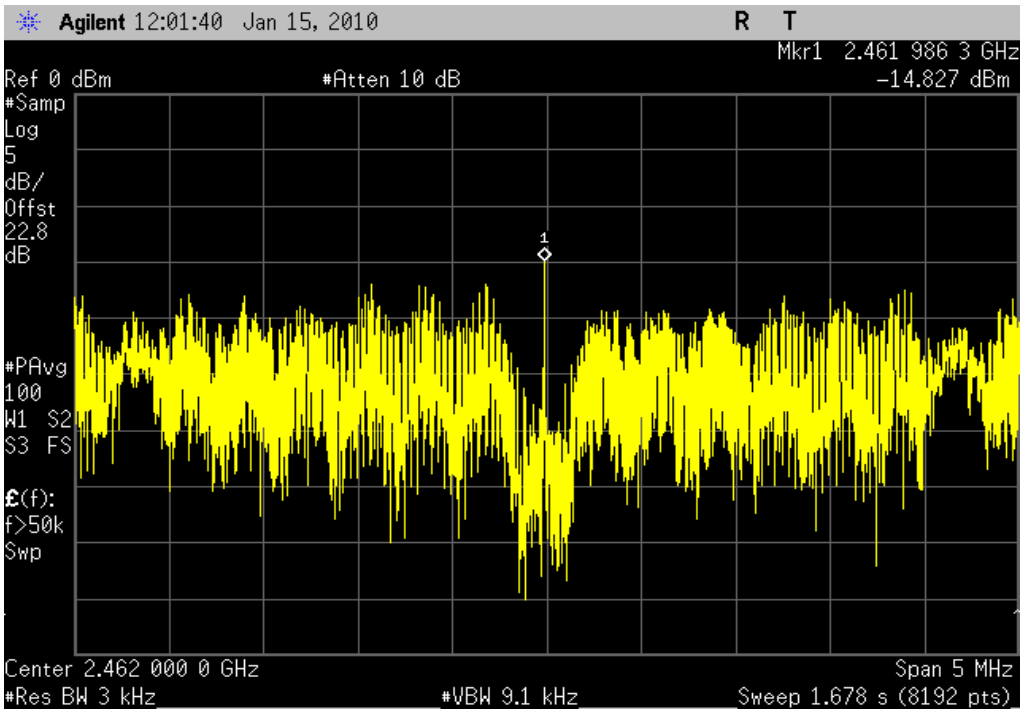
802.11(g) 36 Mbps, Low Channel					
Result:	Pass	**Value:**	-14.7 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



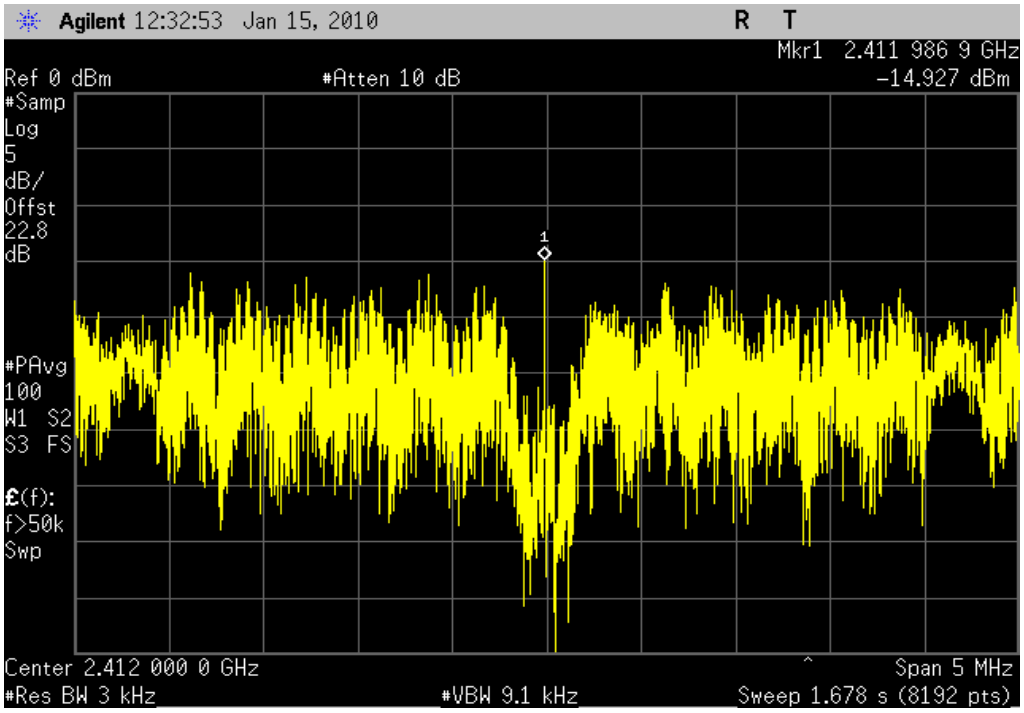
802.11(g) 36 Mbps, Mid Channel					
Result:	Pass	**Value:**	-14.7 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



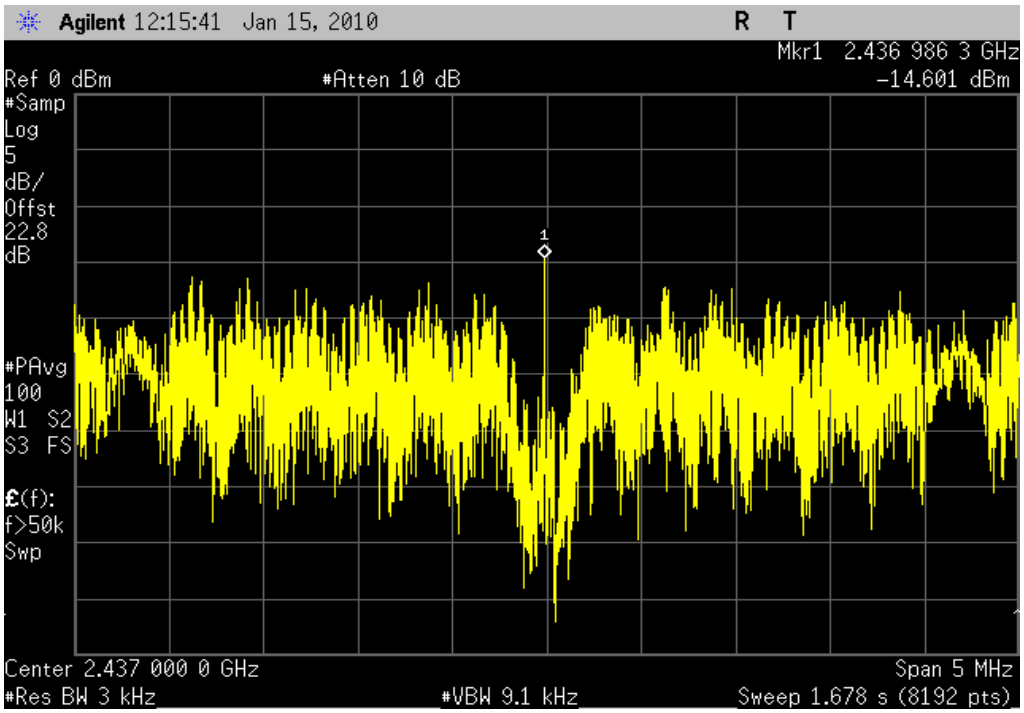
802.11(g) 36 Mbps, High Channel					
Result:	Pass	**Value:**	-14.8 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



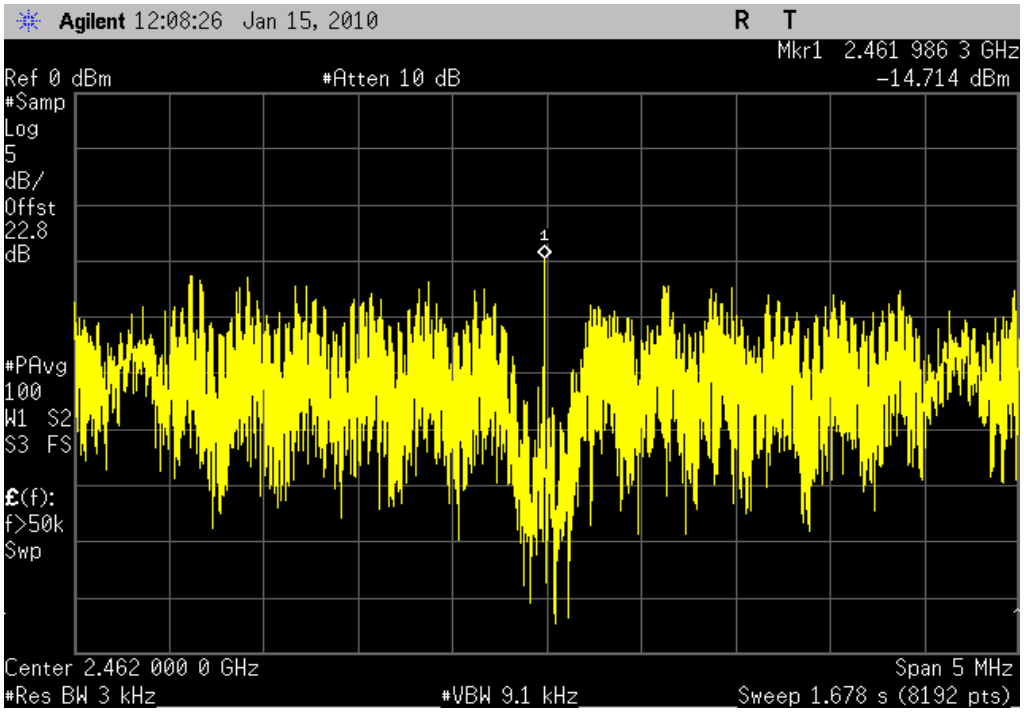
802.11(g) 54 Mbps, Low Channel					
Result:	Pass	**Value:**	-14.9 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



802.11(g) 54 Mbps, Mid Channel					
Result:	Pass	**Value:**	-14.6 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



802.11(g) 54 Mbps, High Channel					
Result:	Pass	**Value:**	-14.7 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



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SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting 802.11(b), 1 Mbps
Transmitting 802.11(b), 11 Mbps
Transmitting 802.11(g), 6 Mbps
Transmitting 802.11(g), 36 Mbps
Transmitting 802.11(g), 54 Mbps

CHANNELS TESTED
Channel 1, 2412 MHz
Channel 6, 2437 MHz
Channel 11, 2462 MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	25 GHz

SAMPLE CALCULATIONS
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E44440A	AFA	11/14/2008	15
High Pass Filter	Micro-Tronics	50111	HGE	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	11/4/2008	16
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	6/26/2009	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	5/19/2009	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Cable	ESM Cable Corp.	KMKM-72	EVY	11/3/2009	13

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2008.07.21
EMI 2009.4.13

EUT:	Ranger/TSC3 802.11 radio	**Work Order:**	TRPO0054
Serial Number:	Unknown	**Date:**	12/02/09
Customer:	Trimble Navigation Limited	**Temperature:**	21
Attendees:	None	**Humidity:**	38%
Project:	None	**Barometric Pres.:**	30.15
Tested by:	Rod Peloquin	**Power:** 120VAC/60Hz	**Job Site:** EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	**Test Distance (m)**	3

COMMENTS

None

EUT OPERATING MODES

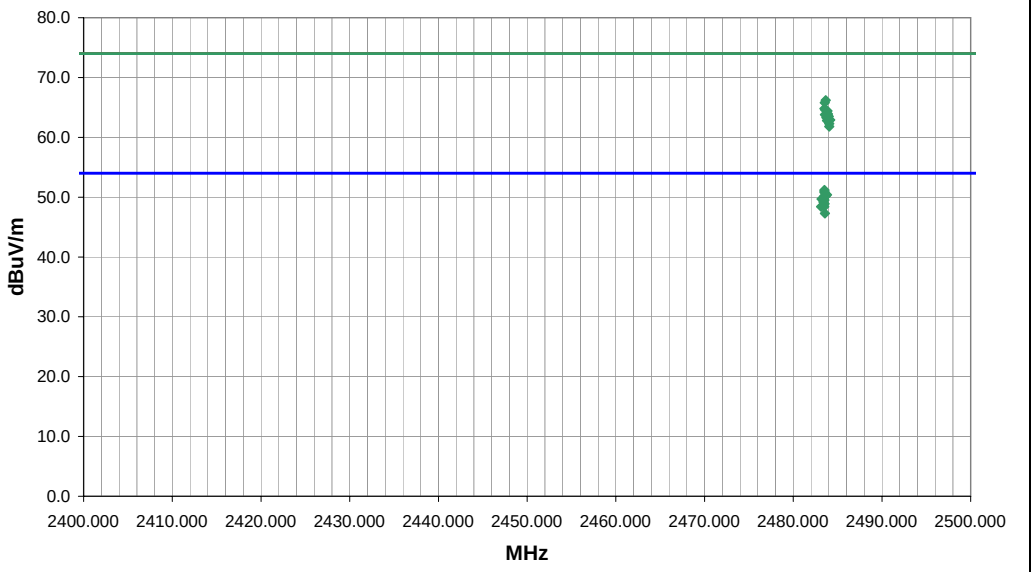
Transmitting 802.11, high channel

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.517	32.2	-1.0	221.0	1.1	3.0	20.0	H-Horn	AV	0.0	51.2	54.0	-2.8	1 Mbps, EUT vertical
2483.507	32.0	-1.0	118.0	1.1	3.0	20.0	H-Horn	AV	0.0	51.0	54.0	-3.0	6 Mbps, EUT vertical
2483.510	31.8	-1.0	118.0	1.1	3.0	20.0	H-Horn	AV	0.0	50.8	54.0	-3.2	54 Mbps, EUT vertical
2483.798	31.4	-1.0	100.0	1.1	3.0	20.0	H-Horn	AV	0.0	50.4	54.0	-3.6	36 Mbps, EUT vertical
2483.512	31.2	-1.0	117.0	2.4	3.0	20.0	H-Horn	AV	0.0	50.2	54.0	-3.8	6 Mbps, EUT horizontal
2483.660	31.2	-1.0	108.0	1.1	3.0	20.0	H-Horn	AV	0.0	50.2	54.0	-3.8	11 Mbps, EUT vertical
2483.197	30.7	-1.0	104.0	1.2	3.0	20.0	H-Horn	AV	0.0	49.7	54.0	-4.3	6 Mbps, EUT on side
2483.512	30.5	-1.0	134.0	1.5	3.0	20.0	V-Horn	AV	0.0	49.5	54.0	-4.5	1 Mbps, EUT vertical
2483.412	30.2	-1.0	135.0	1.1	3.0	20.0	V-Horn	AV	0.0	49.2	54.0	-4.8	6 Mbps, EUT vertical
2483.525	29.9	-1.0	138.0	1.6	3.0	20.0	V-Horn	AV	0.0	48.9	54.0	-5.1	11 Mbps, EUT vertical
2483.133	29.4	-1.0	118.0	1.1	3.0	20.0	V-Horn	AV	0.0	48.4	54.0	-5.6	36 Mbps, EUT vertical
2483.502	29.4	-1.0	137.0	1.1	3.0	20.0	V-Horn	AV	0.0	48.4	54.0	-5.6	54 Mbps, EUT vertical
2483.568	28.3	-1.0	261.0	1.0	3.0	20.0	V-Horn	AV	0.0	47.3	54.0	-6.7	6 Mbps, EUT horizontal
2483.655	47.2	-1.0	100.0	1.1	3.0	20.0	H-Horn	PK	0.0	66.2	74.0	-7.8	36 Mbps, EUT vertical
2483.553	46.8	-1.0	118.0	1.1	3.0	20.0	H-Horn	PK	0.0	65.8	74.0	-8.2	54 Mbps, EUT vertical
2483.513	45.8	-1.0	117.0	2.4	3.0	20.0	H-Horn	PK	0.0	64.8	74.0	-9.2	6 Mbps, EUT horizontal
2483.605	45.6	-1.0	118.0	1.1	3.0	20.0	H-Horn	PK	0.0	64.6	74.0	-9.4	6 Mbps, EUT vertical
2483.853	45.4	-1.0	221.0	1.1	3.0	20.0	H-Horn	PK	0.0	64.4	74.0	-9.6	1 Mbps, EUT vertical
2483.913	44.9	-1.0	104.0	1.2	3.0	20.0	H-Horn	PK	0.0	63.9	74.0	-10.1	6 Mbps, EUT on side
2483.563	44.8	-1.0	118.0	1.1	3.0	20.0	V-Horn	PK	0.0	63.8	74.0	-10.2	36 Mbps, EUT vertical

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2008.07.21
EMI 2009.4.13

EUT:	Ranger/TSC3 802.11 radio	Work Order:	TRPO0054
Serial Number:	Unknown	Date:	12/03/09
Customer:	Trimble Navigation Limited	Temperature:	21
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

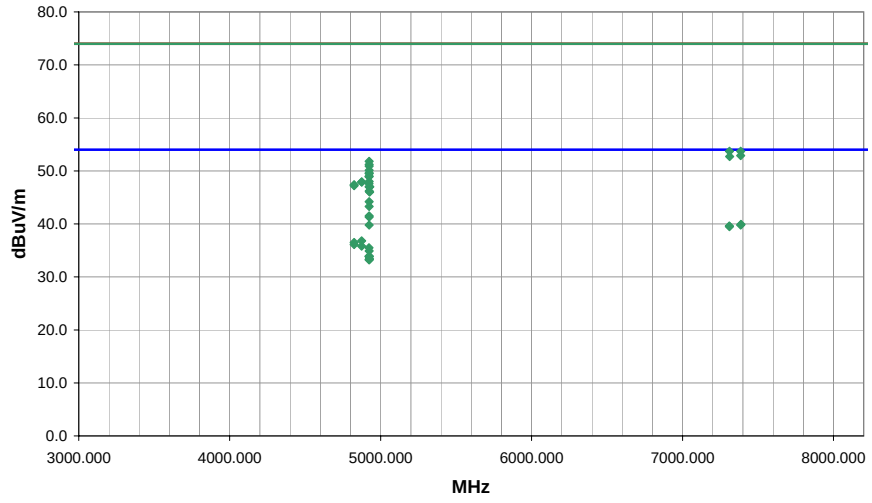
Transmitting 802.11

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4924.020	37.7	8.5	61.0	1.4	3.0	0.0	H-Horn	AV	0.0	46.2	54.0	-7.8	High channel, 1 Mbps, EUT horizontal
4923.977	35.7	8.5	347.0	1.3	3.0	0.0	V-Horn	AV	0.0	44.2	54.0	-9.8	High channel, 1 Mbps, EUT horizontal
4924.000	34.8	8.5	0.0	1.0	3.0	0.0	H-Horn	AV	0.0	43.3	54.0	-10.7	High channel, 1 Mbps, EUT on side
4923.980	33.0	8.5	277.0	1.6	3.0	0.0	V-Horn	AV	0.0	41.5	54.0	-12.5	High channel, 1 Mbps, EUT on side
4924.010	32.8	8.5	287.0	1.6	3.0	0.0	V-Horn	AV	0.0	41.3	54.0	-12.7	High channel, 1 Mbps, EUT vertical
7386.873	24.5	15.4	72.0	1.7	3.0	0.0	H-Horn	AV	0.0	39.9	54.0	-14.1	High channel, 1 Mbps, EUT horizontal
7384.847	24.4	15.4	319.0	1.0	3.0	0.0	V-Horn	AV	0.0	39.8	54.0	-14.2	High channel, 1 Mbps, EUT horizontal
4924.013	31.3	8.5	278.0	1.1	3.0	0.0	H-Horn	AV	0.0	39.8	54.0	-14.2	High channel, 1 Mbps, EUT vertical
7309.577	24.4	15.2	6.0	1.0	3.0	0.0	H-Horn	AV	0.0	39.6	54.0	-14.4	Mid channel, 1 Mbps, EUT horizontal
7310.987	24.3	15.2	143.0	1.7	3.0	0.0	V-Horn	AV	0.0	39.5	54.0	-14.5	Mid channel, 1 Mbps, EUT horizontal
4874.003	28.4	8.4	95.0	1.0	3.0	0.0	H-Horn	AV	0.0	36.8	54.0	-17.2	Mid channel, 1 Mbps, EUT horizontal
4824.010	28.0	8.5	308.0	1.0	3.0	0.0	H-Horn	AV	0.0	36.5	54.0	-17.5	Low channel, 1 Mbps, EUT horizontal
4824.040	27.6	8.5	325.0	1.0	3.0	0.0	V-Horn	AV	0.0	36.1	54.0	-17.9	Low channel, 1 Mbps, EUT horizontal
4873.957	27.4	8.4	346.0	1.3	3.0	0.0	V-Horn	AV	0.0	35.8	54.0	-18.2	Mid channel, 1 Mbps, EUT horizontal
4923.108	27.0	8.5	60.0	1.4	3.0	0.0	H-Horn	AV	0.0	35.5	54.0	-18.5	High channel, 11 Mbps, EUT horizontal
4923.370	26.4	8.5	351.0	1.3	3.0	0.0	V-Horn	AV	0.0	34.9	54.0	-19.1	High channel, 11 Mbps, EUT horizontal
4923.600	25.4	8.5	61.0	1.4	3.0	0.0	H-Horn	AV	0.0	33.9	54.0	-20.1	High channel, 54 Mbps, EUT horizontal
4923.800	25.4	8.5	58.0	1.4	3.0	0.0	H-Horn	AV	0.0	33.9	54.0	-20.1	High channel, 36 Mbps, EUT horizontal
4924.140	25.3	8.5	63.0	1.4	3.0	0.0	H-Horn	AV	0.0	33.8	54.0	-20.2	High channel, 6 Mbps, EUT horizontal
7310.373	38.5	15.2	6.0	1.0	3.0	0.0	H-Horn	PK	0.0	53.7	74.0	-20.3	Mid channel, 1 Mbps, EUT horizontal
7384.527	38.3	15.4	72.0	1.7	3.0	0.0	H-Horn	PK	0.0	53.7	74.0	-20.3	High channel, 1 Mbps, EUT horizontal
4925.520	24.9	8.5	330.0	1.3	3.0	0.0	V-Horn	AV	0.0	33.4	54.0	-20.6	High channel, 36 Mbps, EUT horizontal
4923.880	24.8	8.5	335.0	1.3	3.0	0.0	V-Horn	AV	0.0	33.3	54.0	-20.7	High channel, 6 Mbps, EUT horizontal
4923.707	24.7	8.5	169.0	1.3	3.0	0.0	V-Horn	AV	0.0	33.2	54.0	-20.8	High channel, 54 Mbps, EUT horizontal
7385.347	37.5	15.4	319.0	1.0	3.0	0.0	V-Horn	PK	0.0	52.9	74.0	-21.1	High channel, 1 Mbps, EUT horizontal
7311.870	37.5	15.2	143.0	1.7	3.0	0.0	V-Horn	PK	0.0	52.7	74.0	-21.3	Mid channel, 1 Mbps, EUT horizontal
4924.127	43.3	8.5	61.0	1.4	3.0	0.0	H-Horn	PK	0.0	51.8	74.0	-22.2	High channel, 1 Mbps, EUT horizontal
4923.967	42.7	8.5	0.0	1.0	3.0	0.0	H-Horn	PK	0.0	51.2	74.0	-22.8	High channel, 1 Mbps, EUT on side
4924.147	42.4	8.5	347.0	1.3	3.0	0.0	V-Horn	PK	0.0	50.9	74.0	-23.1	High channel, 1 Mbps, EUT horizontal
4924.053	41.6	8.5	277.0	1.6	3.0	0.0	V-Horn	PK	0.0	50.1	74.0	-23.9	High channel, 1 Mbps, EUT on side
4923.300	41.1	8.5	60.0	1.4	3.0	0.0	H-Horn	PK	0.0	49.6	74.0	-24.4	High channel, 11 Mbps, EUT horizontal
4924.043	41.0	8.5	287.0	1.6	3.0	0.0	V-Horn	PK	0.0	49.5	74.0	-24.5	High channel, 1 Mbps, EUT vertical
4923.713	40.5	8.5	278.0	1.1	3.0	0.0	H-Horn	PK	0.0	49.0	74.0	-25.0	High channel, 1 Mbps, EUT vertical
4922.760	40.4	8.5	58.0	1.4	3.0	0.0	H-Horn	PK	0.0	48.9	74.0	-25.1	High channel, 36 Mbps, EUT horizontal
4924.210	39.5	8.5	351.0	1.3	3.0	0.0	V-Horn	PK	0.0	48.0	74.0	-26.0	High channel, 11 Mbps, EUT horizontal
4874.210	39.5	8.4	346.0	1.3	3.0	0.0	V-Horn	PK	0.0	47.9	74.0	-26.1	Mid channel, 1 Mbps, EUT horizontal
4874.493	39.5	8.4	95.0	1.0	3.0	0.0	H-Horn	PK	0.0	47.9	74.0	-26.1	Mid channel, 1 Mbps, EUT horizontal
4922.330	39.1	8.5	63.0	1.4	3.0	0.0	H-Horn	PK	0.0	47.6	74.0	-26.4	High channel, 6 Mbps, EUT horizontal
4823.913	38.9	8.5	308.0	1.0	3.0	0.0	H-Horn	PK	0.0	47.4	74.0	-26.6	Low channel, 1 Mbps, EUT horizontal
4823.817	38.7	8.5	325.0	1.0	3.0	0.0	V-Horn	PK	0.0	47.2	74.0	-26.8	Low channel, 1 Mbps, EUT horizontal
4924.200	38.5	8.5	61.0	1.4	3.0	0.0	H-Horn	PK	0.0	47.0	74.0	-27.0	High channel, 54 Mbps, EUT horizontal
4925.130	38.5	8.5	335.0	1.3	3.0	0.0	V-Horn	PK	0.0	47.0	74.0	-27.0	High channel, 6 Mbps, EUT horizontal
4927.973	38.5	8.5	330.0	1.3	3.0	0.0	V-Horn	PK	0.0	47.0	74.0	-27.0	High channel, 36 Mbps, EUT horizontal
4927.240	37.5	8.5	169.0	1.3	3.0	0.0	V-Horn	PK	0.0	46.0	74.0	-28.0	High channel, 54 Mbps, EUT horizontal

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2008.07.21
EMI 2009.4.13

EUT:	Ranger/TSC3 802.11 radio	Work Order:	TRPO0054
Serial Number:	Unknown	Date:	12/03/09
Customer:	Trimble Navigation Limited	Temperature:	21
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

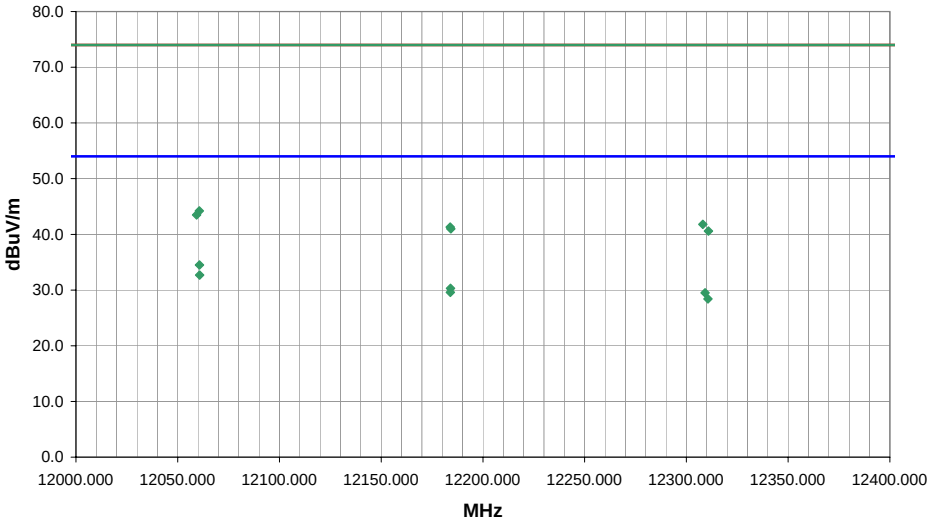
Transmitting 802.11

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	3
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
12060.730	43.3	-8.8	45.0	1.0	3.0	0.0	H-Horn	AV	0.0	34.5	54.0	-19.5	Low channel, 1 Mbps, EUT horizontal
12060.810	41.5	-8.8	329.0	1.0	3.0	0.0	V-Horn	AV	0.0	32.7	54.0	-21.3	Low channel, 1 Mbps, EUT horizontal
12184.090	38.9	-8.6	45.0	1.0	3.0	0.0	H-Horn	AV	0.0	30.3	54.0	-23.7	Mid channel, 1 Mbps, EUT horizontal
12183.970	38.2	-8.6	328.0	1.0	3.0	0.0	V-Horn	AV	0.0	29.6	54.0	-24.4	Mid channel, 1 Mbps, EUT horizontal
12309.180	37.7	-8.2	323.0	1.0	3.0	0.0	V-Horn	AV	0.0	29.5	54.0	-24.5	High channel, 1 Mbps, EUT horizontal
12310.600	36.6	-8.2	58.0	1.0	3.0	0.0	H-Horn	AV	0.0	28.4	54.0	-25.6	High channel, 1 Mbps, EUT horizontal
12060.620	53.0	-8.8	45.0	1.0	3.0	0.0	H-Horn	PK	0.0	44.2	74.0	-29.8	Low channel, 1 Mbps, EUT horizontal
12059.310	52.3	-8.8	329.0	1.0	3.0	0.0	V-Horn	PK	0.0	43.5	74.0	-30.5	Low channel, 1 Mbps, EUT horizontal
12308.090	50.0	-8.2	323.0	1.0	3.0	0.0	V-Horn	PK	0.0	41.8	74.0	-32.2	High channel, 1 Mbps, EUT horizontal
12183.950	49.9	-8.6	45.0	1.0	3.0	0.0	H-Horn	PK	0.0	41.3	74.0	-32.7	Mid channel, 1 Mbps, EUT horizontal
12184.270	49.6	-8.6	328.0	1.0	3.0	0.0	V-Horn	PK	0.0	41.0	74.0	-33.0	Mid channel, 1 Mbps, EUT horizontal
12310.870	48.8	-8.2	58.0	1.0	3.0	0.0	H-Horn	PK	0.0	40.6	74.0	-33.4	High channel, 1 Mbps, EUT horizontal

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS DATA SHEET

PSA 2008.07.21
EMI 2009.8.29

EUT:	Ranger/TSC3 802.11 radio	Work Order:	TRPO0054
Serial Number:	Unknown	Date:	12/30/09
Customer:	Trimble Navigation Limited	Temperature:	21
Attendees:	None	Humidity:	38%
Project:	None	Barometric Pres.:	30.15
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2010	ANSI C63.10:2009

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	3

COMMENTS

None

EUT OPERATING MODES

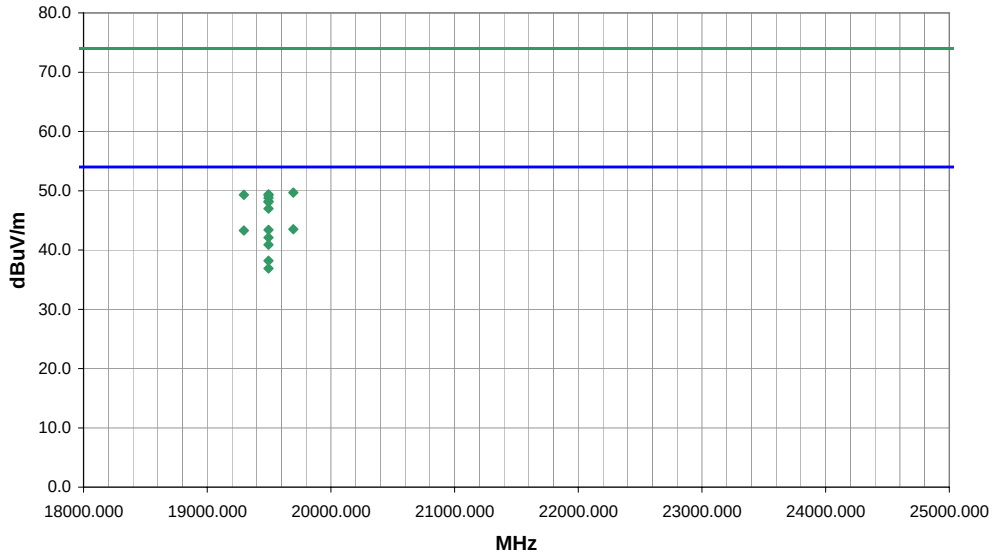
Transmitting 802.11(b), 1 Mbps

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
19695.950	52.0	-8.5	65.0	1.0	3.0	0.0	√-High Horr	AV	0.0	43.5	54.0	-10.5	High channel, EUT horizontal
19495.930	51.9	-8.5	275.0	1.0	3.0	0.0	⊣-High Horr	AV	0.0	43.4	54.0	-10.6	Mid channel, EUTon side
19295.930	51.8	-8.5	70.0	1.0	3.0	0.0	√-High Horr	AV	0.0	43.3	54.0	-10.7	Low channel, EUT horizontal
19495.950	50.6	-8.5	68.0	1.0	3.0	0.0	√-High Horr	AV	0.0	42.1	54.0	-11.9	Mid channel, EUT horizontal
19495.950	49.4	-8.5	74.0	1.1	3.0	0.0	⊣-High Horr	AV	0.0	40.9	54.0	-13.1	Mid channel, EUT horizontal
19495.940	46.7	-8.5	250.0	1.0	3.0	0.0	⊣-High Horr	AV	0.0	38.2	54.0	-15.8	Mid channel, EUTvertical
19495.920	45.4	-8.5	289.0	1.0	3.0	0.0	√-High Horr	AV	0.0	36.9	54.0	-17.1	Mid channel, EUTon side
19695.740	58.2	-8.5	65.0	1.0	3.0	0.0	√-High Horr	PK	0.0	49.7	74.0	-24.3	High channel, EUT horizontal
19495.990	57.9	-8.5	275.0	1.0	3.0	0.0	⊣-High Horr	PK	0.0	49.4	74.0	-24.6	Mid channel, EUTon side
19295.700	57.8	-8.5	70.0	1.0	3.0	0.0	√-High Horr	PK	0.0	49.3	74.0	-24.7	Low channel, EUT horizontal
19495.970	57.7	-8.5	68.0	1.0	3.0	0.0	√-High Horr	PK	0.0	49.2	74.0	-24.8	Mid channel, EUT horizontal
19495.900	57.3	-8.5	74.0	1.1	3.0	0.0	⊣-High Horr	PK	0.0	48.8	74.0	-25.2	Mid channel, EUT horizontal
19495.700	56.7	-8.5	276.0	1.1	3.0	0.0	√-High Horr	PK	0.0	48.2	74.0	-25.8	Mid channel, EUTvertical
19495.880	56.6	-8.5	250.0	1.0	3.0	0.0	⊣-High Horr	PK	0.0	48.1	74.0	-25.9	Mid channel, EUTvertical
19495.600	55.5	-8.5	289.0	1.0	3.0	0.0	√-High Horr	PK	0.0	47.0	74.0	-27.0	Mid channel, EUTon side

AC POWERLINE CONDUCTED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION
Transmitting 802.11(b), 1 Mbps, high channel
Transmitting 802.11(b), 1 Mbps, mid channel
Transmitting 802.11(b), 1 Mbps, low channel

POWER SETTINGS INVESTIGATED
120VAC/60Hz

CONFIGURATIONS INVESTIGATED
TRPO0054 - 1

SAMPLE CALCULATIONS
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Receiver	Rohde & Schwarz	ESCI	ARH	9/25/2009	13 mo
LISN	Solar	9252-50-R-24-BNC	LIR	2/4/2009	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	5/27/2009	13 mo
EV07 Cables		Conducted Cables	EVG	6/1/2009	13 mo

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2009.06.09
Version 2009.12.18

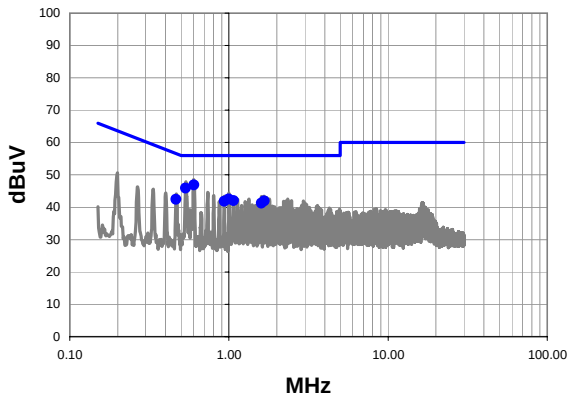
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin

EUT:	Ranger/TSC3 802.11 radio
Configuration:	1 - Radiated Spurious Emissions
Customer:	Trimble Navigation Limited
Attendees:	None
EUT Power:	120VAC/60Hz
Operating Mode:	Transmitting 802.11(b), 1 Mbps, low channel
Deviations:	No deviations.
Comments:	None

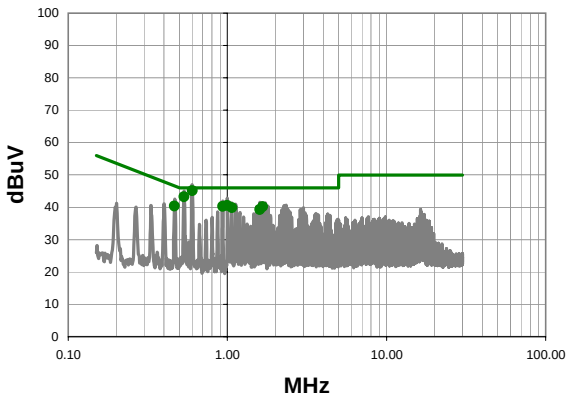
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	1	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.603	26.4	20.5	46.9	56.0	-9.1
0.534	25.4	20.5	45.9	56.0	-10.1
1.000	22.1	20.4	42.5	56.0	-13.5
1.068	21.7	20.4	42.1	56.0	-13.9
1.668	21.5	20.4	41.9	56.0	-14.1
0.466	22.0	20.5	42.5	56.6	-14.1
0.935	21.5	20.4	41.9	56.0	-14.1
1.600	20.9	20.4	41.3	56.0	-14.7

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.603	24.6	20.5	45.1	46.0	-0.9
0.534	22.7	20.5	43.2	46.0	-2.8
1.000	20.2	20.4	40.6	46.0	-5.4
0.935	19.9	20.4	40.3	46.0	-5.7
1.668	19.8	20.4	40.2	46.0	-5.8
1.068	19.5	20.4	39.9	46.0	-6.1
0.466	19.9	20.5	40.4	46.6	-6.2
1.600	18.9	20.4	39.3	46.0	-6.7

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2009.06.09
Version 2009.12.18

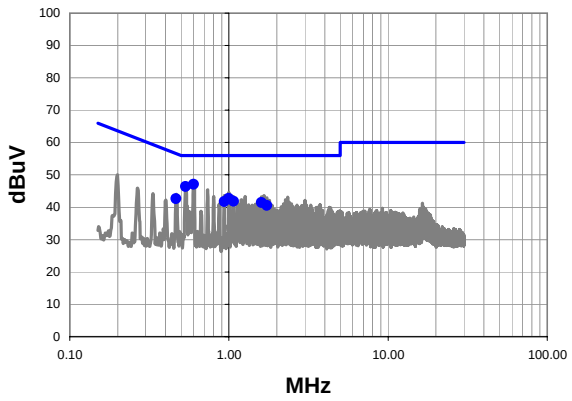
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin

EUT:	Ranger/TSC3 802.11 radio
Configuration:	1 - Radiated Spurious Emissions
Customer:	Trimble Navigation Limited
Attendees:	None
EUT Power:	120VAC/60Hz
Operating Mode:	Transmitting 802.11(b), 1 Mbps, low channel
Deviations:	No deviations.
Comments:	None

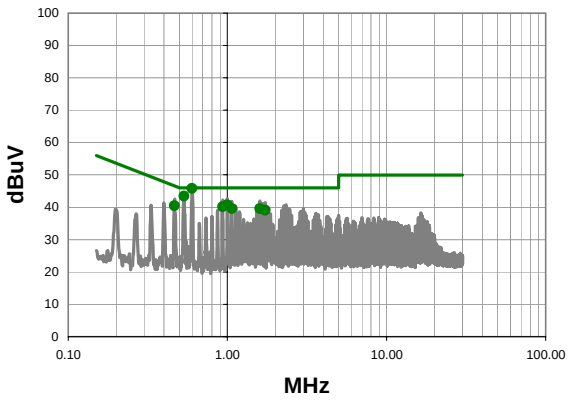
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	2	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	26.6	20.5	47.1	56.0	-8.9
0.534	25.9	20.5	46.4	56.0	-9.6
1.000	22.3	20.4	42.7	56.0	-13.3
0.466	22.2	20.5	42.7	56.6	-13.9
1.068	21.5	20.4	41.9	56.0	-14.1
0.934	21.4	20.4	41.8	56.0	-14.2
1.600	21.1	20.4	41.5	56.0	-14.5
1.732	20.2	20.4	40.6	56.0	-15.4

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	25.3	20.5	45.8	46.0	-0.2
0.534	22.9	20.5	43.4	46.0	-2.6
1.000	20.4	20.4	40.8	46.0	-5.2
0.934	19.8	20.4	40.2	46.0	-5.8
0.466	20.0	20.5	40.5	46.6	-6.1
1.600	19.2	20.4	39.6	46.0	-6.4
1.068	19.2	20.4	39.6	46.0	-6.4
1.732	18.7	20.4	39.1	46.0	-6.9

NORTHWEST

EMC

AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2009.06.09
Version 2009.12.18

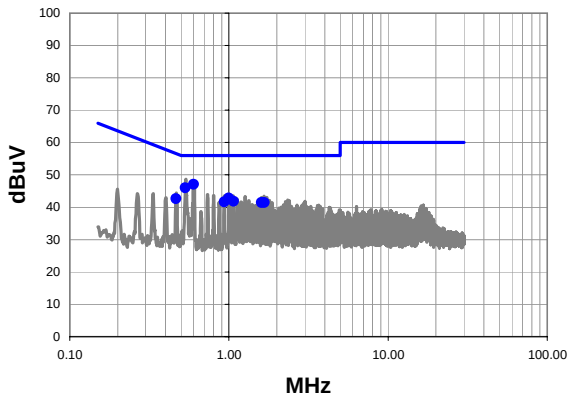
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin

EUT:	Ranger/TSC3 802.11 radio
Configuration:	1 - Radiated Spurious Emissions
Customer:	Trimble Navigation Limited
Attendees:	None
EUT Power:	120VAC/60Hz
Operating Mode:	Transmitting 802.11(b), 1 Mbps, mid channel
Deviations:	No deviations.
Comments:	None

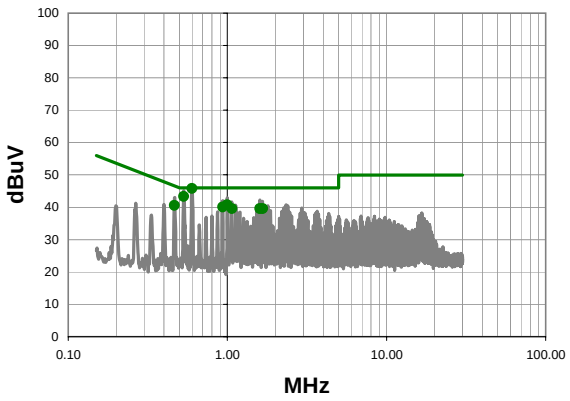
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	3	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	26.6	20.5	47.1	56.0	-8.9
0.533	25.5	20.5	46.0	56.0	-10.0
1.000	22.4	20.4	42.8	56.0	-13.2
0.466	22.2	20.5	42.7	56.6	-13.9
1.068	21.5	20.4	41.9	56.0	-14.1
0.934	21.3	20.4	41.7	56.0	-14.3
1.600	21.1	20.4	41.5	56.0	-14.5
1.668	21.0	20.4	41.4	56.0	-14.6

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	25.3	20.5	45.8	46.0	-0.2
0.533	22.8	20.5	43.3	46.0	-2.7
1.000	20.4	20.4	40.8	46.0	-5.2
0.934	19.7	20.4	40.1	46.0	-5.9
0.466	20.1	20.5	40.6	46.6	-6.0
1.668	19.2	20.4	39.6	46.0	-6.4
1.600	19.2	20.4	39.6	46.0	-6.4
1.068	19.2	20.4	39.6	46.0	-6.4

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AC POWERLINE CONDUCTED EMISSIONS

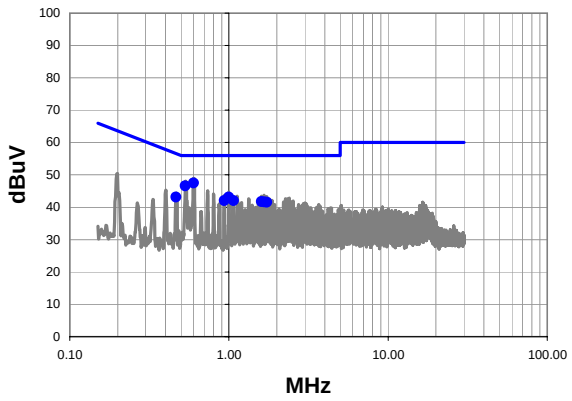
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin

EUT:	Ranger/TSC3 802.11 radio
Configuration:	1 - Radiated Spurious Emissions
Customer:	Trimble Navigation Limited
Attendees:	None
EUT Power:	120VAC/60Hz
Operating Mode:	Transmitting 802.11(b), 1 Mbps, mid channel
Deviations:	No deviations.
Comments:	None

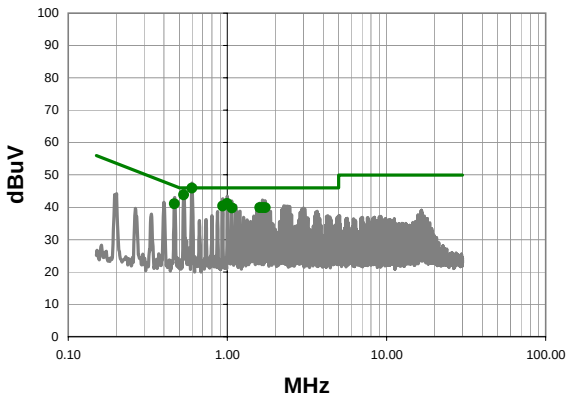
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	4	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	27.0	20.5	47.5	56.0	-8.5
0.533	26.1	20.5	46.6	56.0	-9.4
1.000	22.7	20.4	43.1	56.0	-12.9
0.466	22.7	20.5	43.2	56.6	-13.4
1.068	21.7	20.4	42.1	56.0	-13.9
0.934	21.7	20.4	42.1	56.0	-13.9
1.600	21.4	20.4	41.8	56.0	-14.2
1.668	21.2	20.4	41.6	56.0	-14.4
1.732	21.1	20.4	41.5	56.0	-14.5

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	25.4	20.5	45.9	46.0	-0.1
0.533	23.3	20.5	43.8	46.0	-2.2
1.000	20.8	20.4	41.2	46.0	-4.8
0.466	20.6	20.5	41.1	46.6	-5.5
0.934	20.0	20.4	40.4	46.0	-5.6
1.732	19.5	20.4	39.9	46.0	-6.1
1.668	19.5	20.4	39.9	46.0	-6.1
1.600	19.5	20.4	39.9	46.0	-6.1
1.068	19.4	20.4	39.8	46.0	-6.2

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AC POWERLINE CONDUCTED EMISSIONS

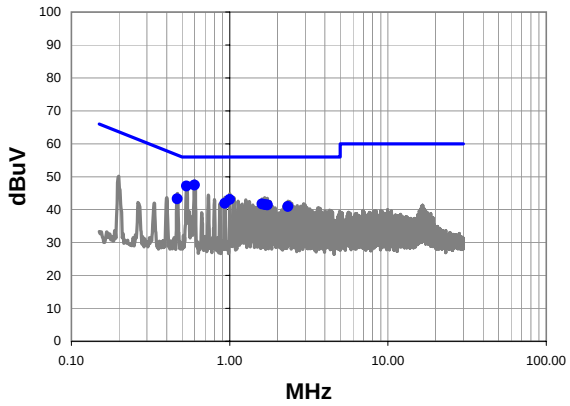
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin

EUT:	Ranger/TSC3 802.11 radio
Configuration:	1 - Radiated Spurious Emissions
Customer:	Trimble Navigation Limited
Attendees:	None
EUT Power:	120VAC/60Hz
Operating Mode:	Transmitting 802.11(b), 1 Mbps, high channel
Deviations:	No deviations.
Comments:	None

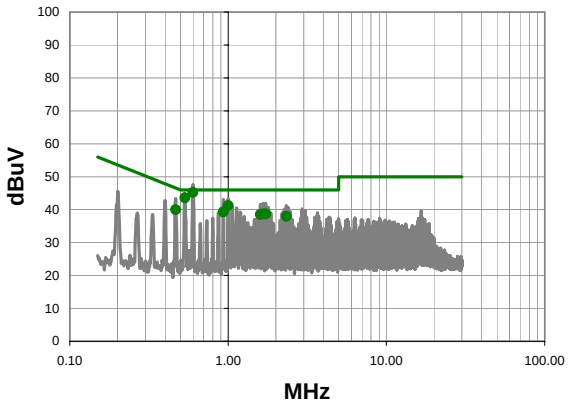
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	5	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	26.9	20.5	47.4	56.0	-8.6
0.535	26.7	20.5	47.2	56.0	-8.8
1.000	22.7	20.4	43.1	56.0	-12.9
0.466	22.8	20.5	43.3	56.6	-13.3
0.934	21.5	20.4	41.9	56.0	-14.1
1.600	21.3	20.4	41.7	56.0	-14.3
1.668	21.1	20.4	41.5	56.0	-14.5
1.732	21.0	20.4	41.4	56.0	-14.6
2.332	20.5	20.4	40.9	56.0	-15.1

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.601	24.7	20.5	45.2	46.0	-0.8
0.535	23.1	20.5	43.6	46.0	-2.4
1.000	20.8	20.4	41.2	46.0	-4.8
0.466	19.5	20.5	40.0	46.6	-6.6
0.934	18.9	20.4	39.3	46.0	-6.7
1.732	18.3	20.4	38.7	46.0	-7.3
1.668	18.3	20.4	38.7	46.0	-7.3
1.600	18.1	20.4	38.5	46.0	-7.5
2.332	17.5	20.4	37.9	46.0	-8.1

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AC POWERLINE CONDUCTED EMISSIONS

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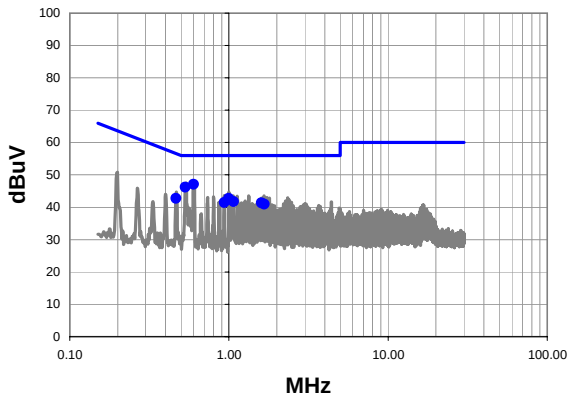
Work Order:	TRPO0054	**Date:**	01/05/10		
Project:	None	**Temperature:**	21		
Job Site:	EV07	**Humidity:**	38		
Serial Number:	Unknown	**Barometric Pres.:**	30.15	**Tested by:**	Rod Peloquin
EUT:	Ranger/TSC3 802.11 radio				
Configuration:	1 - Radiated Spurious Emissions				
Customer:	Trimble Navigation Limited				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Transmitting 802.11(b), 1 Mbps, high channel				
Deviations:	No deviations.				
Comments:	None				

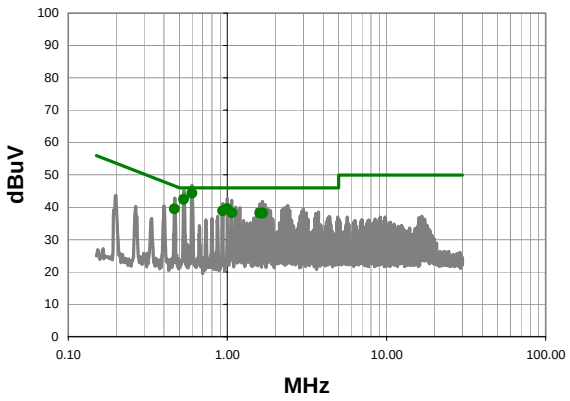
Test Specifications	**Test Method**
FCC 15.207:2010	ANSI C63.10:2009

Run #	6	**Line:**	Neutral	**Ext. Attenuation:**	20	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	26.6	20.5	47.1	56.0	-8.9
0.533	25.7	20.5	46.2	56.0	-9.8
1.000	22.3	20.4	42.7	56.0	-13.3
0.466	22.3	20.5	42.8	56.6	-13.8
1.068	21.4	20.4	41.8	56.0	-14.2
0.934	21.1	20.4	41.5	56.0	-14.5
1.600	21.0	20.4	41.4	56.0	-14.6
1.668	20.6	20.4	41.0	56.0	-15.0

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.599	23.8	20.5	44.3	46.0	-1.7
0.533	22.0	20.5	42.5	46.0	-3.5
1.000	19.2	20.4	39.6	46.0	-6.4
0.466	19.0	20.5	39.5	46.6	-7.1
0.934	18.5	20.4	38.9	46.0	-7.1
1.068	17.9	20.4	38.3	46.0	-7.7
1.668	17.8	20.4	38.2	46.0	-7.8
1.600	17.8	20.4	38.2	46.0	-7.8