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Emissions
Test Report

EUT Name: Wireless uDSL Residential Gateway

Model No.: HomePortal 3801HGV

CFR 47 Part 15.247:2008 and RSS 210:2007 Permissive Class II Test Report

Prepared for:

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Report/Issue Date: December 9, 2010
Report Number: 31053550.001

Statement of Compliance

Manufacturer:	Pace Americas 310 Providence Mine Road Nevada City, CA 95959 (530) 274-5440
Requester / Applicant:	Mark Rieger
Name of Equipment:	Wireless uDSL Residential Gateway
Model No.	HomePortal 3801HGV
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.247:2008 and RSS 210:2007
Test Dates:	29 November 2010 to 30 November 2010

Guidance Documents:

Emissions: ANSI C63.10: 2009

Test Methods:

Emissions: ANSI C63.10: 2009

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. This report contains data that are not covered by NVLAP accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Jeremy Luong	30 November 2010	Conan Boyle	28 December 2010
Test Engineer	Date	NVLAP Signatory	Date

500011-0 **US5254** **2932M**

1 Executive Summary

1.1 Scope

This report is intended to document the Class II permissive change with the requirements of the CFR 47 Part 15.247:2008 and RSS 210:2007 based on the results of testing performed on 29 November 2010 through 30 November 2010 on the Wireless uDSL Residential Gateway Model HomePortal 3801HGV manufactured by Pace Americas. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this addendum report.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4	Test Parameters (from Standard)	Result
Spurious Emission in Received Mode	CFR47 15.109, RSS-GEN Sect.7.2.3	Class B	**Complied**
Spurious Emission in Transmitted Mode	CFR47 15.209, RSS-GEN Sect.7.2.3	Class B	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS 210 Sect.2.6	Class B	**Complied**
Occupied Bandwidth	CFR47 15.247 (a2), RSS GEN Sect.4.4.1	500 kHz minimum	**Complied**
Maximum Transmitted Power	CFR47 15.247 (b3), RSS 210 Sect. A.8.4	30 dBm w/ 6 dBi antenna	**Complied**
RF Exposure	CFR47 15.247 (i), 2.1091	General Population	**Complied**

Note: Above characteristics were re-evaluated with Soshin (HMD804G) filter.

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None.

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at 2305 Mission College Blvd, Suite 105, Santa Clara, CA 95054, is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No US5254). The laboratory scope of accreditation includes: Title 47 CFR Parts 15 and 18. The accreditation is updated every 3 years.

2.1.2 NIST / NVLAP

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Standard 17025:2005 (Lab Code: 500011-0). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Industry Canada

Industry Canada Industrie Canada

Registration No.: 2932M. The 5 meter Semi-Anechoic Chamber has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2003.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures. (Registration Nos.: R-3269, C-3637, C-3638, T-1752, T-1753).

2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Lane, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / NVLAP accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4:2003, at a test distance of 3 and 5 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by NVLAP (Lab Code 500011-0).

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

	U_{lab}	U_{cispr}
Radiated Disturbance		
30 MHz – 25,000 MHz	3.2 dB	5.2 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.4 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.5 dB

Note: U_{lab} is the calculated Combined Standard Uncertainty
U_{cispr} is the measurement uncertainty requirement per CISPR 16.

Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is ± 4.1%.
The estimated combined standard uncertainty for radiated immunity measurements is ± 2.7dB.
The estimated combined standard uncertainty for conducted immunity measurements is ± 1.4dB.
The estimated combined standard uncertainty for damped oscillatory wave immunity measurements is ± 8.8%.
The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 0.45%.

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

The HomePortal 3801HGV is a Wireless uDSL Residential Gateway. The 3801HGV is 3000 series residential gateway. This features:
• 1-uDSL (Coax or RJ-11) Broadband Modem Port
• 1-HPNA 3.1 (Coax) Port
• 4-Ethernet Ports/1 WAN Port
• 802.11b/g Wireless Access Point
• 1-2line RJ14 FXS (VoIP) port

The sample under test evaluated with the following changes installed;

R193 (improved closed loop gain measurements and factory calibration results)
WAS: 2101-005005-000, RES,SMD,1.0K OHM,5%,0402,ROHS
IS: 2101-004270-000, RES,SMD,681OHM,1%,0402,ROHS

C251 (improved antenna matching impedance)
WAS: NO INSTALL
IS: 2301-020002-000, CAP,NPO,HI Q,0.5PF,25V,+/-0.1PF,0402,ROHS

U23 (second source component)
WAS: 2501-200039-000, FILTER,LP,2.4GHZ,WIDEBAND,0805 (NTK TECHNOLOGIES, INC., LAT250D-7038C)
IS: 2501-200039-000, FILTER,LP,2.4GHZ,WIDEBAND,0805 (Soshin HMD804G-T)

3.2 Equipment Configuration

A description of the equipment configuration is given in Table 11 and Table 12. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in Table 11 and Table 12. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The HomePortal 3801HGV uses the permanently attached antenna inside the device.

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247: 2009 and RSS 210 Annex 8: 2007. These test methods are listed under the laboratory's NVLAP Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

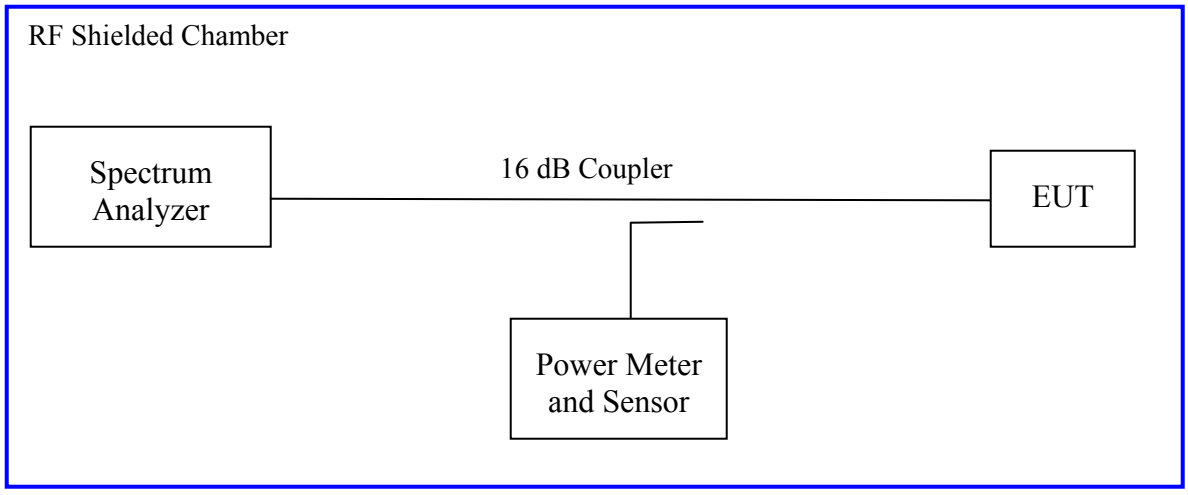
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b3):2009 and RSS 210 A.8.4: 2007

The maximum transmitted power is +30 dBm or 1Watt.

4.1.1 Test Method

The conducted method was used to measure the channel power output according to ANSI C63.10:2009 Section 6.10.3.1. The measurement was performed with modulation per CFR47 Part 15.247 (b3):2009 and RSS 210 A.8.4. This test was conducted on 3 channels of Sample, S/N 461029006839. The worst mode result indicated below.

Test Setup:



Method #1 of "Measurement of Digital Transmission Systems Operating under Section 15.247"applies since the EUT continuously transmit; where T, Transmission Duration Pulse, is greater than analyzer sweep time.

4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Integrated		**Power Setting:** +20 dBm @ Ch1& Ch11, +26 dBm @ Ch6			
Max. Antenna Gain: 2.31 dBi		**Signal State:** Modulated			
Ambient Temp.: 21° C		**Relative Humidity:**22%			
Test Results per CFR47 Part 15.247					
Operating Channel	**Limit [dBm]**	**802.11b Output Level [dBm]**	**802.11b Margin [dB]**	**802.11g Output Level [dBm]**	**802.11g Margin [dB]**
2412 MHz	+30.00	+17.64	-12.36	+16.72	-13.28
2437 MHz	+30.00	+24.35	-5.65	+23.11	-6.89
2462 MHz	+30.00	+17.76	-12.24	+16.94	-13.06
Note: The highest power outputs were measured at 1 Mbit/s for 802.11b and 6 Mbit/s for 802.11g. Power measurement performed according to the Method #1 of UNII.					

Table 3: Average Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature			
Antenna Type: Integrated		**Power Setting:** +20 dBm @ Ch1& Ch11, +26 dBm @ Ch6	
Max. Antenna Gain: 2.31 dBi		**Signal State:** Modulated	
Ambient Temp.: 21° C		**Relative Humidity:**22%	
Average Output Power Test Results			
Operating Channel	**Limit [dBm]**	**802.11b Output Level [dBm]**	**802.11g Output Level [dBm]**
2412 MHz	Na	+19.64	+19.87
2437 MHz	Na	+26.15	+26.09
2462 MHz	Na	+19.54	+20.06
Note: The average power outputs were measured at 1 Mbit/s for 802.11b and 6 Mbit/s for 802.11g. Average power measurements are for reference only.			

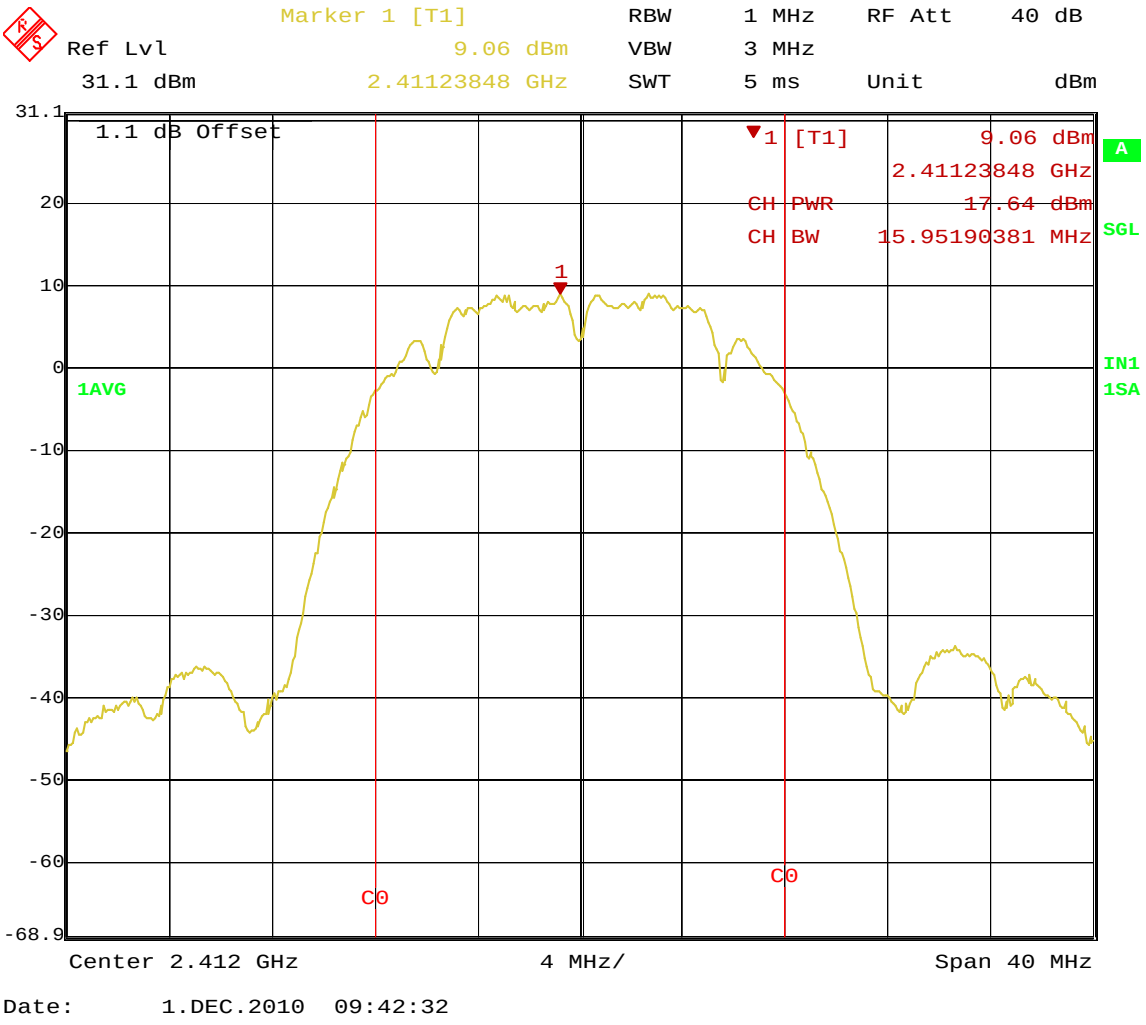


Figure 1: Maximum Transmitted Power, Lowest Channel 2412 MHz of 802.11b

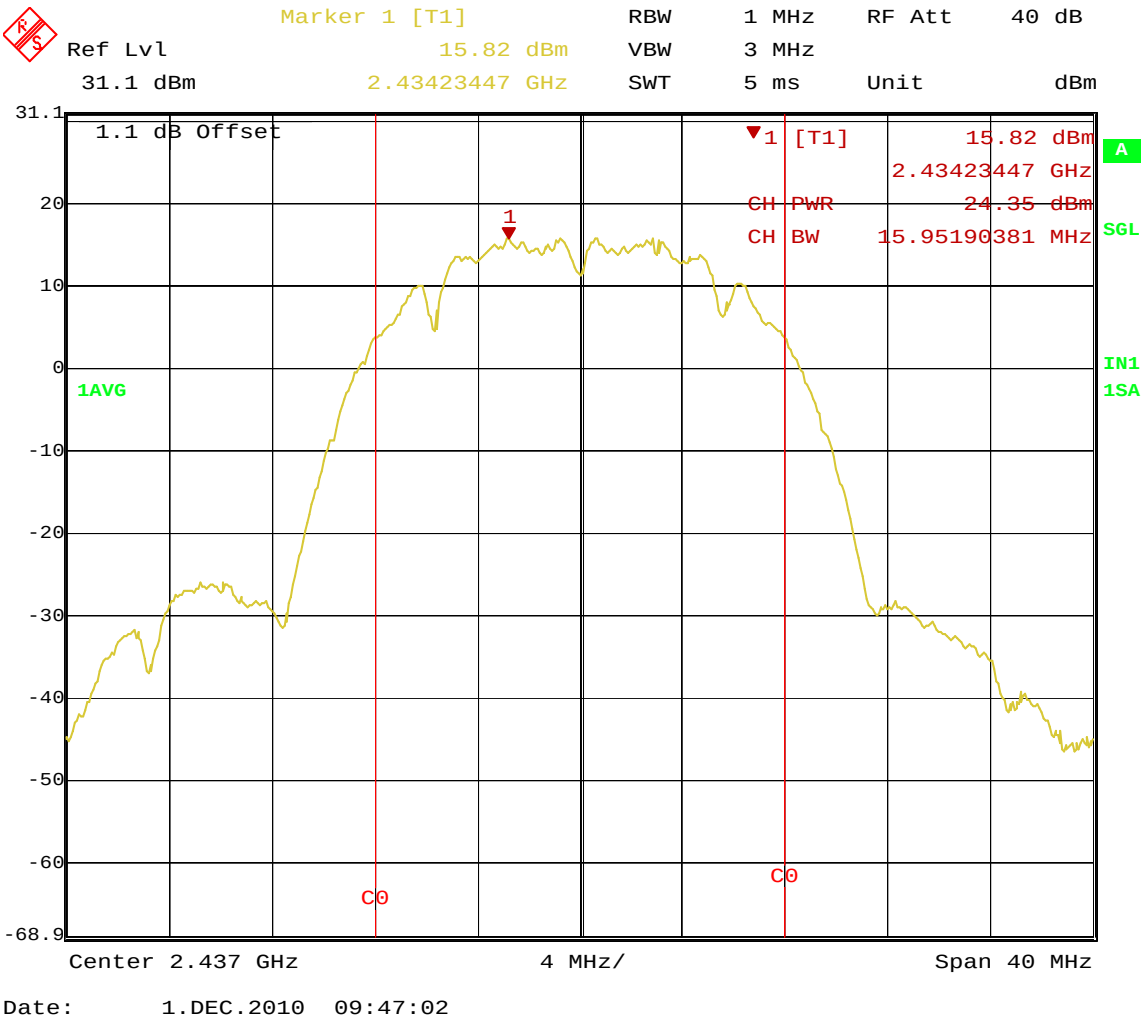


Figure 2: Maximum Transmitted Power, Middle Channel 2437 MHz of 802.11b

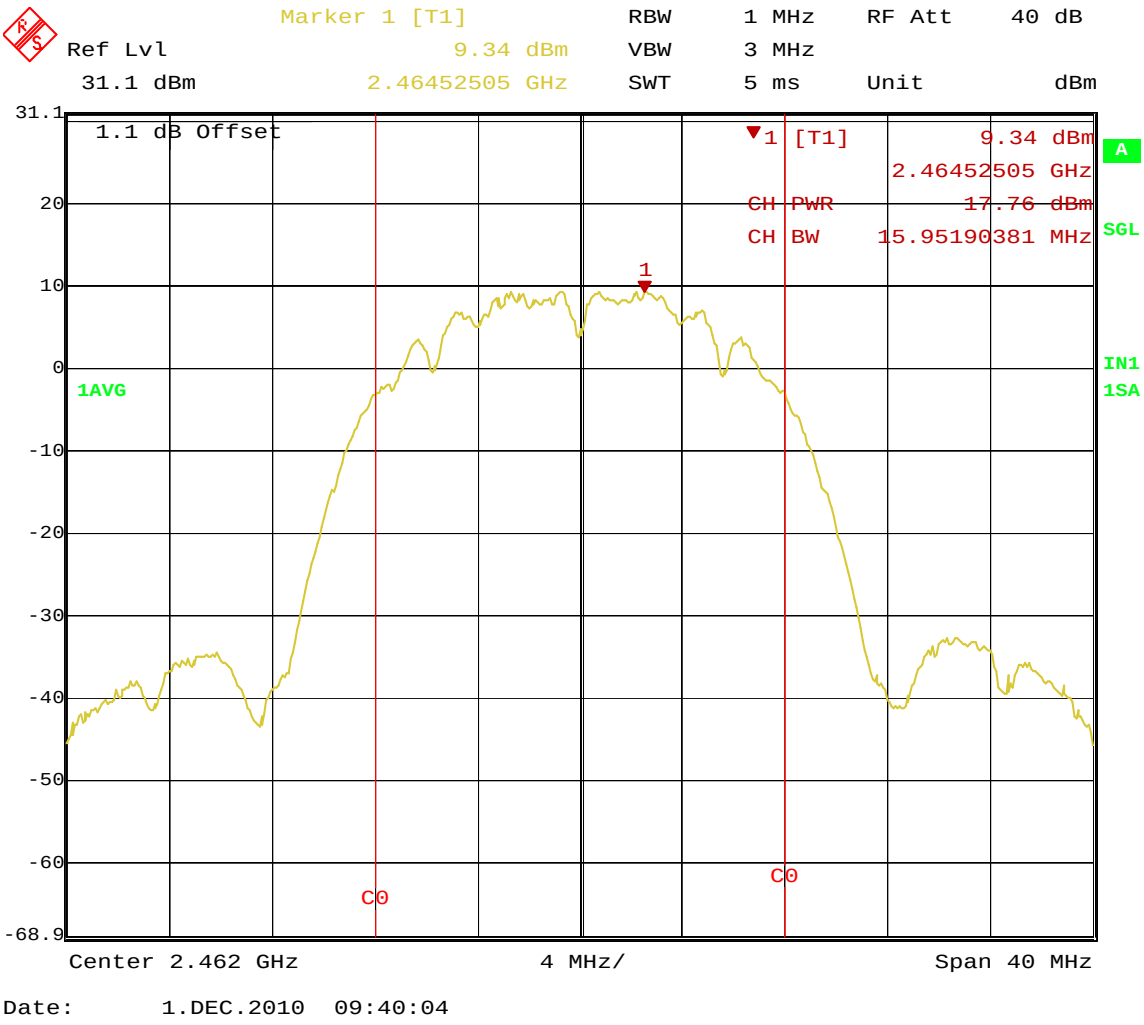


Figure 3: Maximum Transmitted Power, Highest Channel 2462 MHz of 802.11b

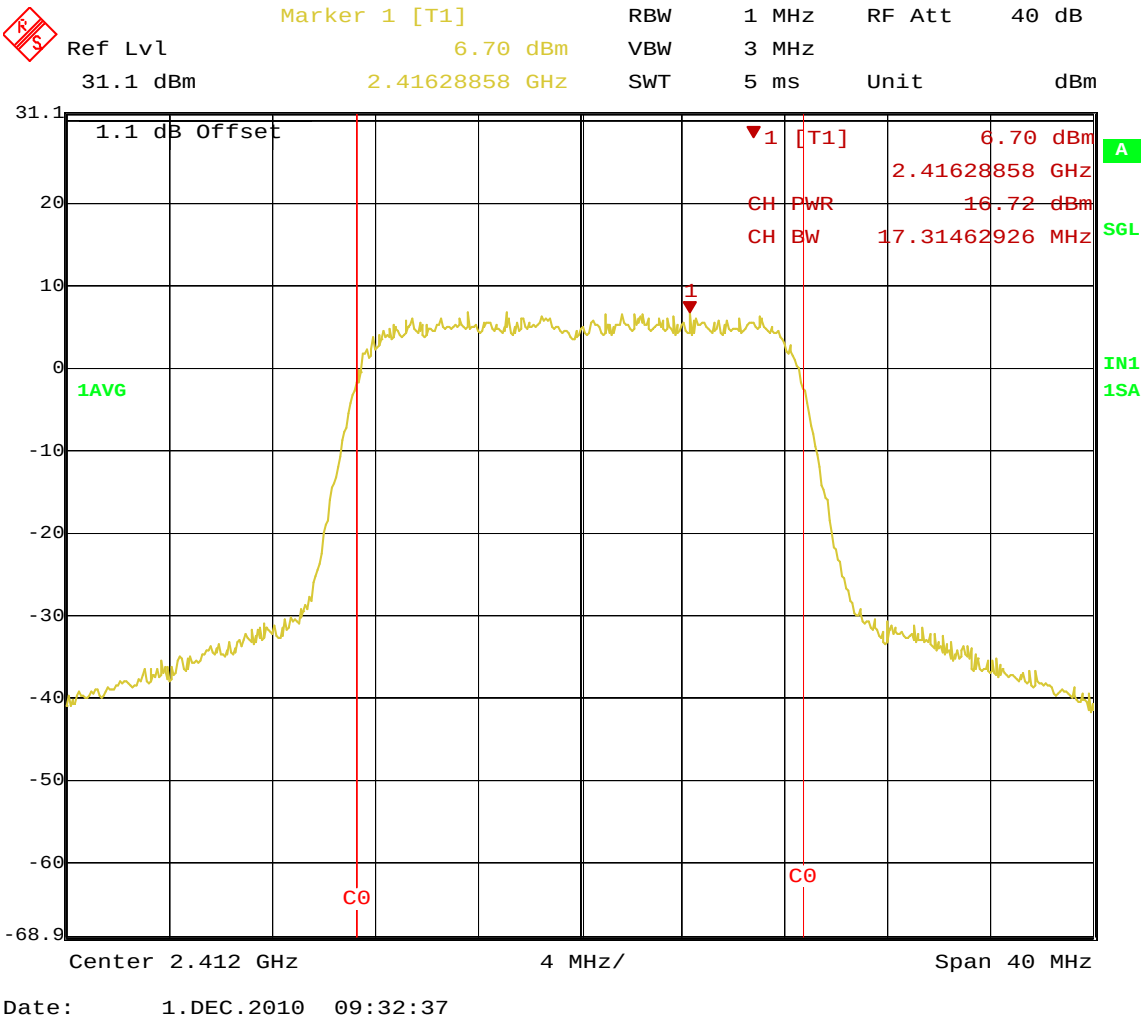


Figure 4: Maximum Transmitted Power, Lowest Channel 2412 MHz of 802.11g

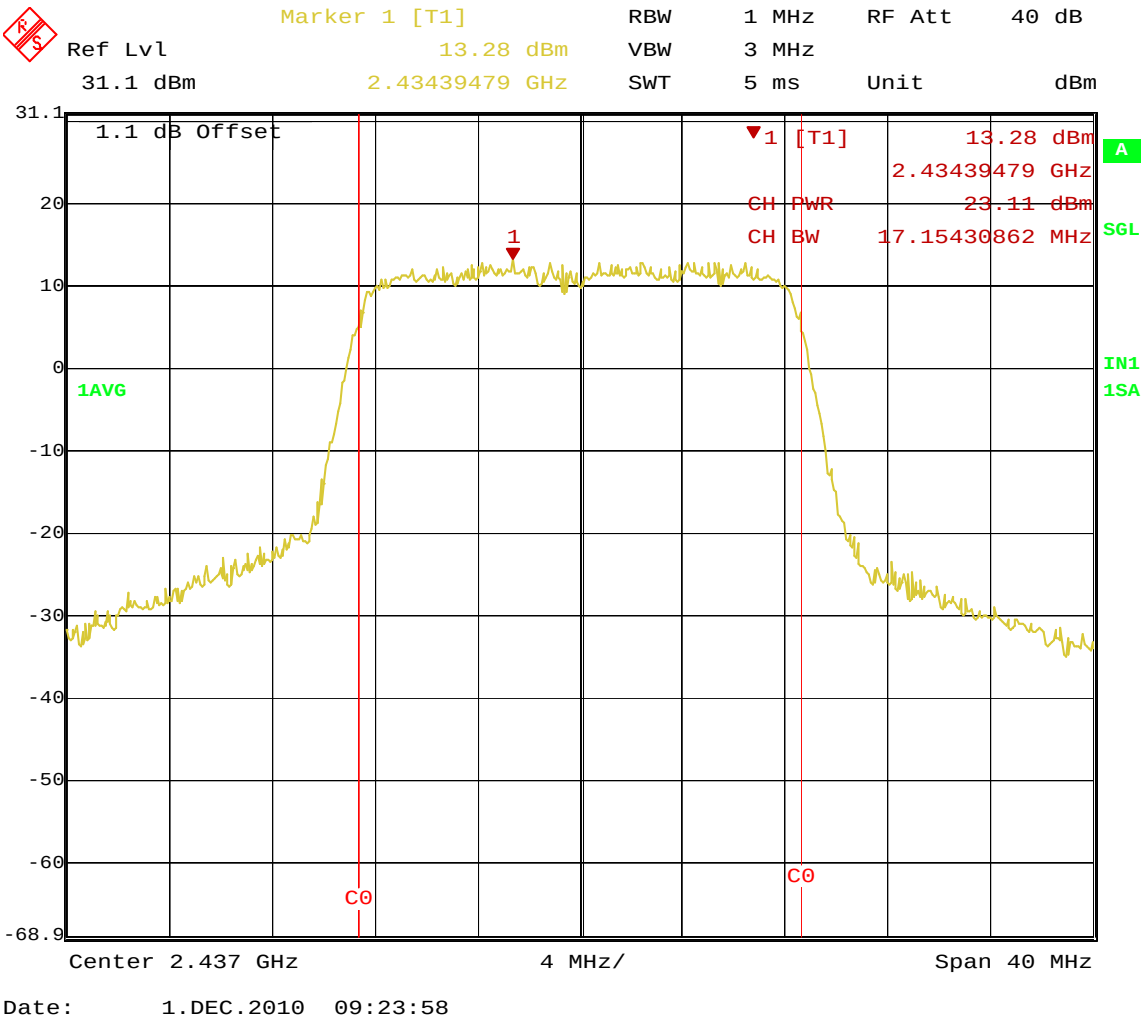


Figure 5: Maximum Transmitted Power, Middle Channel 2437 MHz of 802.11g

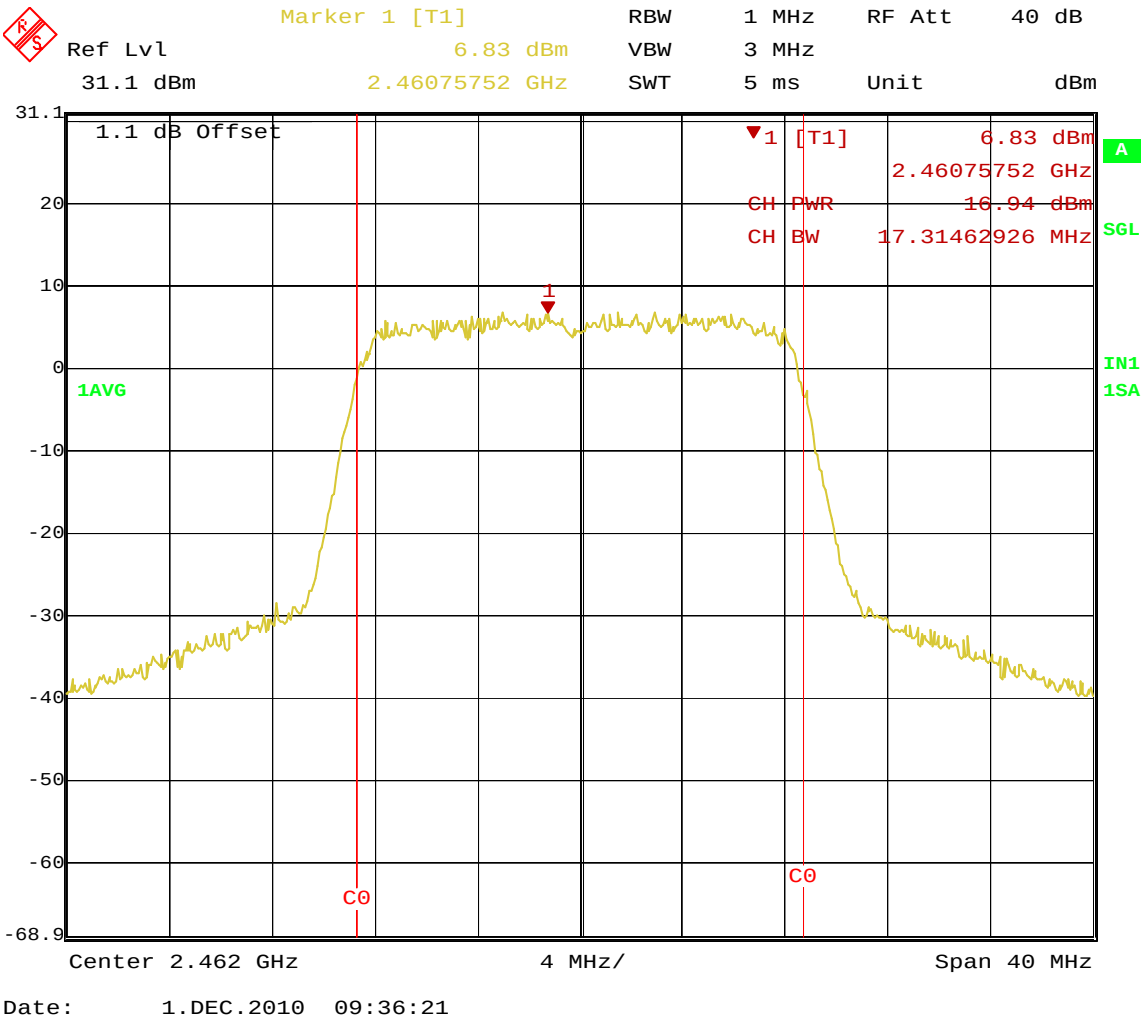


Figure 6: Maximum Transmitted Power, Highest Channel 2462 MHz of 802.11g

4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

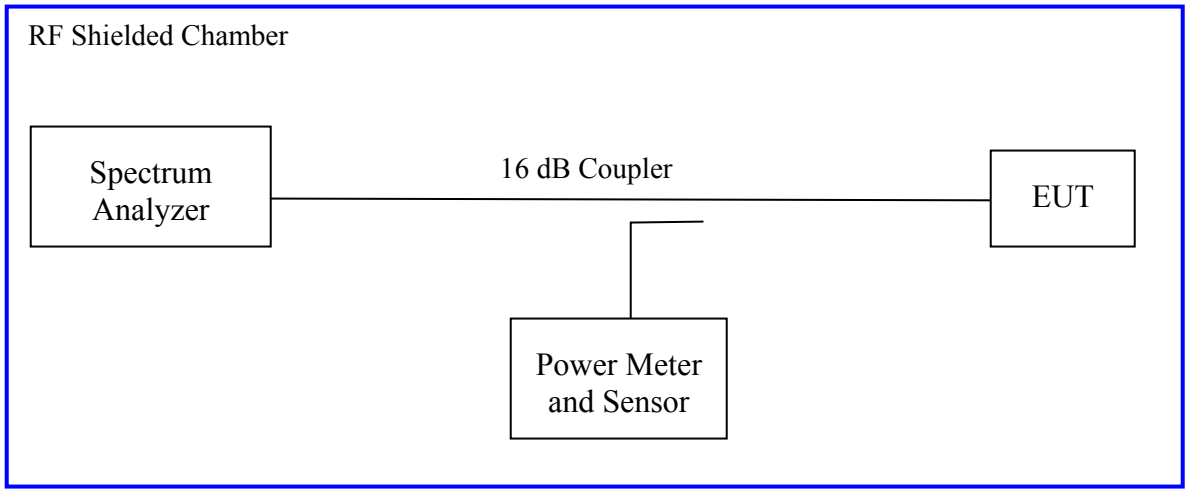
The 6 dB bandwidth is defined the bandwidth of 6 dBr from highest transmitted level of the fundamental frequency.

The bandwidth shall be at least 500 kHz per Section CFR47 15.247(a2) 2009 and RSS Gen Sect. 4.4.1: 2007.

4.2.1 Test Method

The conducted method was used to measure the channel power output. The measurement was performed with modulation per CFR47 15.247(a2) 2009 and RSS Gen Sect. 4.4.1:2007. This test was conducted on 3 channels of Sample, S/N 461029006839. The worst sample result indicated below.

Test Setup:



4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 4: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Integrated		**Power Setting:** +20 dBm @ Ch1& Ch11, +26 dBm @ Ch6		
Max. Antenna Gain: 2.31 dBi		**Signal State:** Modulated		
Ambient Temp.: 21° C		**Relative Humidity:**22%		
99% Bandwidth (MHz)				
Operating Channel	**Limit**	**802.11b @ 11Mbps**	**802.11g @ 54Mbps**	**Results**
2412 MHz	Na	15.39078156	16.67334669	Na
2437 MHz	Na	15.35070140	16.71347685	Na
2462 MHz	Na	15.43086172	16.67334669	Na
6 dB Bandwidth (MHz)				
Operating Channel	**Limit**	**802.11b @ 1Mbps**	**802.11g @ 6Mbps**	**Results**
2412 MHz	500 kHz	12.18436874	16.43286573	Pass
2437 MHz	500 kHz	12.22444890	16.43286573	Pass
2462 MHz	500 kHz	12.18436874	16.39278557	Pass

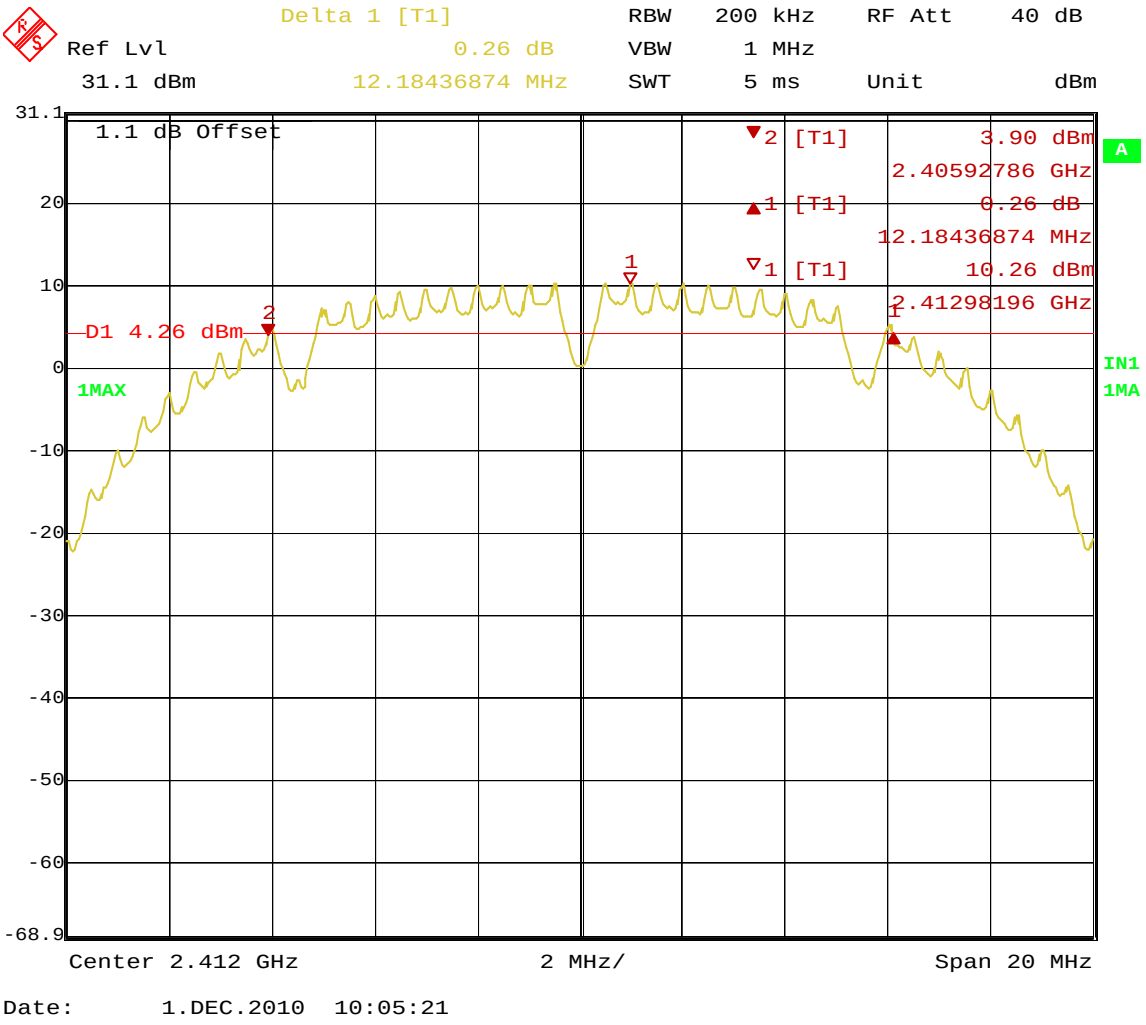


Figure 7: 6 dB Bandwidth at 1 Mbit/s – Operating Channel 2412 MHz

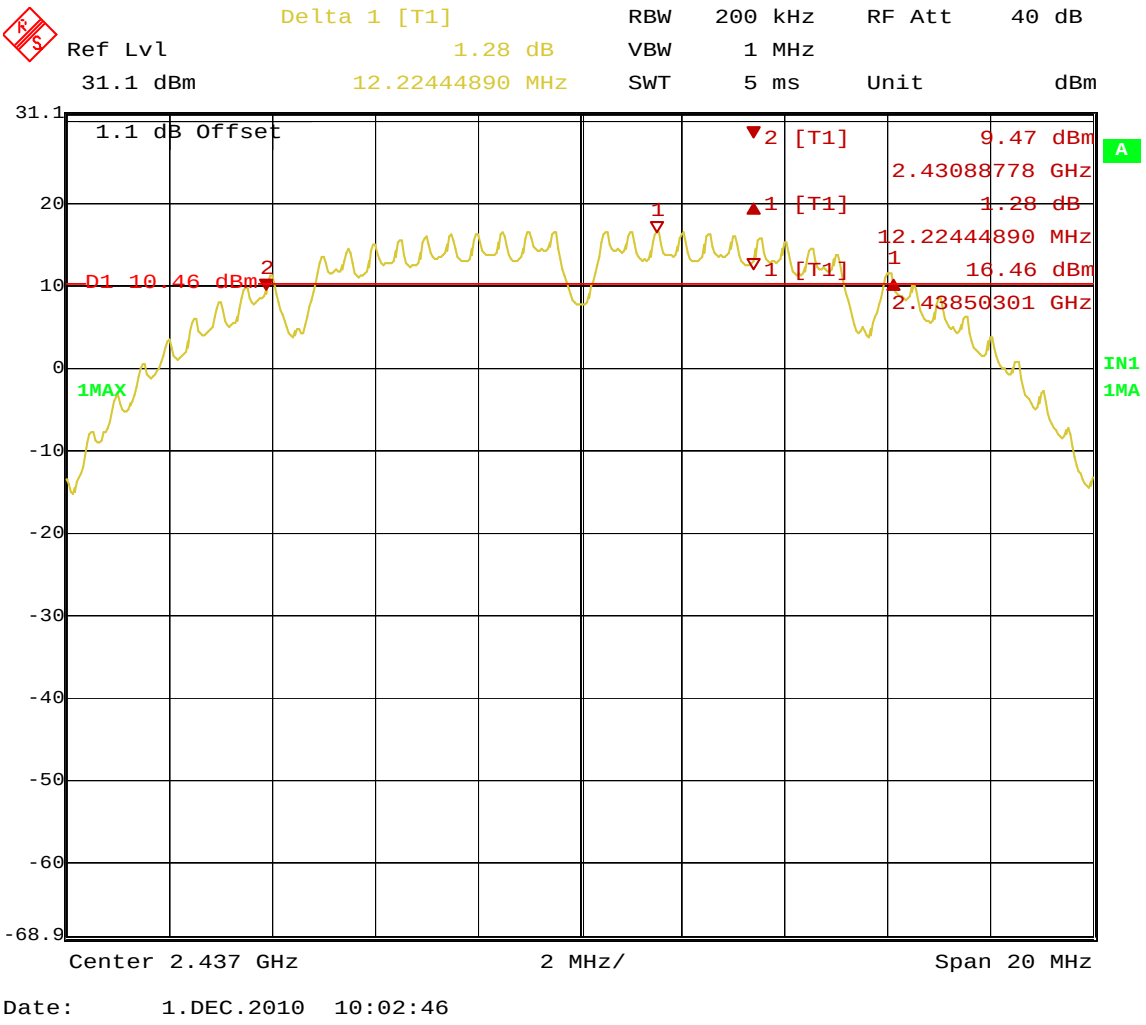


Figure 8: 6 dB Bandwidth at 1 Mbit/s – Operating Channel 2437 MHz

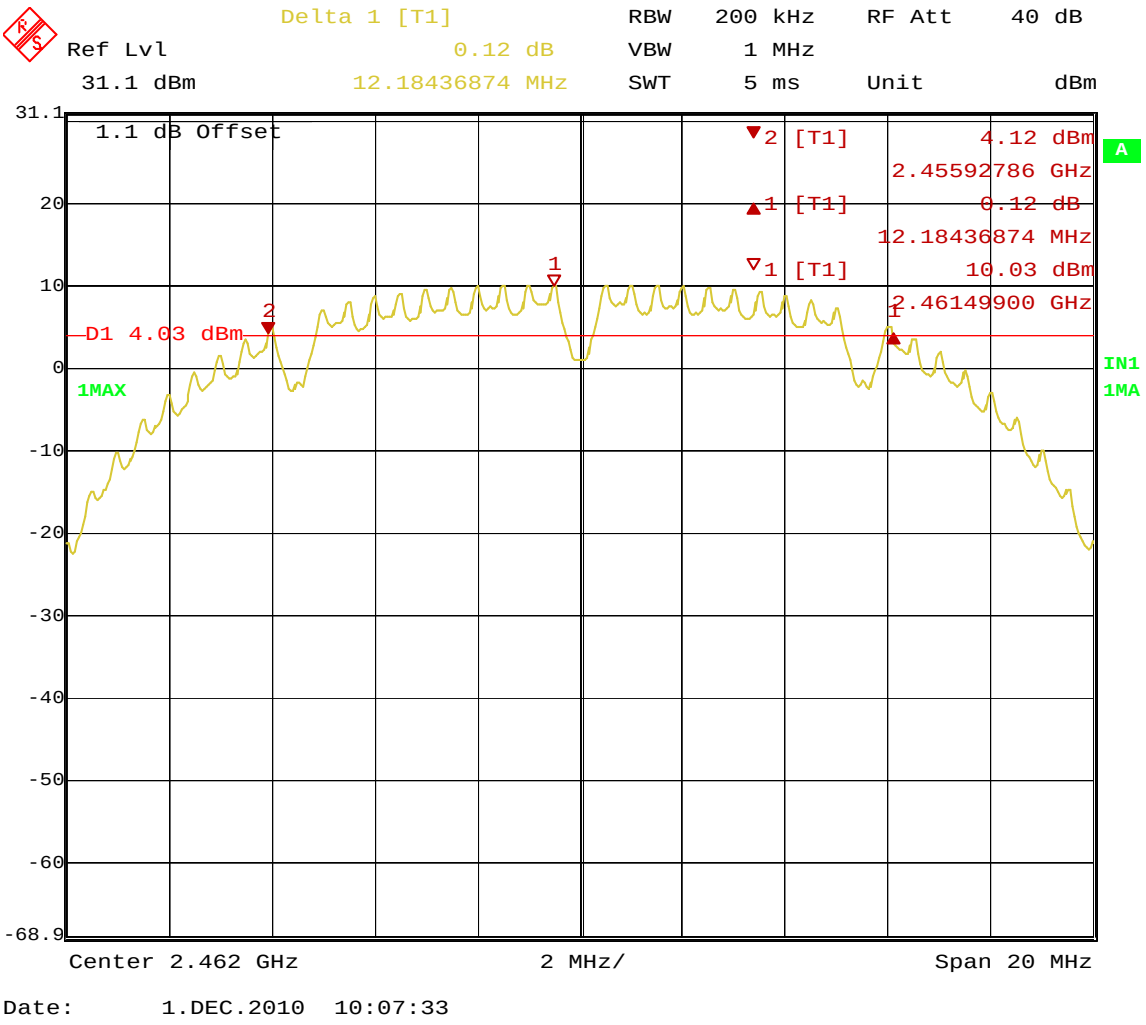


Figure 9: 6 dB Bandwidth at 1 Mbit/s – Operating Channel 2462 MHz

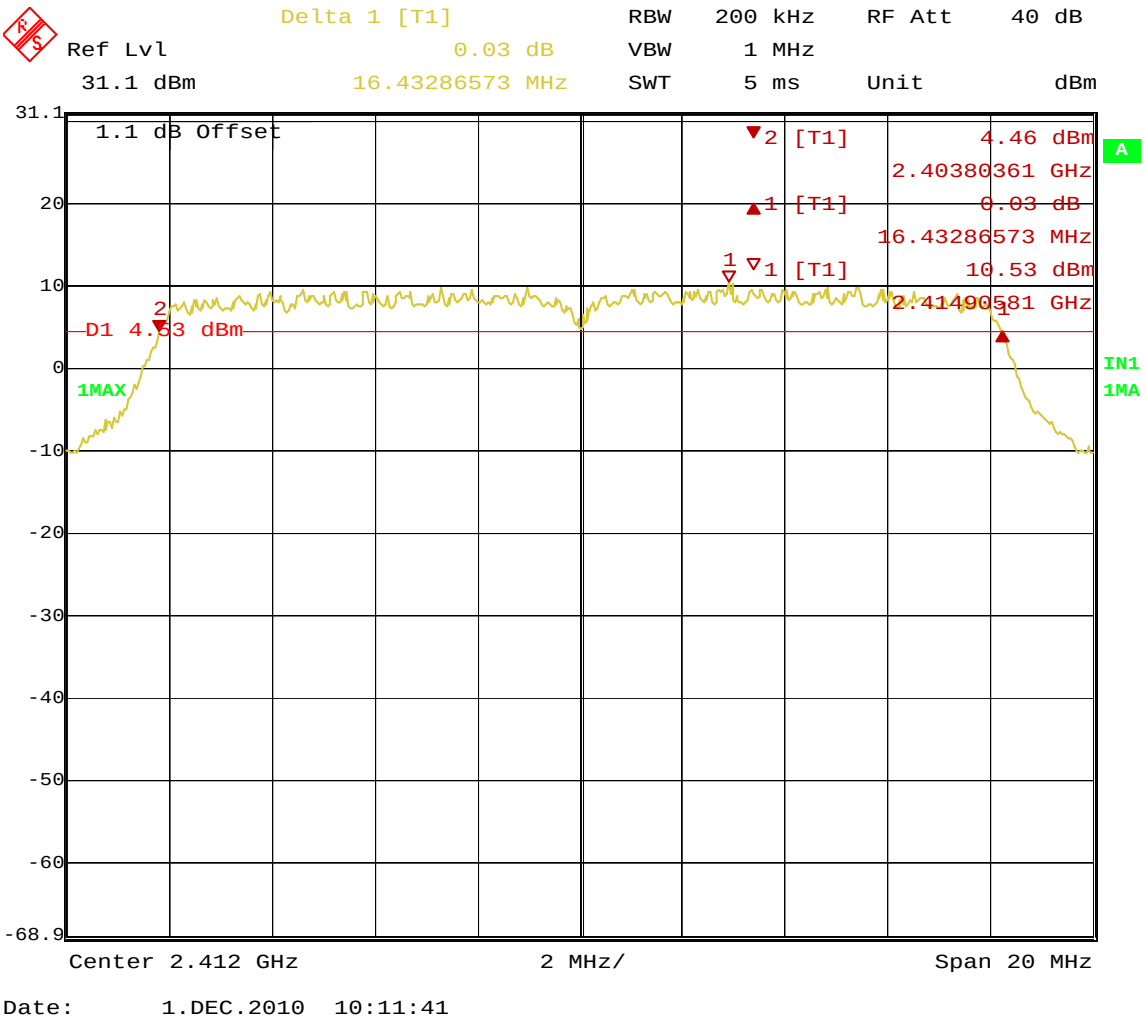


Figure 10: 6 dB Bandwidth at 6 Mbit/s – Operating Channel 2412 MHz

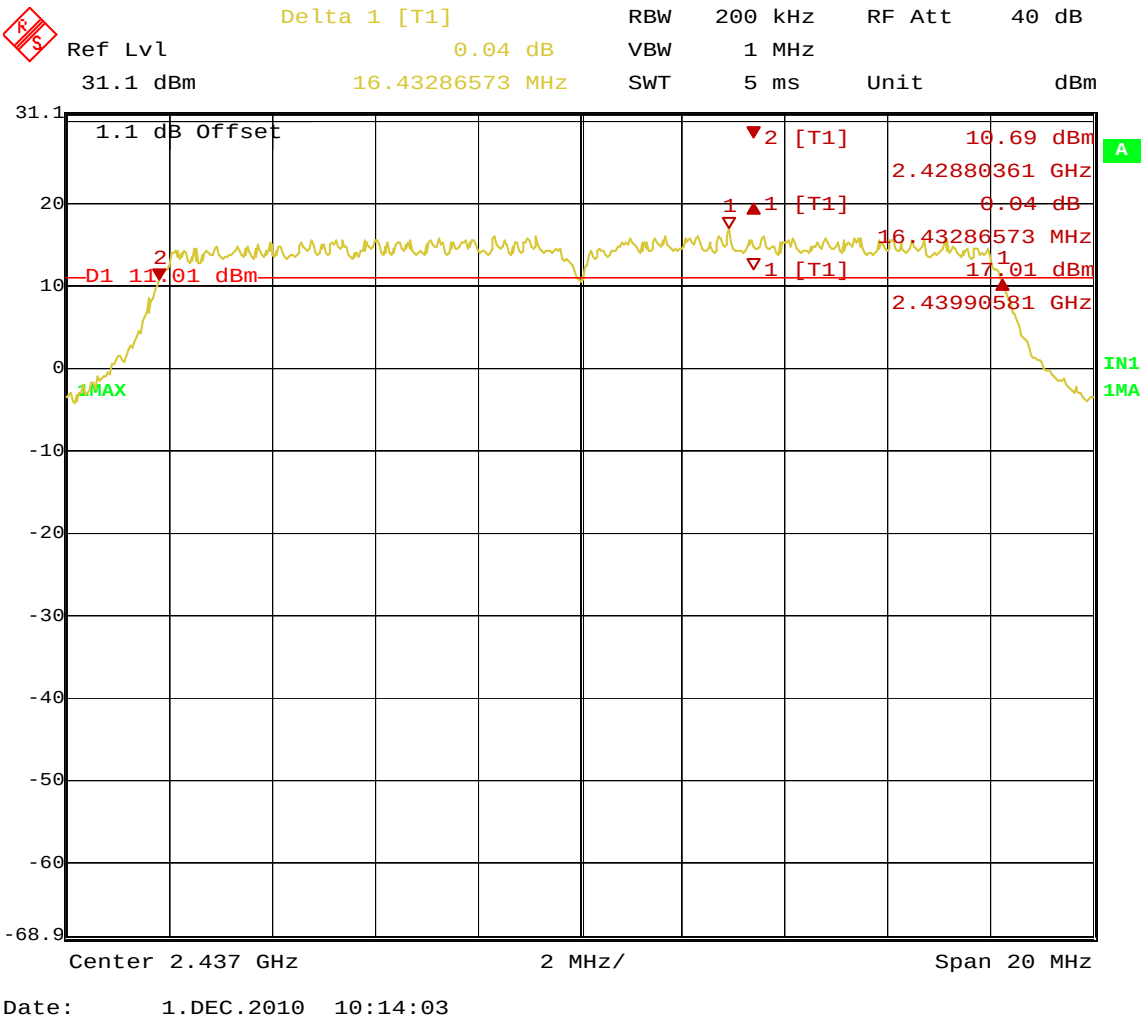


Figure 11: 6 dB Bandwidth at 6 Mbit/s – Operating Channel 2437 MHz

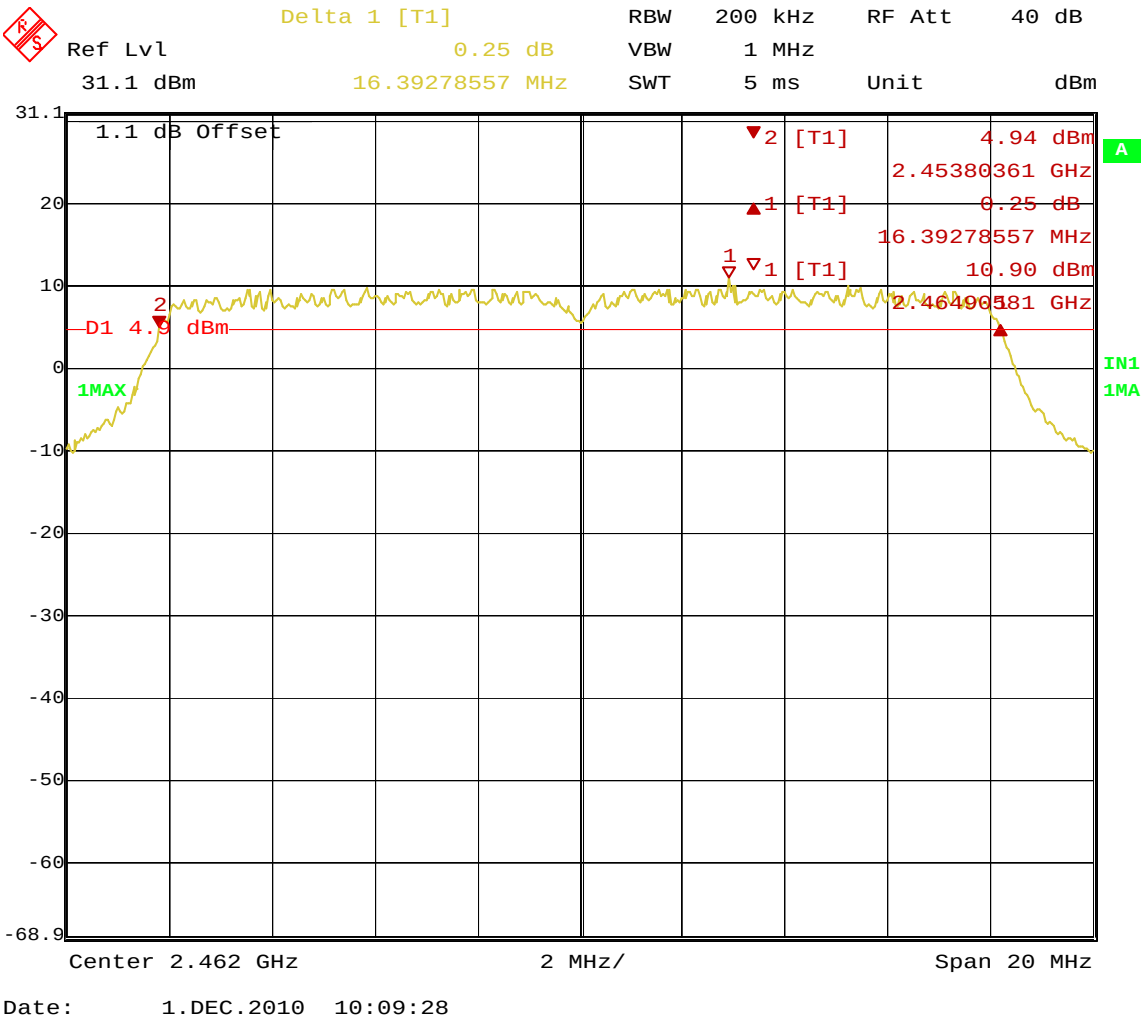


Figure 12: 6 dB Bandwidth at 6 Mbit/s – Operating Channel 2462 MHz

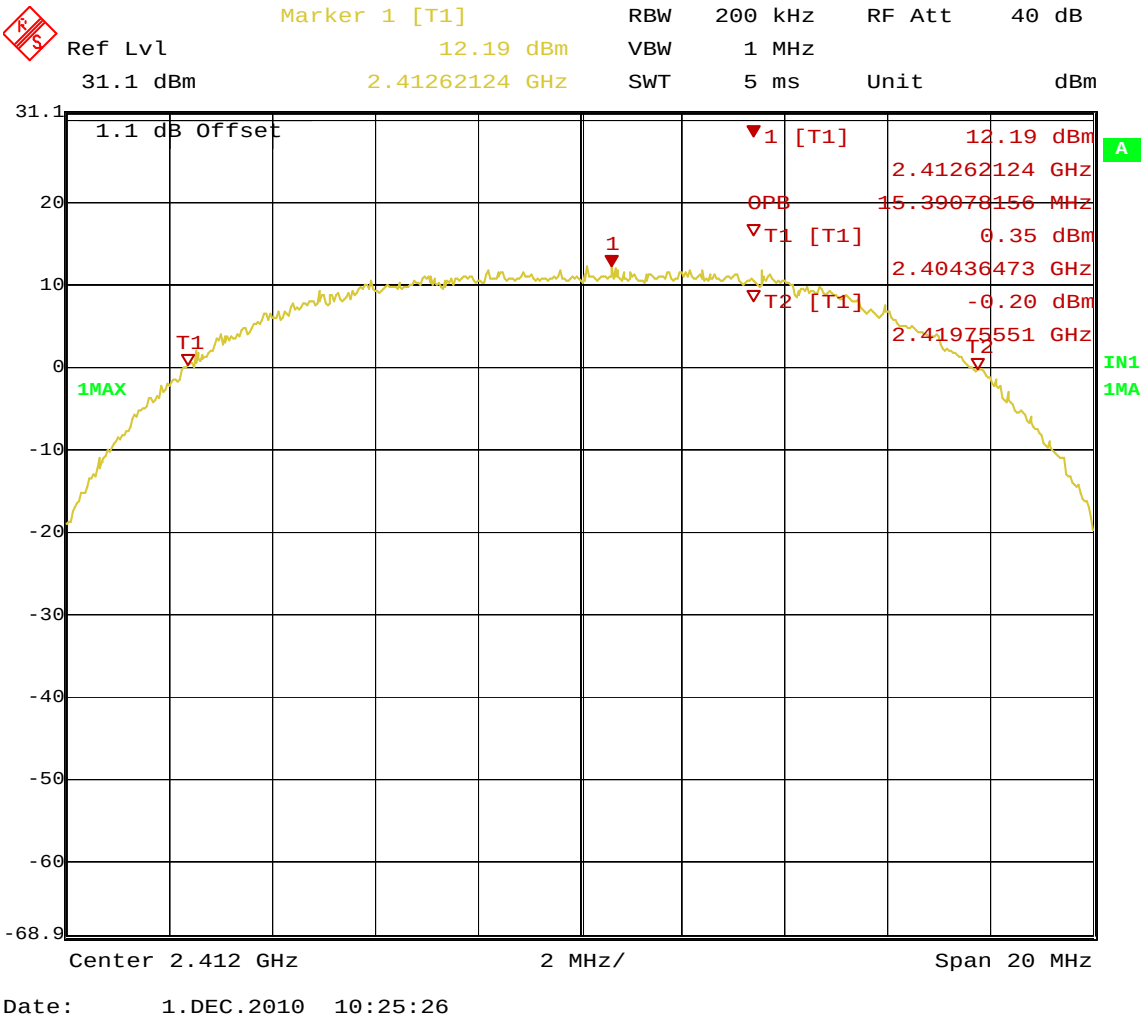


Figure 13: 99% Bandwidth at 11 Mbit/s – Operating Channel 2412 MHz

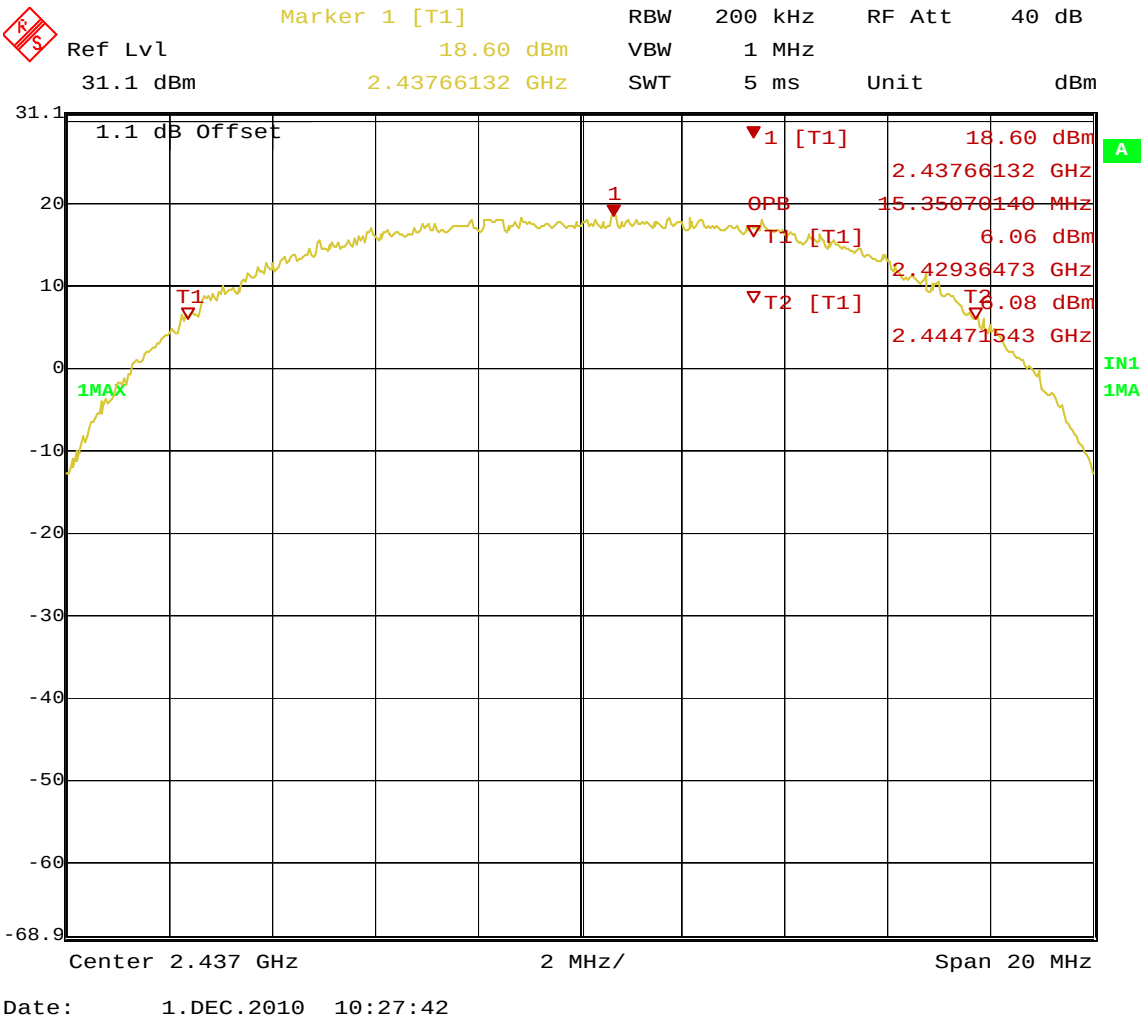


Figure 14: 99% Bandwidth at 11 Mbit/s – Operating Channel 2437 MHz

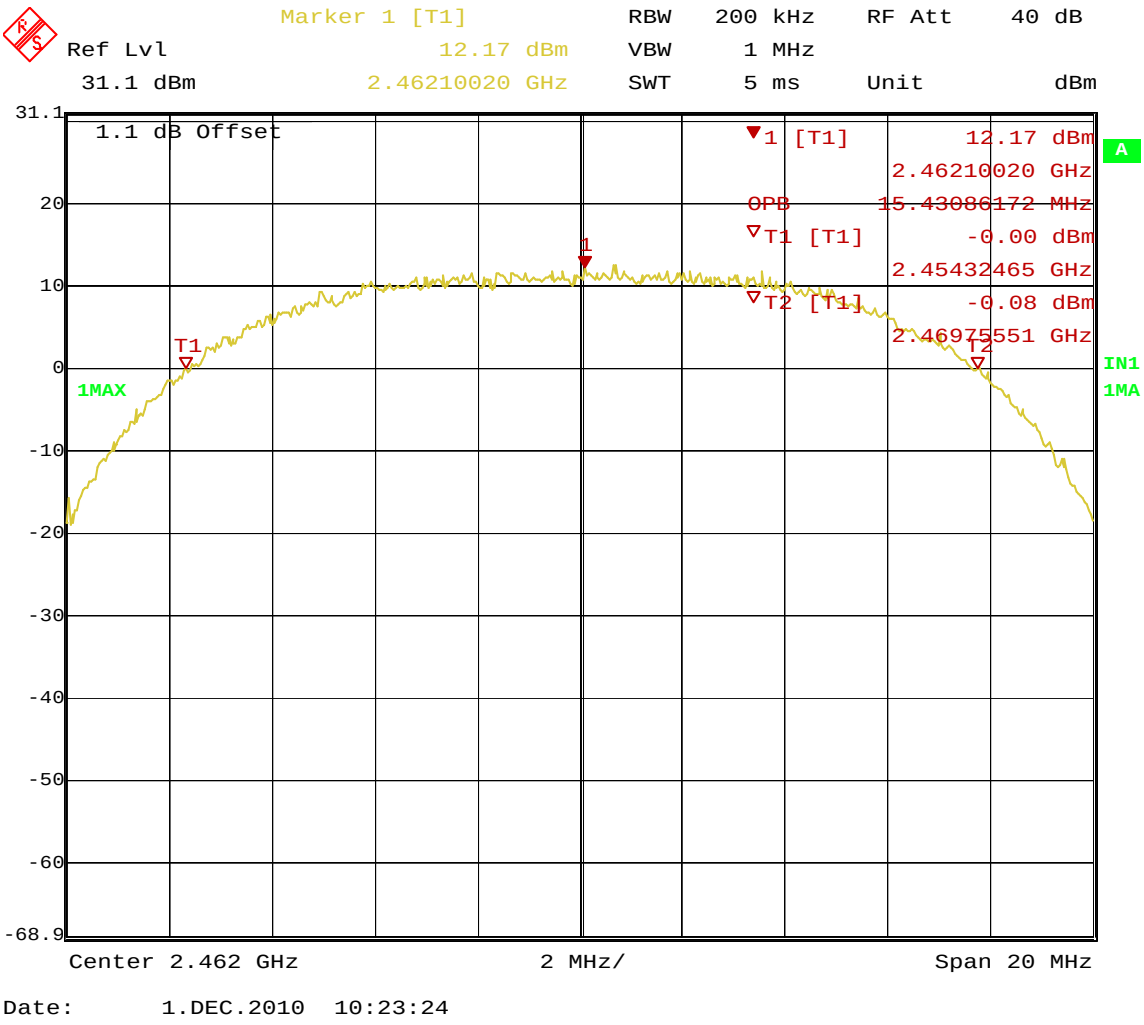


Figure 15: 99% Bandwidth at 11 Mbit/s – Operating Channel 2462 MHz

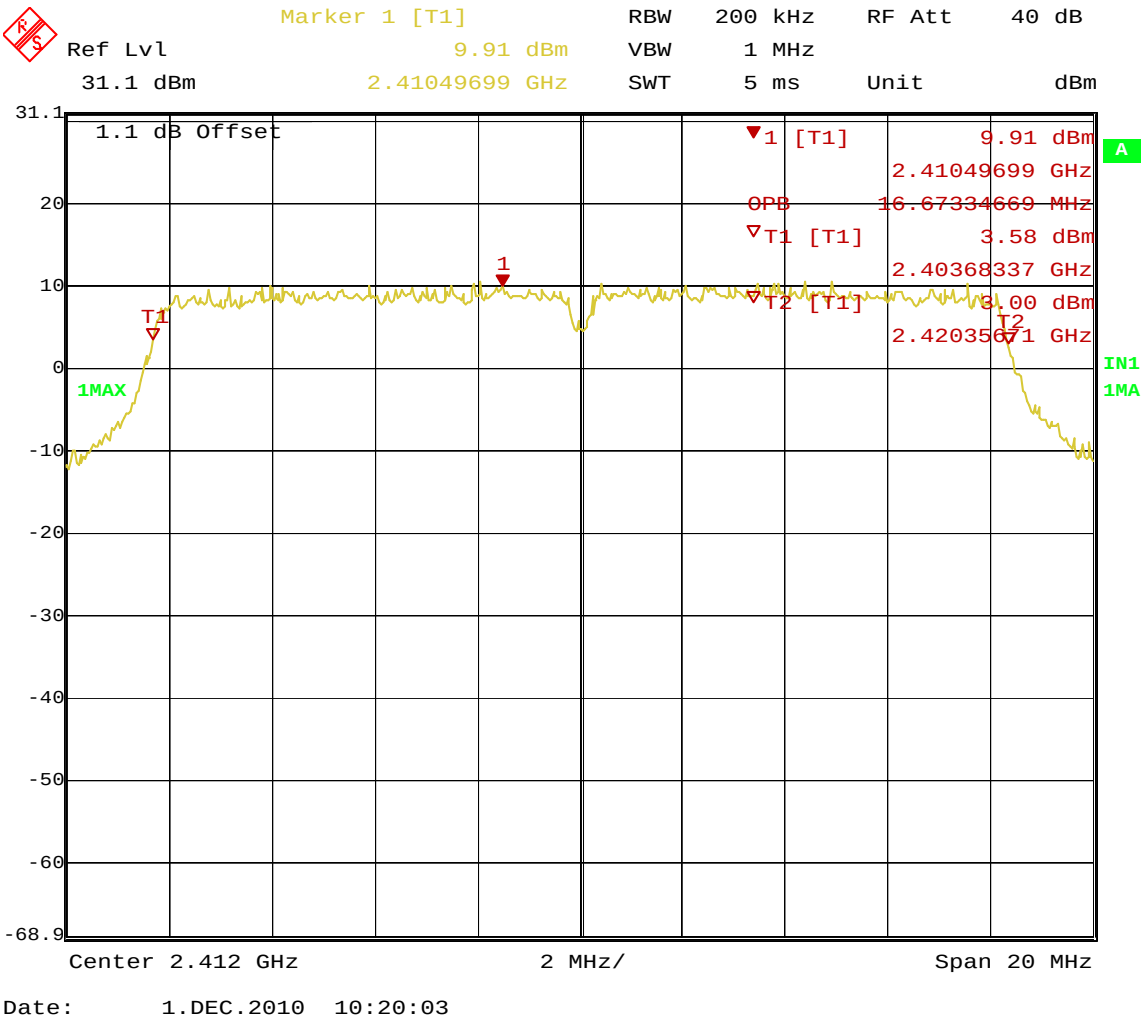


Figure 16: 99% Bandwidth at 54 Mbit/s – Operating Channel 2412 MHz

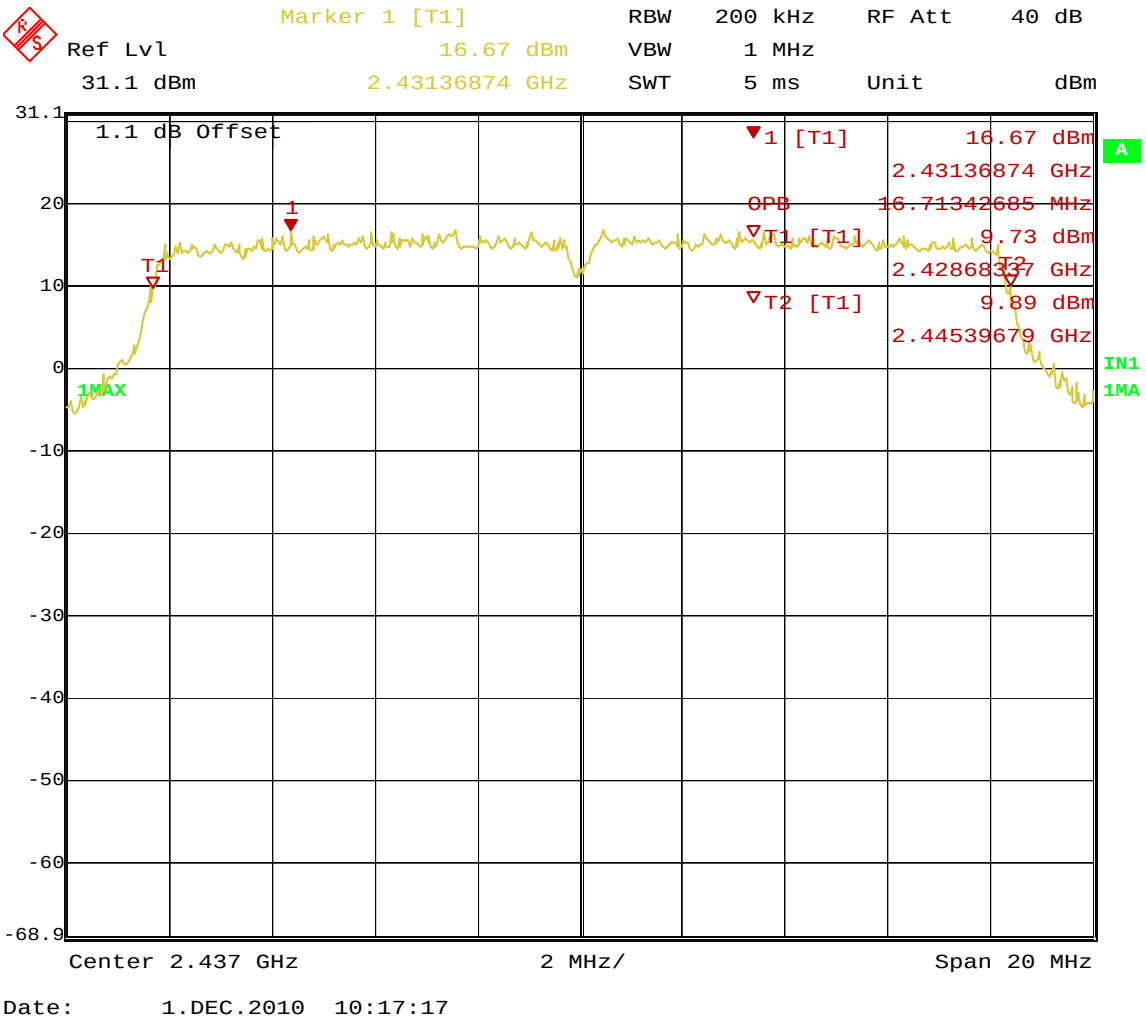


Figure 17: 99% Bandwidth at 54 Mbit/s – Operating Channel 2437 MHz

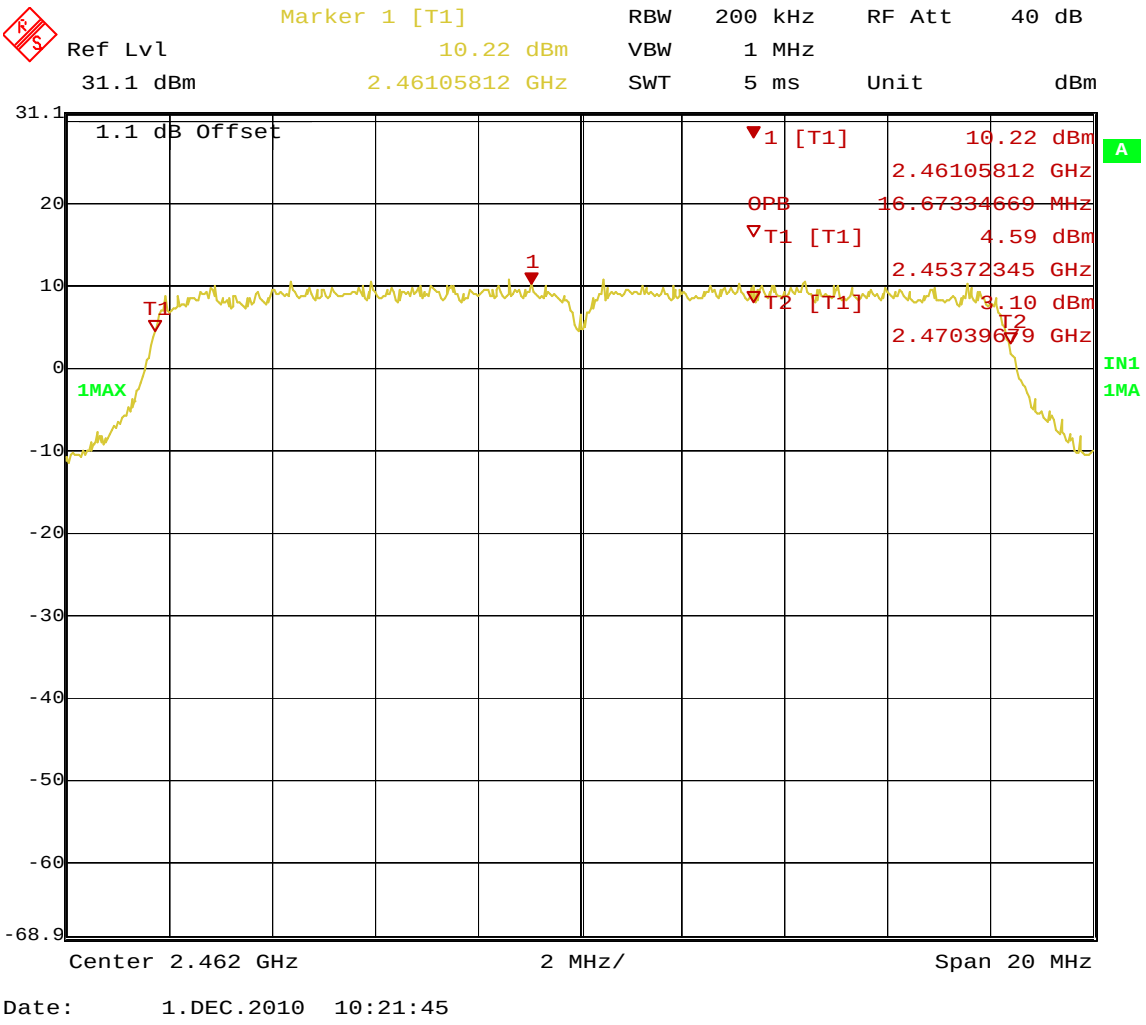


Figure 18: 99% Bandwidth at 54 Mbit/s – Operating Channel 2462 MHz

4.3 Maximum Permissible Exposure

4.3.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this product is measured in a Semi-Anechoic Chamber, and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

4.3.2 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
300-1500	…	…	F/300	6
1500-100,000	…	…	5	6
(B)Limits For General Population / Uncontrolled Exposure				
300-1500	…	…	F/1500	6
1500-100,000	…	…	1.0	30

F = Frequency in MHz

4.3.3 EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

4.3.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in users manual. So, this device is classified as a **Mobile Device**.

4.3.5 Test Results

4.3.5.1 Antenna Gain

The transmitting antenna was integrated. The antenna gain was +2.31 dBi or 1.70 (numeric).

4.3.5.2 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement.

Limit for MPE (from FCC part 1.1310 table1) is 1.0 mW/cm^2

The highest measured channel output power is +24.35 dBm or 272.27 mW

Using the Friss transmission formula, the EIRP is Pout*G, and R is 20cm.

Pd = (272.27*1.70) / (1600π) = 0.0921mW/cm2, which is 0.9078 mW/cm2 below to the limit.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

4.3.6 Sample Calculation

The Friis transmission formula: $Pd = (Pout*G) / (4*\pi*R^2)$

Where;

Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
$\pi \approx 3.1416$
R = distance between observation point and center of the radiator in cm

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).

4.4 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS 210 Sect. A.8.5

4.4.1 Test Methodology

4.4.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

The preliminary tests performed for both 802.11b and g modes at different data rate and positions. The worst mode was 802.11b at 1 Mbps on horizontal position.

4.4.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final scans performed for three operating channels; 2412 MHz, 2437 MHz, and 2462 MHz at 1 Mbps on horizontal position.

The plots were captured to show the Band Edge of the fundamental signal meeting the spurious emission limit at the restricted bands. The worst case was observed at 6 Mbit/s of 802.11g mode when EUT positioned horizontally.

4.4.1.3 Deviations

None.

4.4.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2008 and RSS 210 A1.1.2 2007.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

All harmonics and spurious emission which are outside of the restricted band shall be 20 dB below the in-band emission.

4.4.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

Out of band emissions were also at least 20 dB below the in-band emission for the unrestricted band.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 5: Transmit Spurious Emission at Band Edge Requirements – Test Results

Test Conditions: Radiated Measurement, Normal Temperature and Voltage only							
Antenna Type: Integrated			**Power Setting:** +20 dBm @ Ch1& Ch11, +26 dBm @ Ch6				
Signal State: Modulated			**Data Rate:** 6 Mbps				
Ambient Temp.: 23° C			**Relative Humidity:**33%				
Band Edge Results							
Operating Channel	**EUT Position**	**Polarity**	**Pk Plots**	**Peak Limit**	**Ave. Plots**	**Ave. Limit**	**Result**
2412 MHz	Horizontal	Horizontal	#19	74.00	#20	54.00	Pass
2412 MHz	Horizontal	Vertical	#21	74.00	#22	54.00	Pass
2437 MHz	Horizontal	Horizontal	#23	74.00	#24	54.00	Pass
2437 MHz	Horizontal	Vertical	#25	74.00	#26	54.00	Pass
2462 MHz	Horizontal	Horizontal	#27	74.00	#28	54.00	Pass
2462 MHz	Horizontal	Vertical	#29	74.00	#30	54.00	Pass

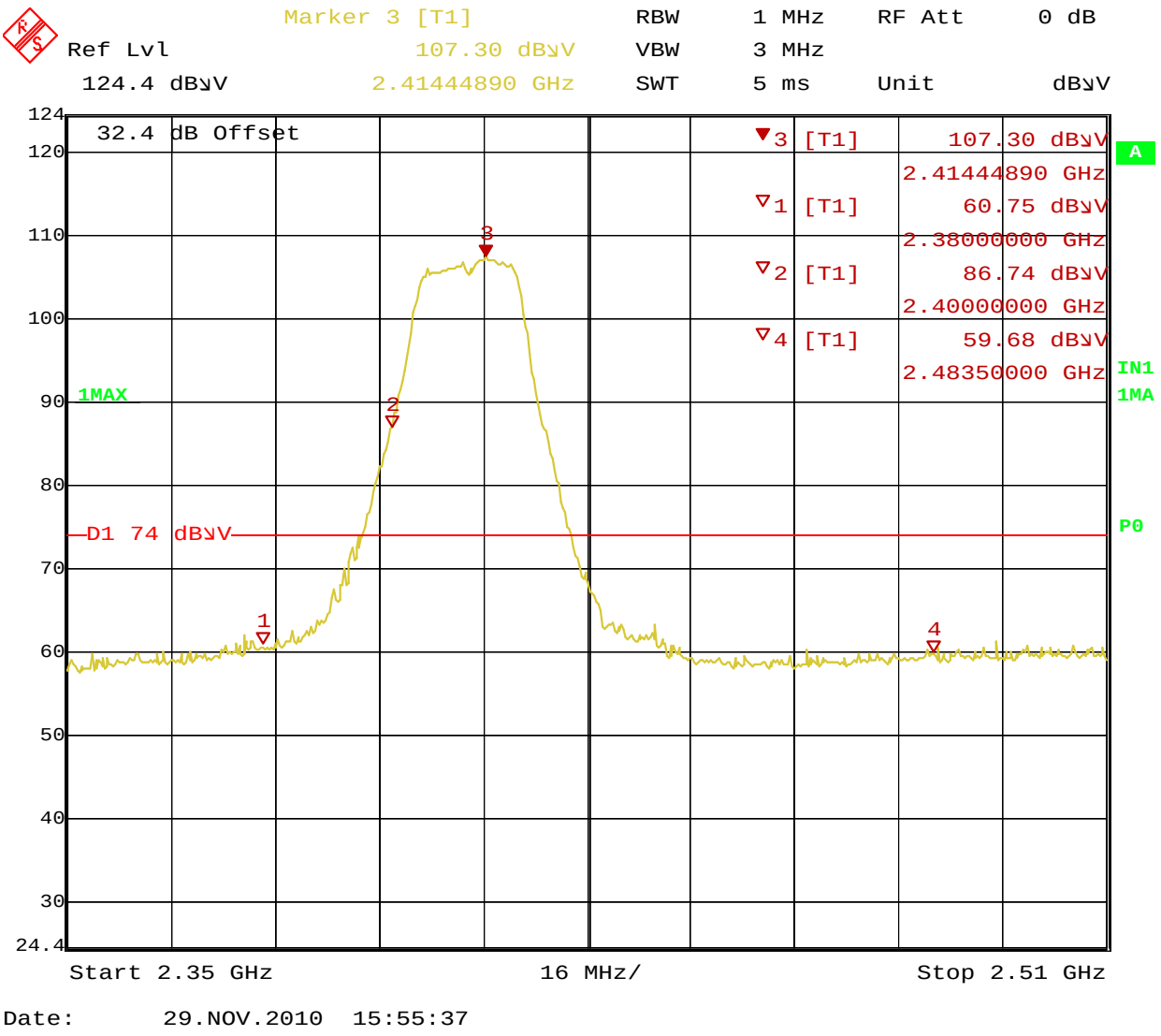


Figure 19: Spurious Emission at the Band Edge for Channel 2412 MHz at 802.11g – Horizontal (Peak)

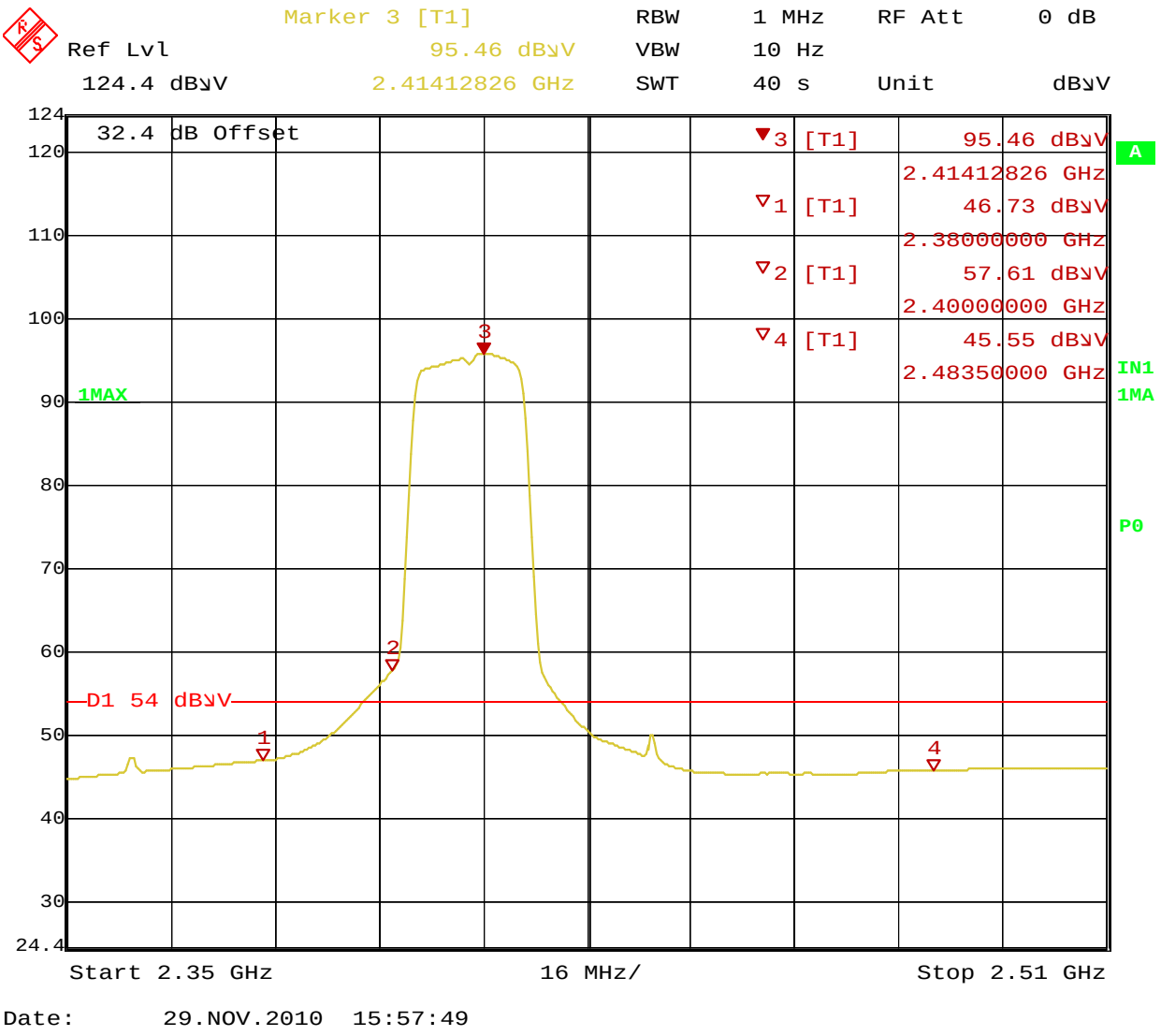


Figure 20: Spurious Emission at the Band Edge for Channel 2412 MHz at 802.11g – Horizontal (Ave.)

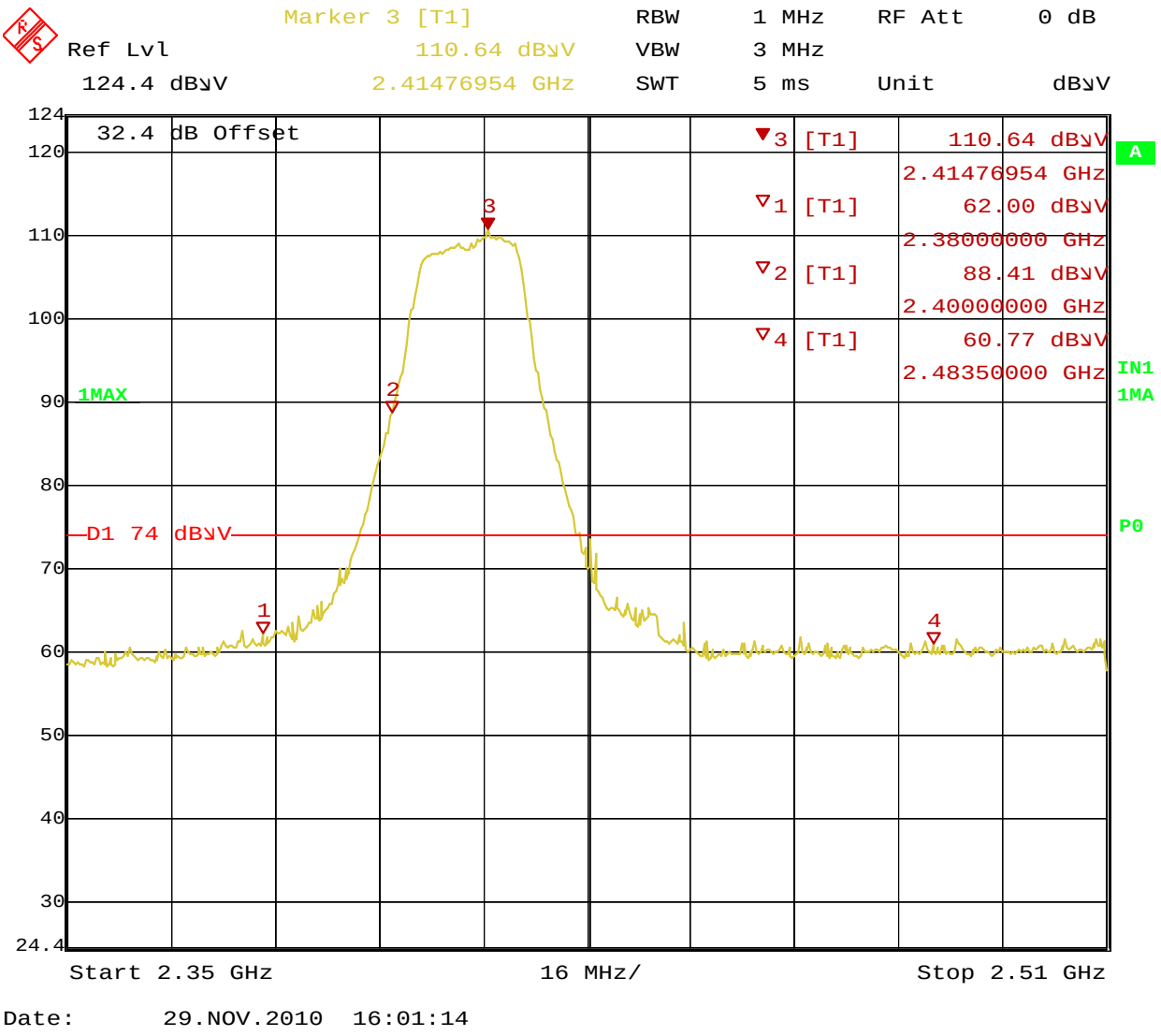


Figure 21: Spurious Emission at the Band Edge for Channel 2412 MHz at 802.11g – Vertical (Peak)

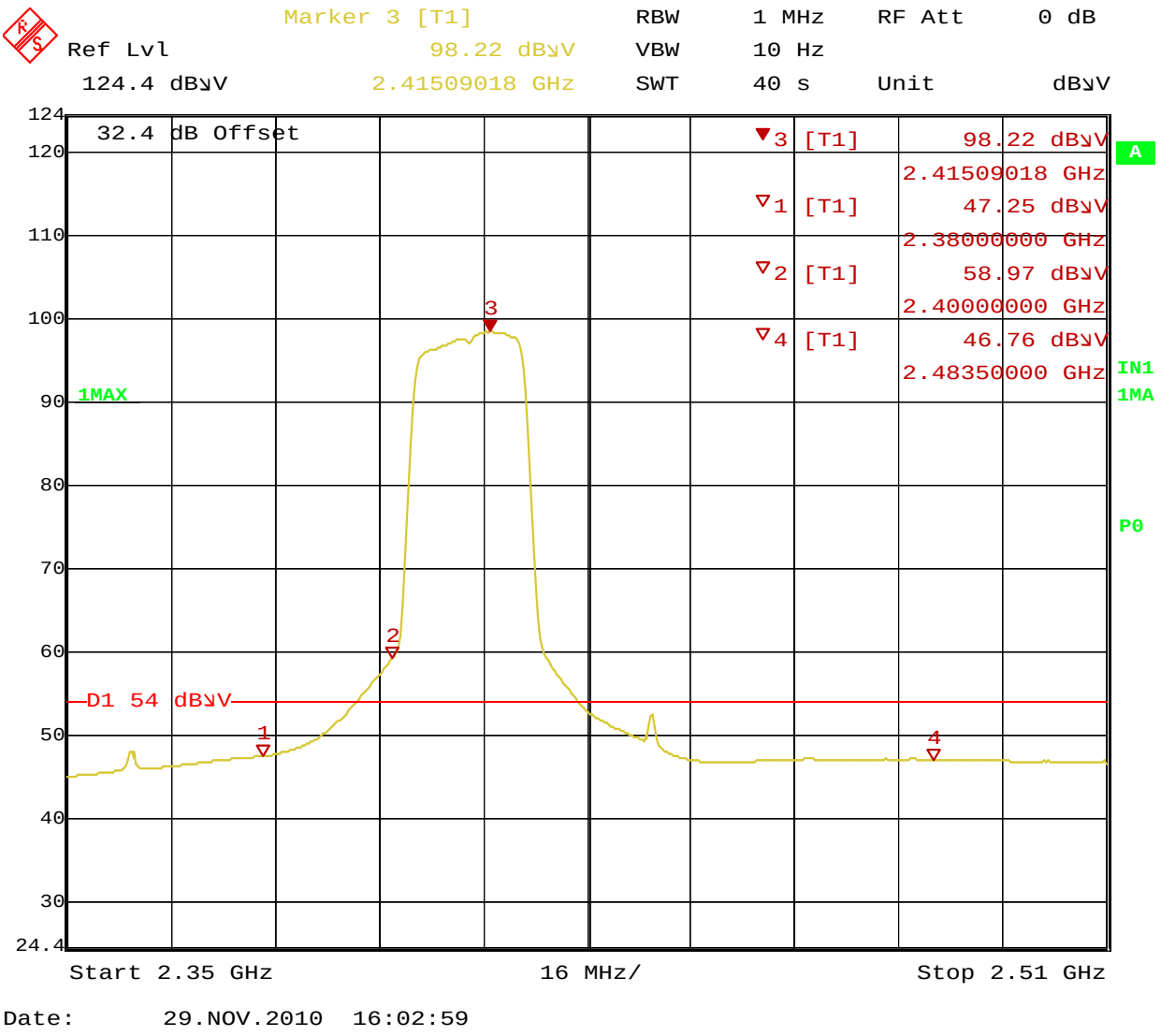


Figure 22: Spurious Emission at the Band Edge for Channel 2412 MHz at 802.11g – Vertical (Ave.)

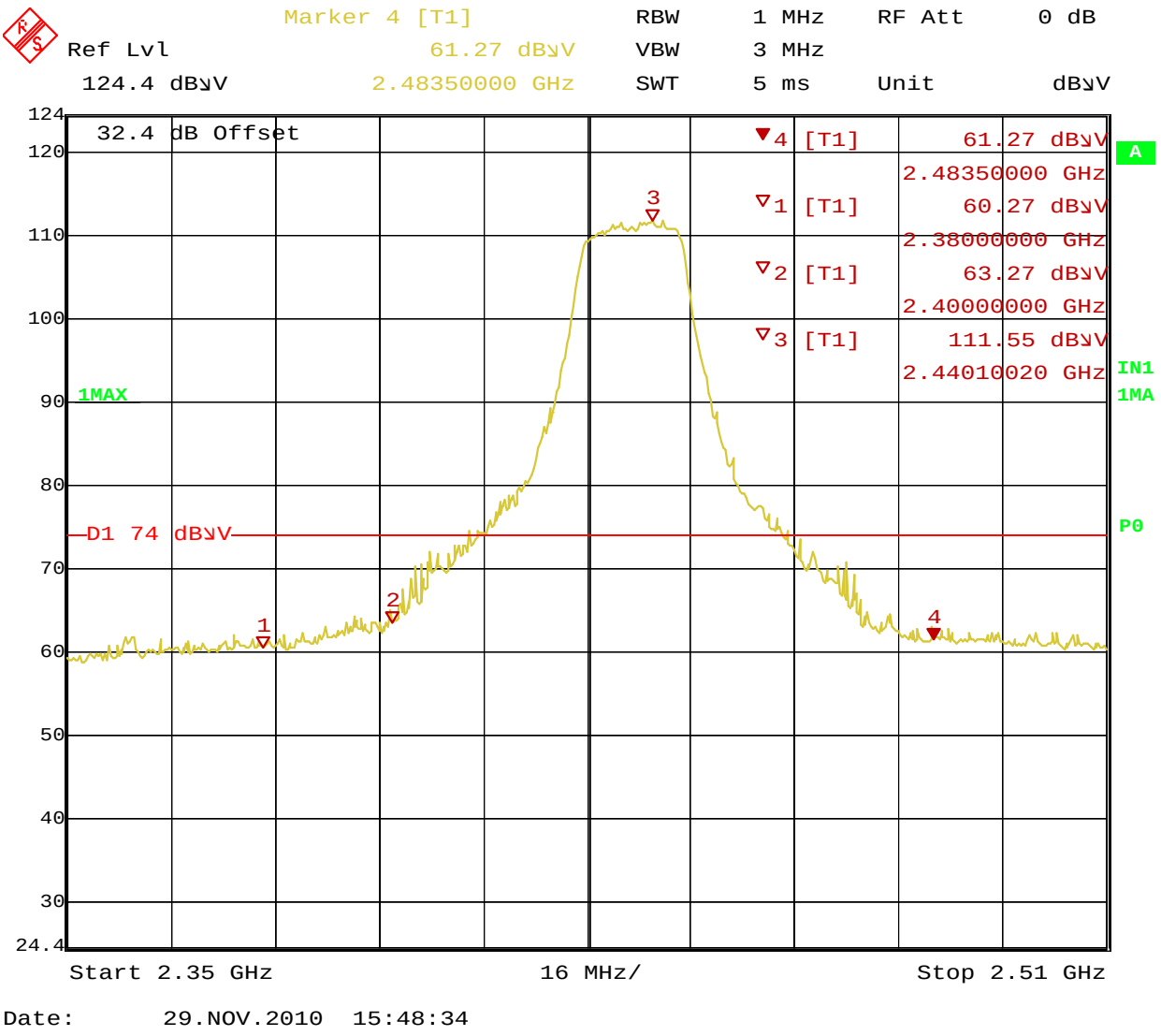


Figure 23: Spurious Emission at the Band Edge for Channel 2437 MHz at 802.11g – Horizontal (Peak)

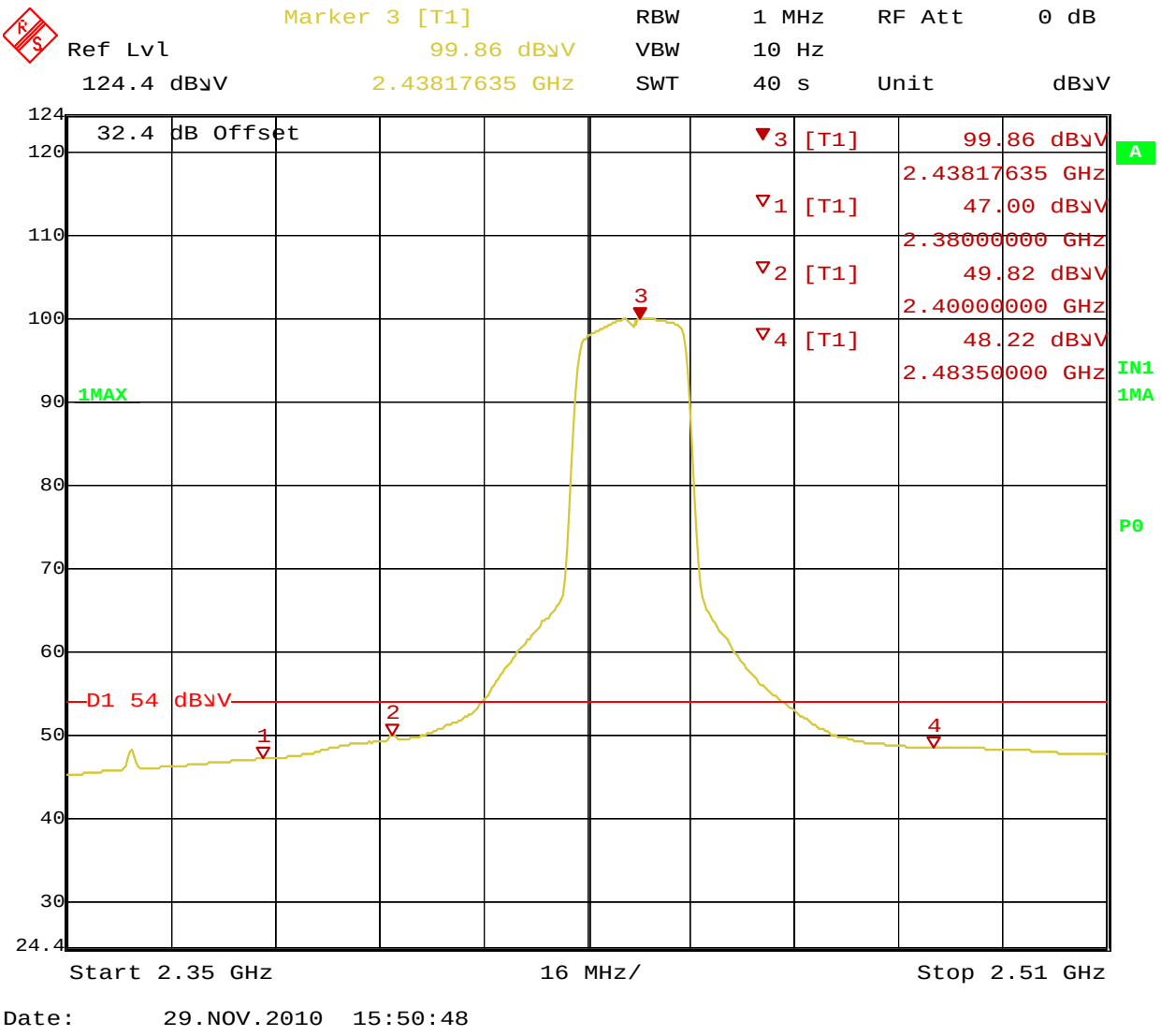


Figure 24: Spurious Emission at the Band Edge for Channel 2437 MHz at 802.11g – Horizontal (Ave.)

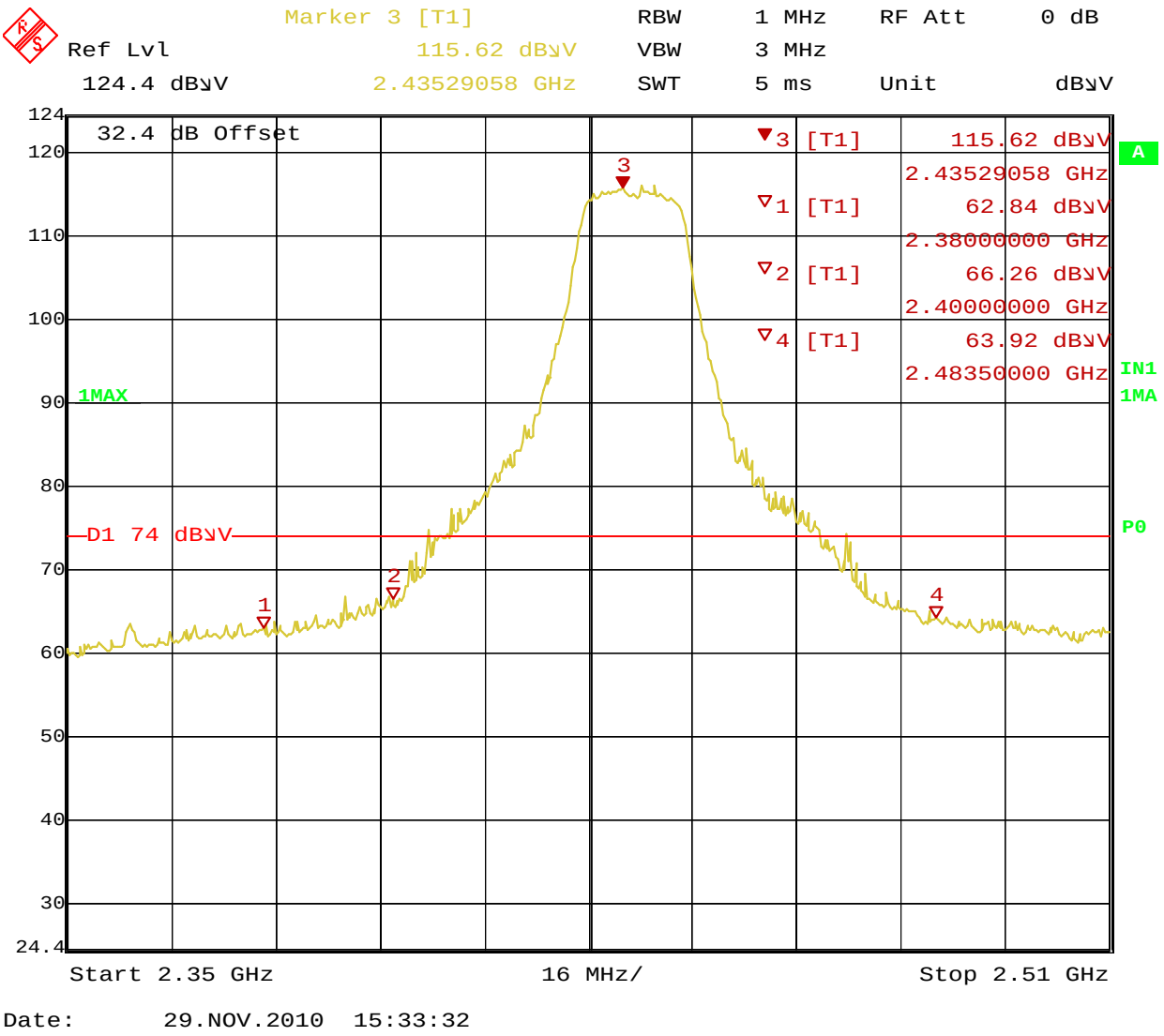


Figure 25: Spurious Emission at the Band Edge for Channel 2437 MHz at 802.11g – Vertical (Peak)

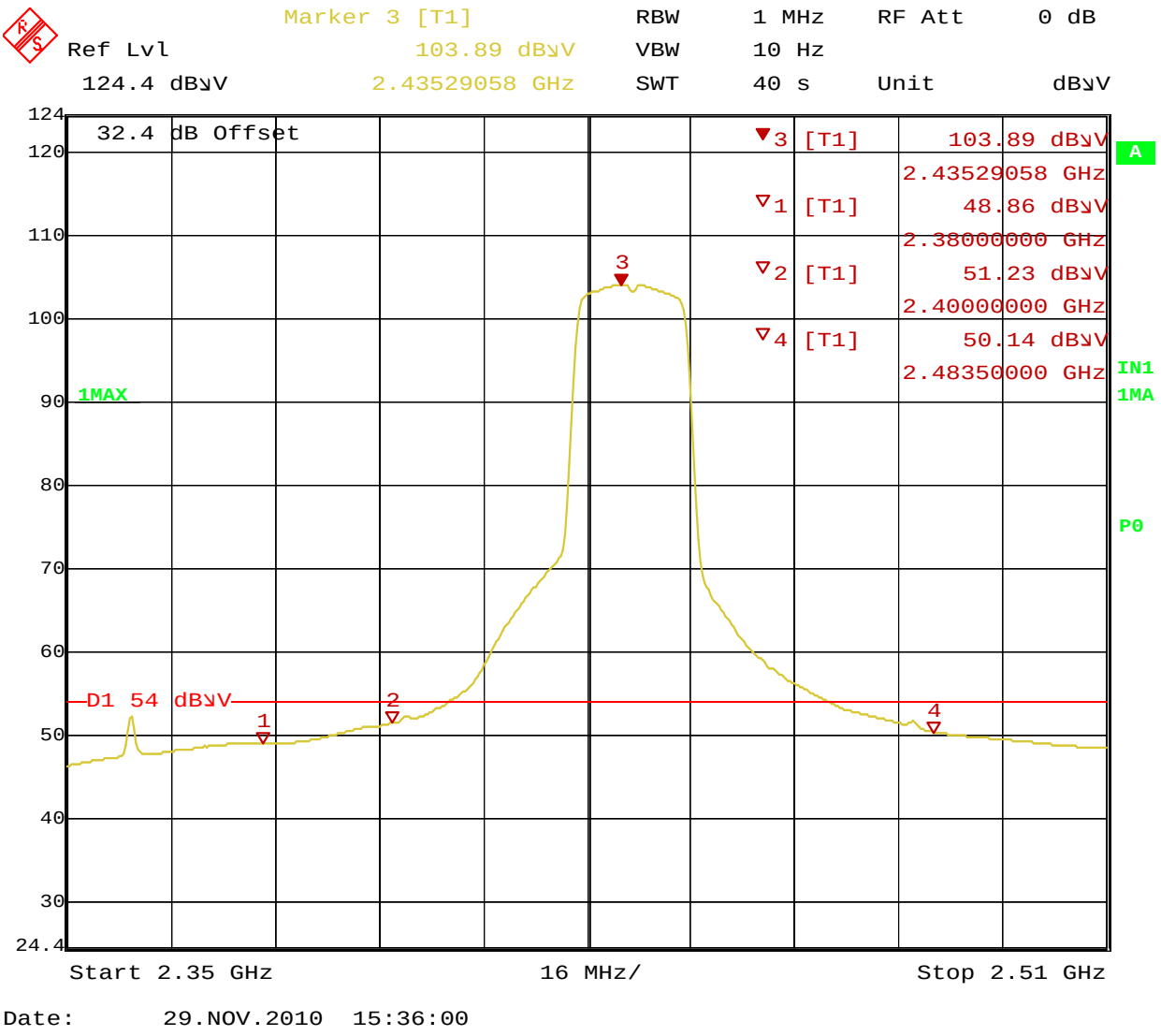


Figure 26: Spurious Emission at the Band Edge for Channel 2437 MHz at 802.11g – Vertical (Ave.)

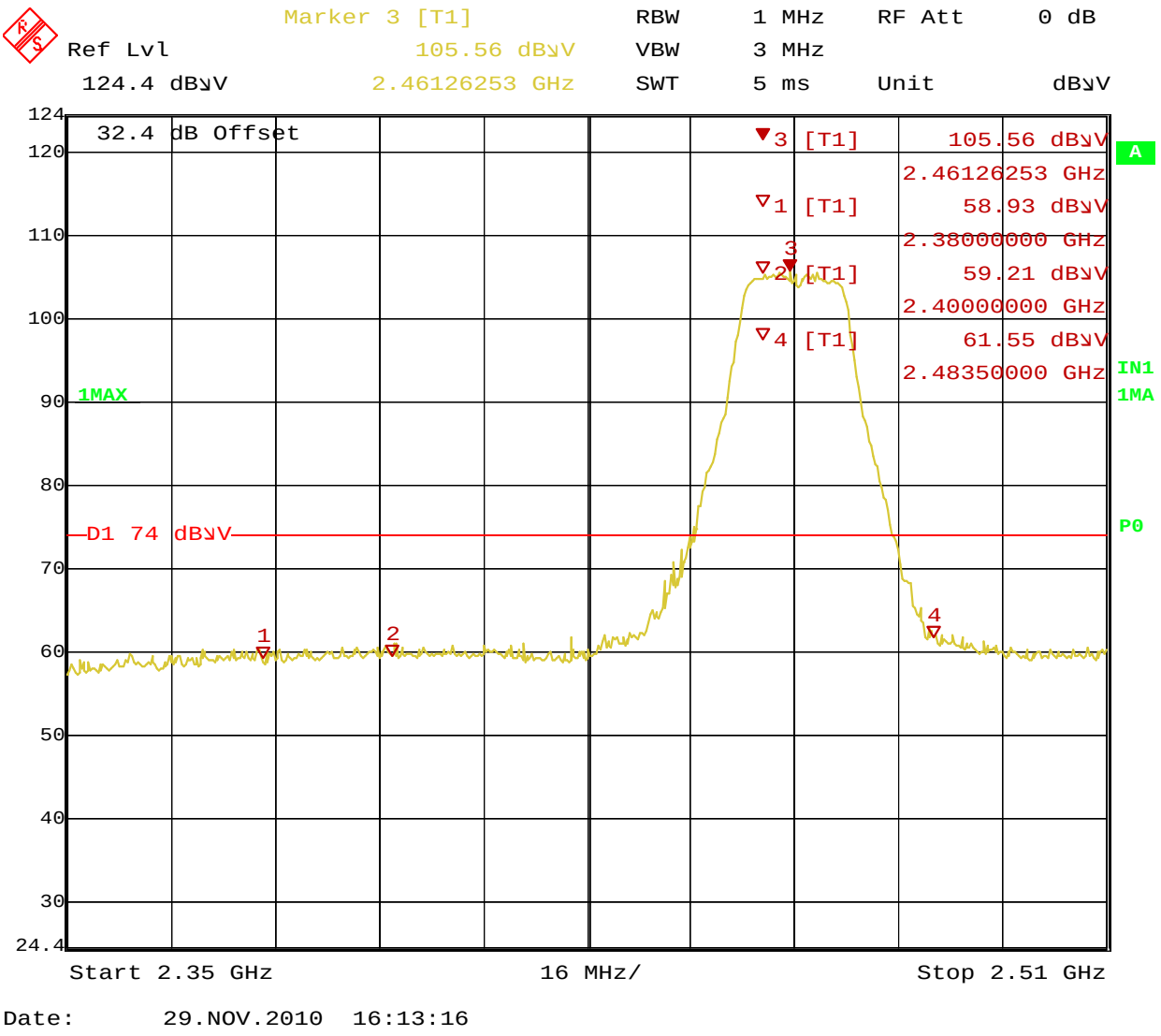


Figure 27: Spurious Emission at the Band Edge for Channel 2462 MHz at 802.11g – Horizontal (Peak)

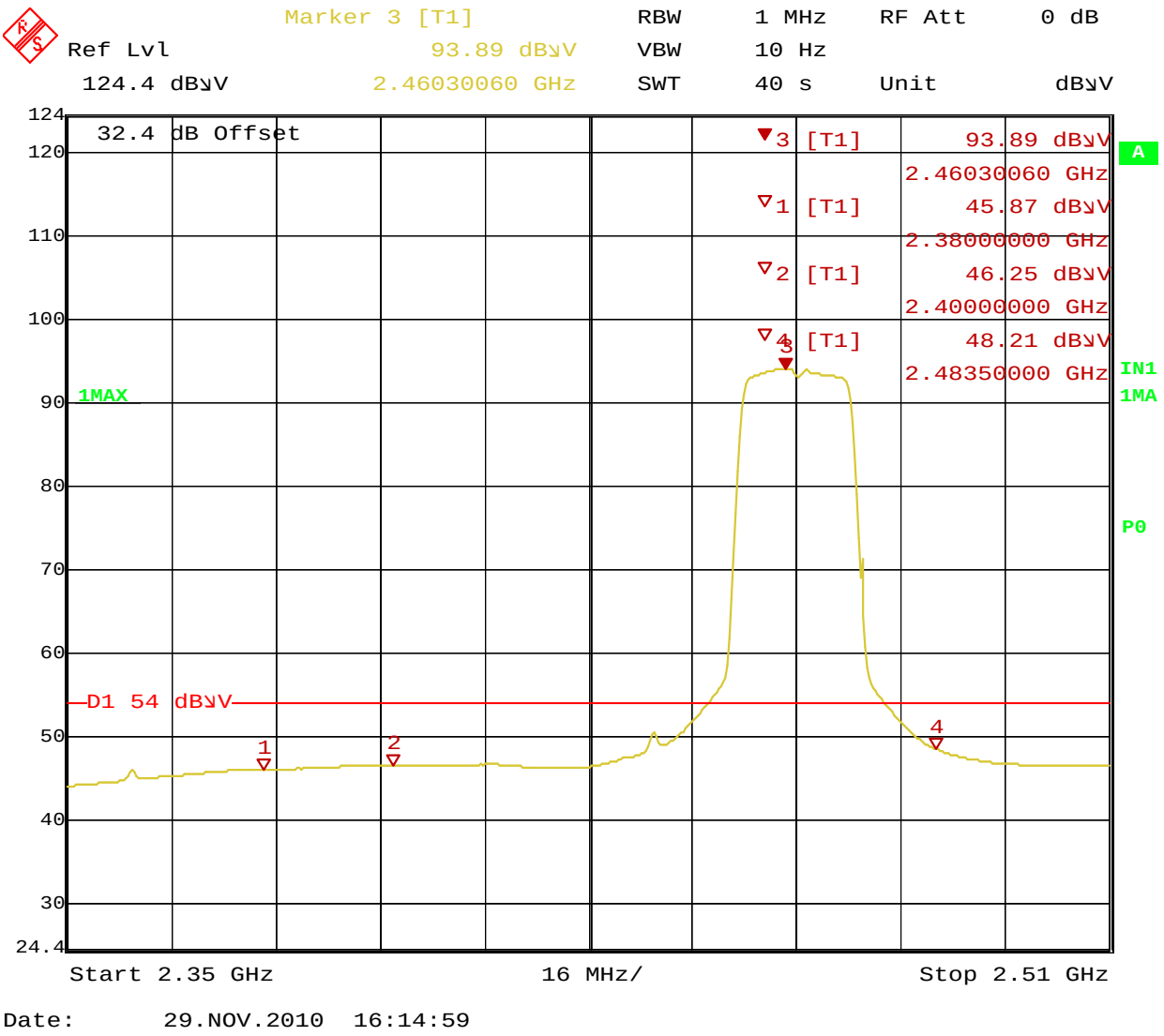


Figure 28: Spurious Emission at the Band Edge for Channel 2462 MHz at 802.11g – Horizontal (Ave.)

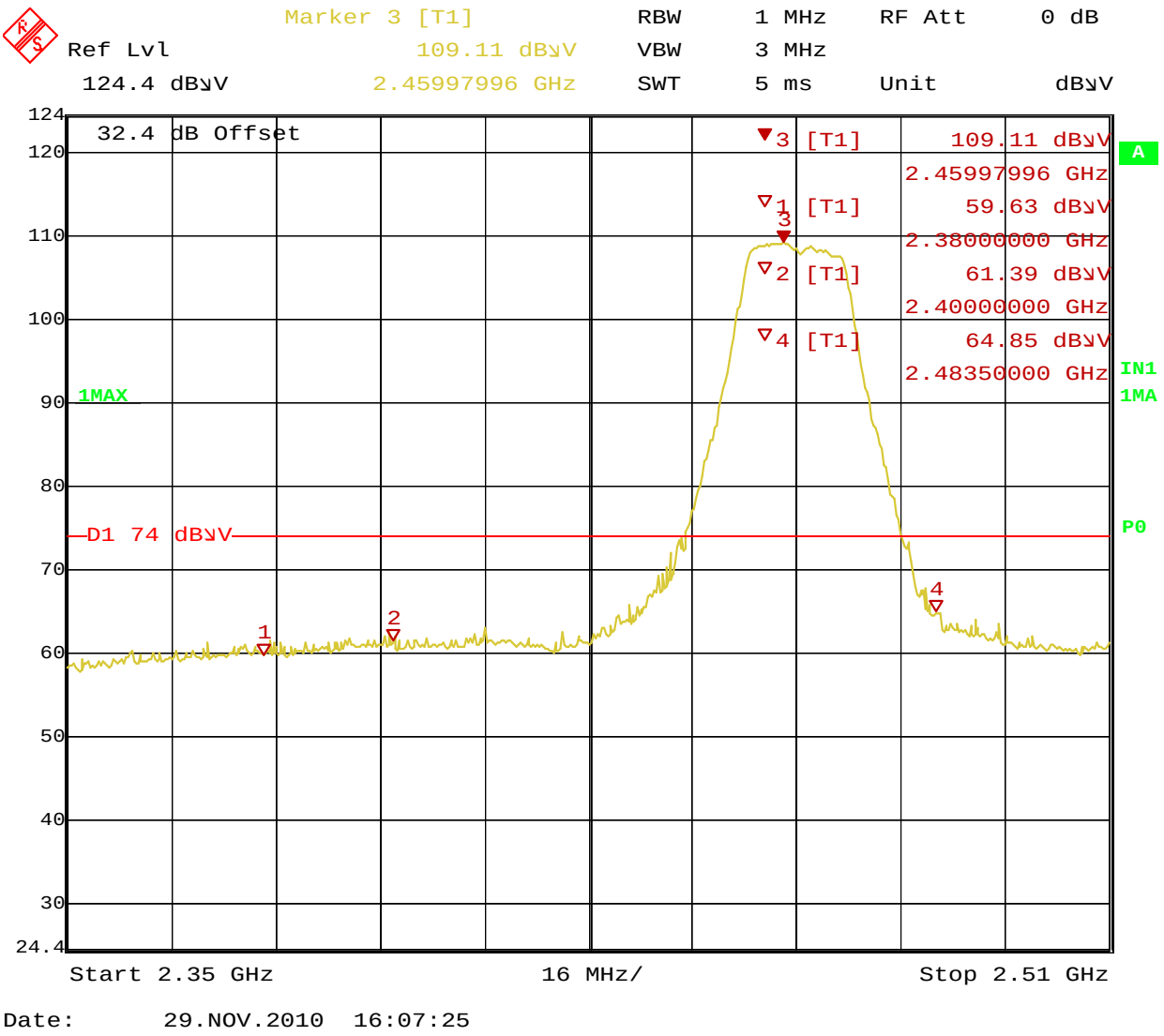


Figure 29: Spurious Emission at the Band Edge for Channel 2462 MHz at 802.11g – Vertical (Peak)

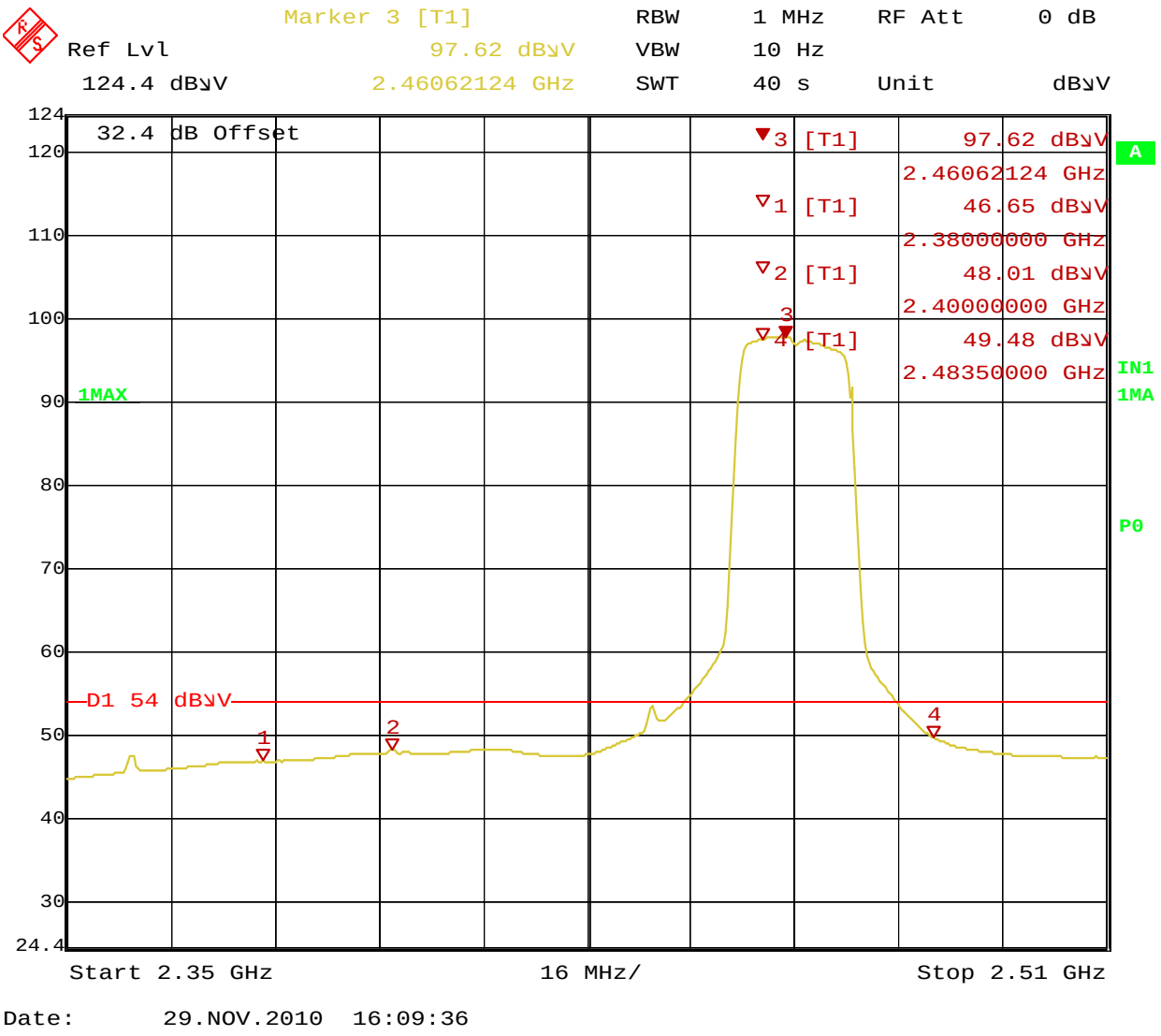


Figure 30: Spurious Emission at the Band Edge for Channel 2462 MHz at 802.11g – Vertical (Ave.)

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EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop	**Line AC / Freq**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

Emission Freq (MHz)	ANT Polar (H/V)	ANT Pos (cm)	Table Pos (deg)	FIM (Pk) Pk (dBuV/m)	FIM QP (dBuV/m)	Total CF dBuV	E-Field QP (dBuV/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	Type
Transmitted Data at 2412 MHz										
249.99	V	113	13	54.42	54.16	-10.35	43.81	46.02	-2.21	Spurious
524.97	V	107	243	51.68	50.90	-5.49	45.41	46.02	-0.61	Spurious
527.91	V	112	242	47.03	44.08	-5.47	38.61	46.02	-7.41	Spurious
565.20	V	117	259	48.01	48.01	-4.60	43.41	46.02	-2.61	Spurious
706.50	V	106	79	43.48	42.87	-1.91	40.96	46.02	-5.06	Spurious
249.99	H	138	75	53.72	53.30	-10.35	42.95	46.02	-3.07	Spurious
374.99	H	103	67	51.25	49.74	-7.16	42.58	46.02	-3.44	Spurious
527.97	H	174	288	49.26	45.70	-4.91	40.79	46.02	-5.23	Spurious
799.97	H	107	97	44.02	43.56	0.04	43.60	46.02	-2.42	Spurious
Transmitted Data at 2437 MHz										
250.00	H	103	83	55.99	55.26	-10.35	44.91	46.02	-1.11	Spurious
375.00	H	106	106	53.08	52.20	-7.16	45.04	46.02	-0.98	Spurious
499.98	H	203	242	46.48	45.63	-5.26	40.37	46.02	-5.65	Spurious
527.88	H	170	175	46.92	45.43	-4.92	40.51	46.02	-5.51	Spurious
800.00	H	103	179	45.09	43.90	0.04	43.94	46.02	-2.08	Spurious
250.00	V	111	7	55.87	55.08	-10.35	44.73	46.02	-1.29	Spurious
499.98	V	118	138	44.43	43.99	-5.66	38.33	46.02	-7.69	Spurious
565.20	V	117	267	47.18	46.69	-4.60	42.09	46.02	-3.93	Spurious
706.49	V	106	82	42.98	42.68	-1.91	40.77	46.02	-5.25	Spurious
Transmitted Data at 2462 MHz										
250.00	H	123	64	54.96	54.11	-10.35	43.76	46.02	-2.26	Spurious
374.98	H	103	69	51.21	50.17	-7.16	43.01	46.02	-3.01	Spurious
524.97	H	183	223	47.74	46.89	-4.99	41.90	46.02	-4.12	Spurious
527.99	H	185	259	48.19	44.10	-4.91	39.19	46.02	-6.83	Spurious
565.20	H	245	196	41.18	40.61	-4.11	36.50	46.02	-9.52	Spurious
800.00	H	103	91	45.20	42.67	0.04	42.71	46.02	-3.31	Spurious
250.00	V	110	31	54.87	54.15	-10.35	43.80	46.02	-2.22	Spurious
524.98	V	127	256	51.39	51.05	-5.49	45.56	46.02	-0.46	Spurious
527.96	V	118	245	46.85	44.04	-5.47	38.57	46.02	-7.45	Spurious
529.88	V	106	241	48.87	46.91	-5.46	41.45	46.02	-4.57	Spurious
565.20	V	109	259	48.47	47.98	-4.60	43.38	46.02	-2.64	Spurious
706.51	V	110	120	43.45	42.95	-1.91	41.04	46.02	-4.98	Spurious

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: Tested at worst case at 1 Mbit/s.

SOP 1 Radiated Emissions

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EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC / Freq**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m / EMCO3115	**Performed by**	Jeremy Luong

Emission Freq (MHz)	ANT Polar (H/V)	Table Pos (deg)	ANT Pos (cm)	FIM (Pk) Pk (dBuV/m)	FIM Ave (dBuV/m)	Total CF dBuV	E-Field Ave (dBuV/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	Type
Transmitted Data at 2412 MHz										
1055.96	V	263	168	49.53	41.96	-9.01	32.95	53.98	-21.03	Spurious
1055.99	H	345	174	59.68	52.29	-9.01	43.28	53.98	-10.70	Spurious
1271.77	V	88	101	54.39	49.55	-7.78	41.77	53.98	-12.21	Spurious
1584.24	V	11	101	47.30	34.92	-6.90	28.01	53.98	-25.97	Spurious
1836.96	V	99	169	51.37	48.57	-4.99	43.58	53.98	-10.40	Spurious
3249.98	V	103	232	46.11	40.89	0.11	41.00	53.98	-12.98	Spurious
4824.06	V	121	199	46.38	40.46	2.42	42.88	53.98	-11.10	Harmonic
Transmitted Data at 2437 MHz										
1055.97	H	348	169	59.60	51.66	-9.01	42.65	53.98	-11.33	Spurious
1554.35	V	285	158	50.75	47.51	-7.09	40.41	53.98	-13.57	Spurious
1836.99	V	115	168	50.69	47.61	-4.99	42.62	53.98	-11.36	Spurious
2360.00	V	87	223	21.74	19.91	32.40	52.31	53.98	-1.67	Spurious
2967.37	V	76	105	47.74	43.21	-1.64	41.58	53.98	-12.40	Spurious
4874.05	V	355	179	49.91	48.13	2.52	50.65	53.98	-3.33	Harmonic
4874.07	H	303	174	45.86	41.33	2.52	43.85	53.98	-10.13	Harmonic
7310.27	V	123	126	44.50	36.15	8.29	44.44	53.98	-9.54	Harmonic
9748.09	V	103	125	38.74	31.40	10.66	42.06	53.98	-11.92	Harmonic
19496.10	H	299	100	39.08	31.93	11.55	43.48	63.98	-20.50	Harmonic
Transmitted Data at 2462 MHz										
1055.96	H	239	172	59.36	52.37	-9.01	43.36	53.98	-10.62	Spurious
1271.75	V	96	183	53.08	48.55	-7.78	40.77	53.98	-13.21	Spurious
1554.39	V	97	131	52.34	48.74	-7.09	41.64	53.98	-12.34	Spurious
1836.94	V	110	102	50.71	47.91	-4.99	42.92	53.98	-11.06	Spurious
2967.37	V	99	107	48.70	43.76	-1.64	42.13	53.98	-11.85	Spurious
4924.06	V	128	127	45.14	38.65	2.60	41.25	53.98	-12.73	Harmonic

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: Tested at worst case at 1 Mbit/s. All emissions are below the spurious limit per CFR47 Part 15.209.

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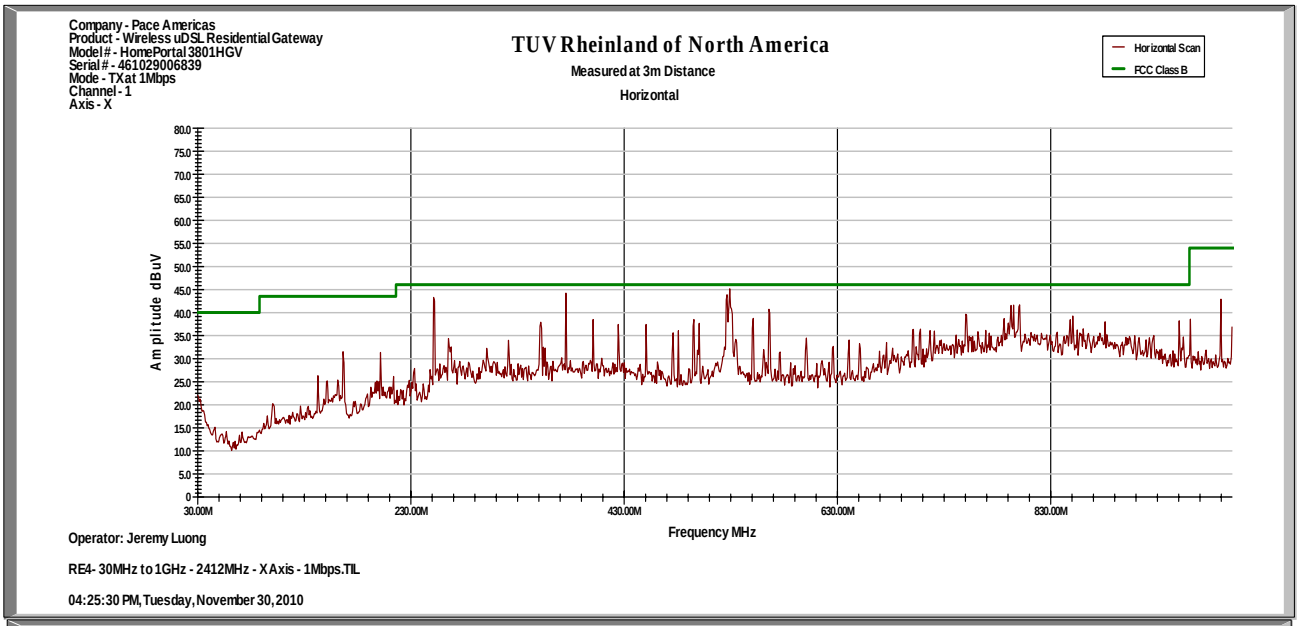
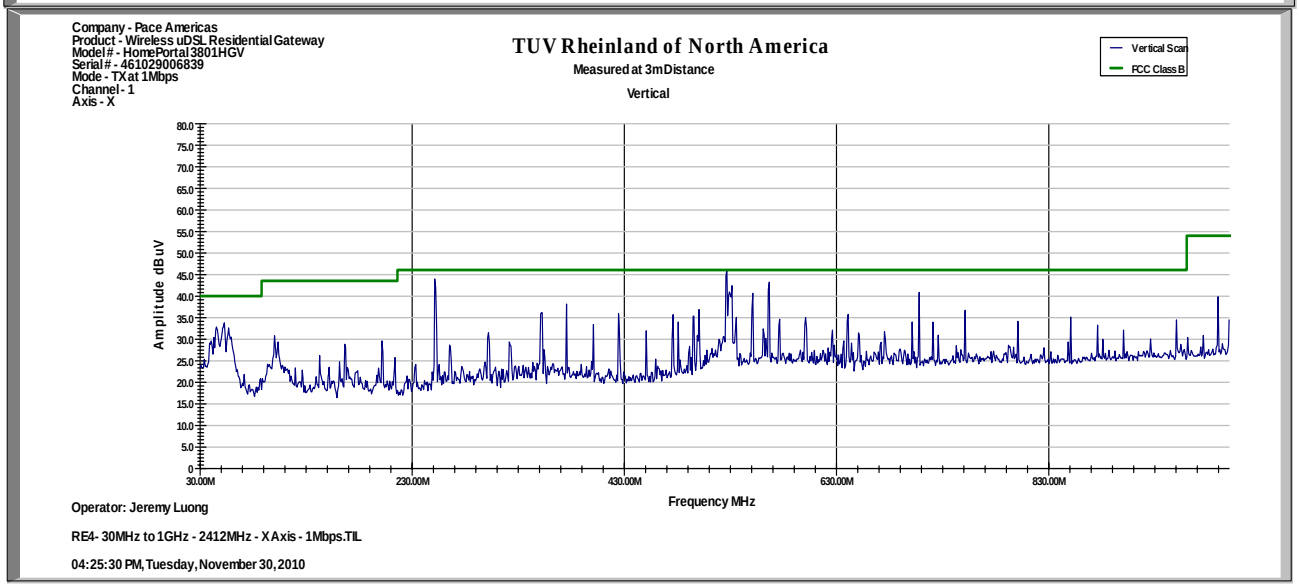
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30 MHz to 1000 MHz Plot for Transmit Mode at 2412 MHz





Notes: None.

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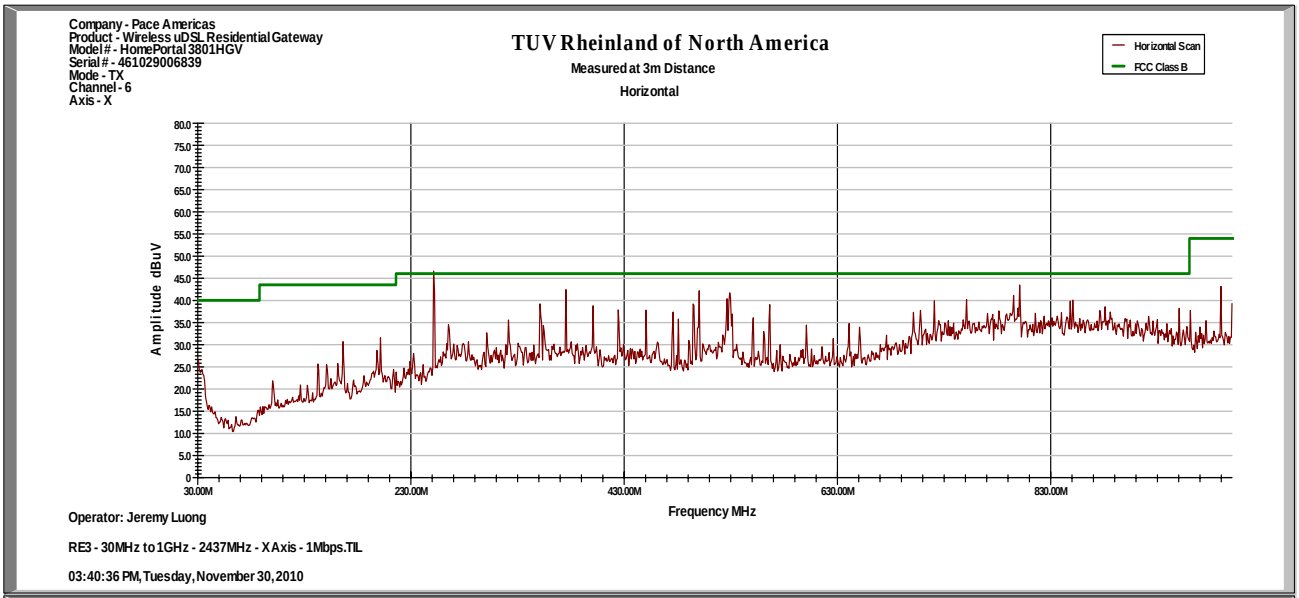
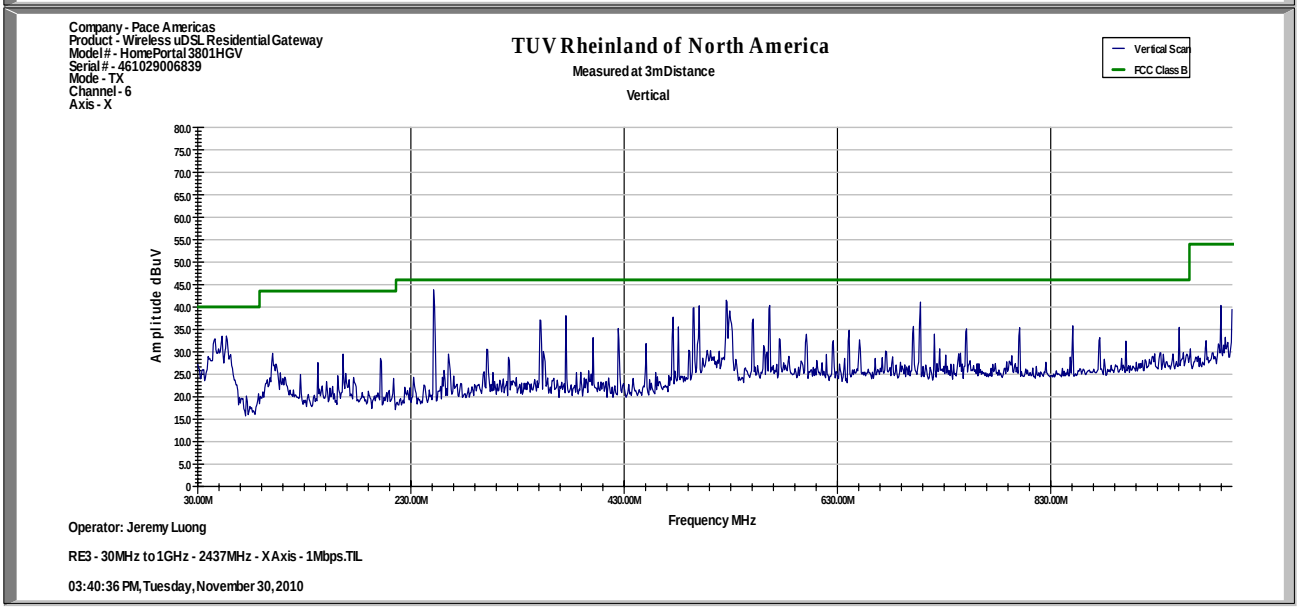
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30 MHz to 1000 MHz Plot for Transmit Mode at 2437 MHz





Notes: None.

SOP 1 Radiated Emissions

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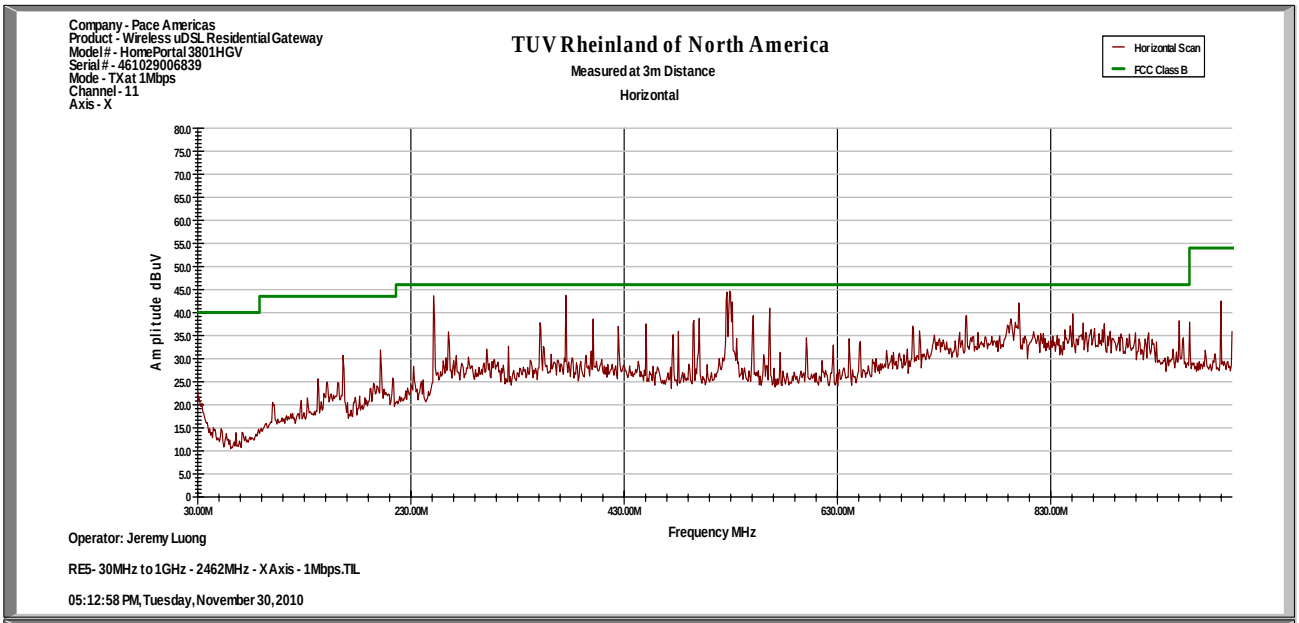
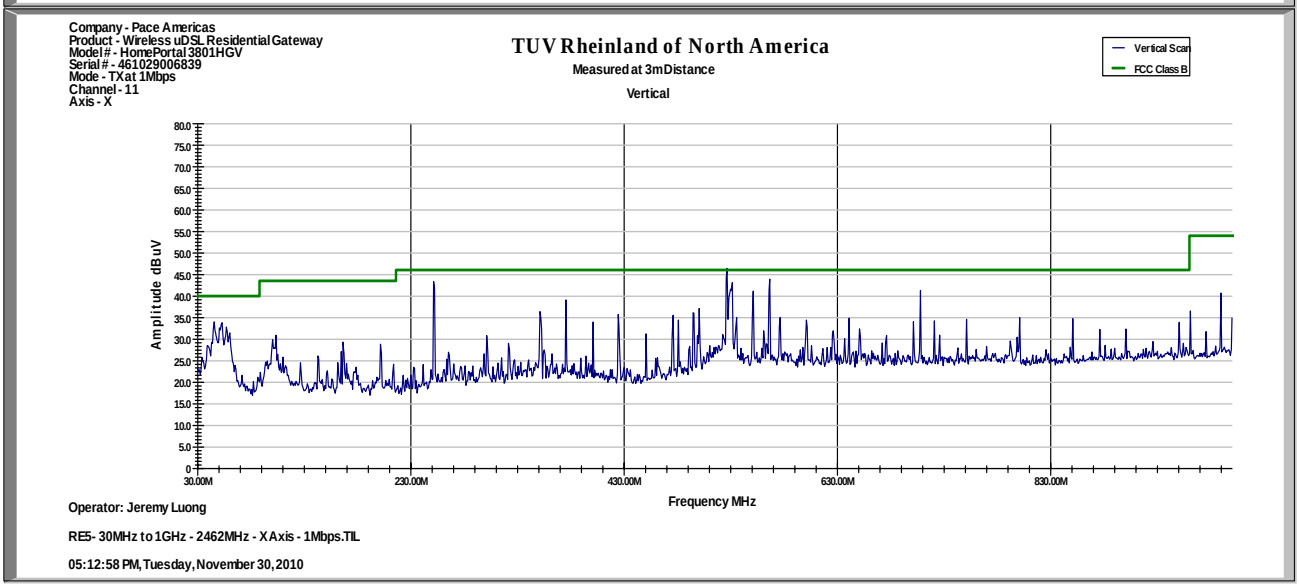
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30 MHz to 1000 MHz Plot for Transmit Mode at 2462 MHz





Notes: None.

SOP 1 Radiated Emissions

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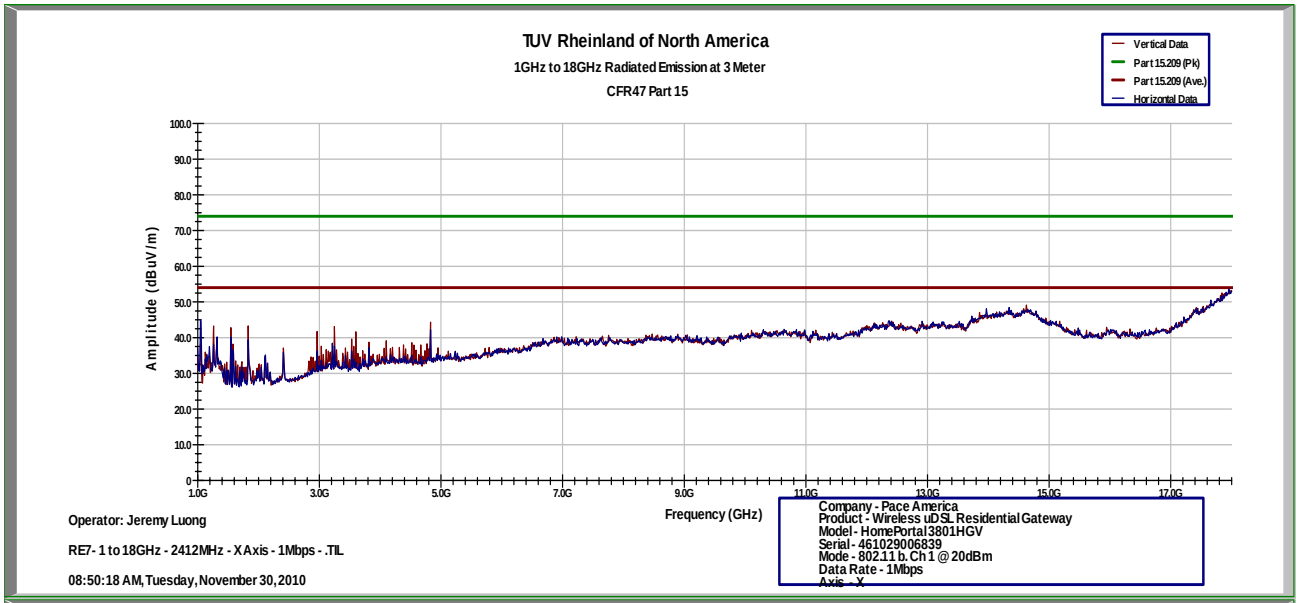
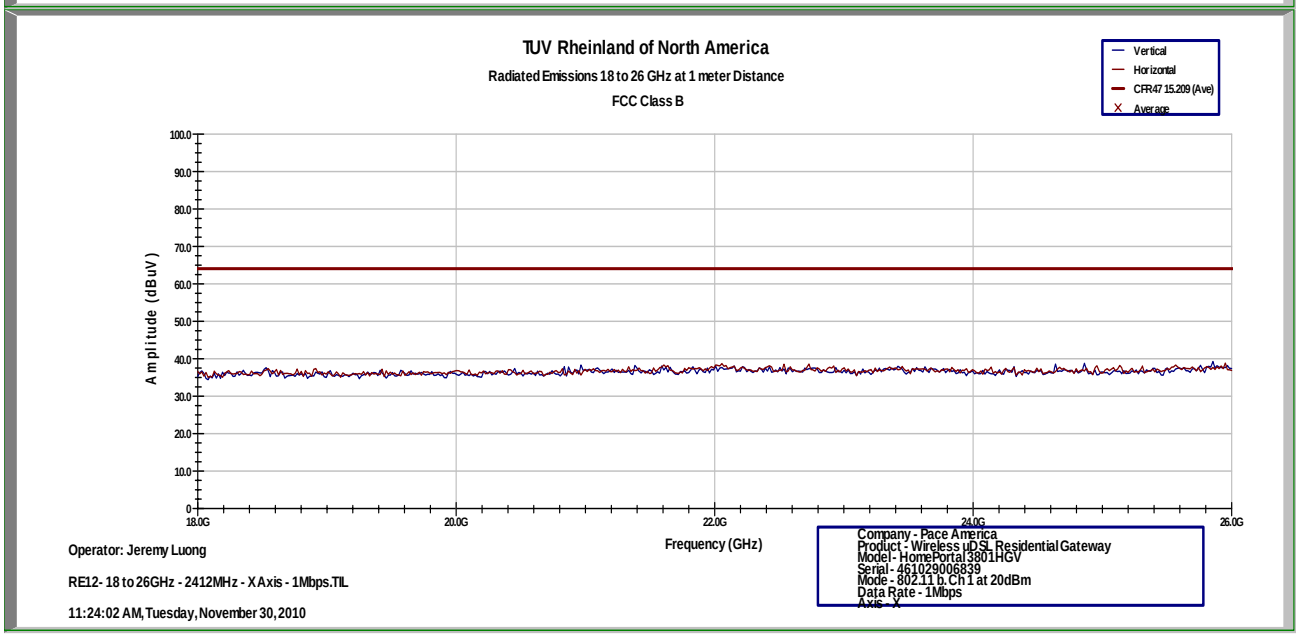
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m and 3m / EMCO3115 & RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 GHz to 25 GHz Plots for Transmit Mode at 2412 MHz





Notes: None.

SOP 1 Radiated Emissions

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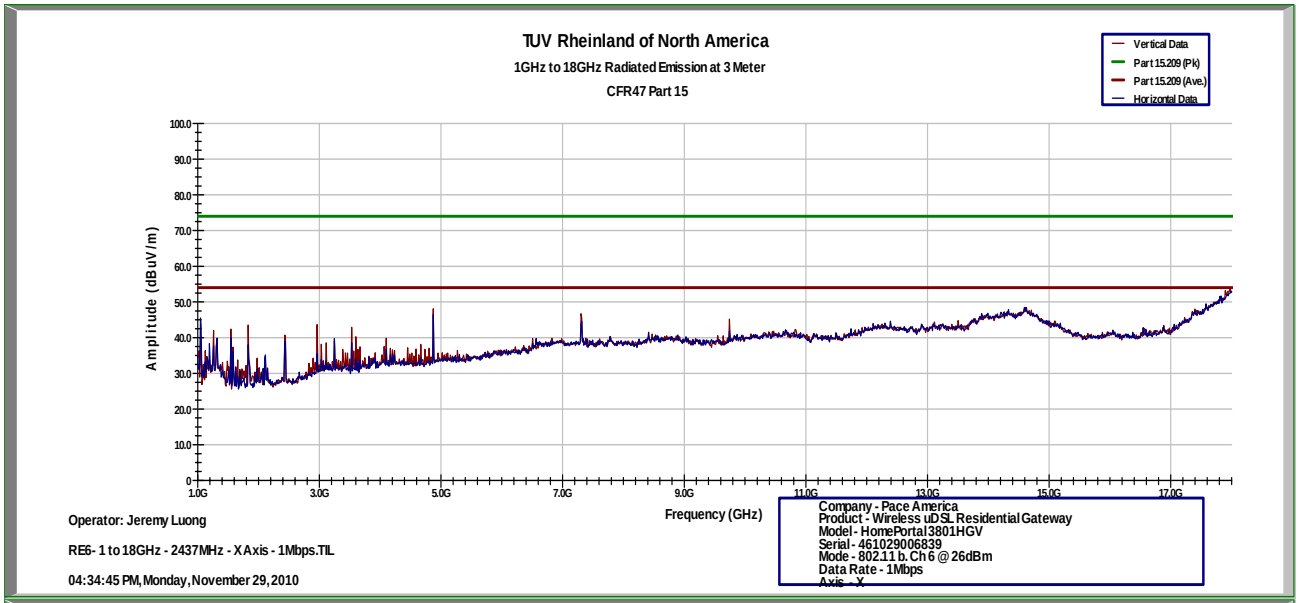
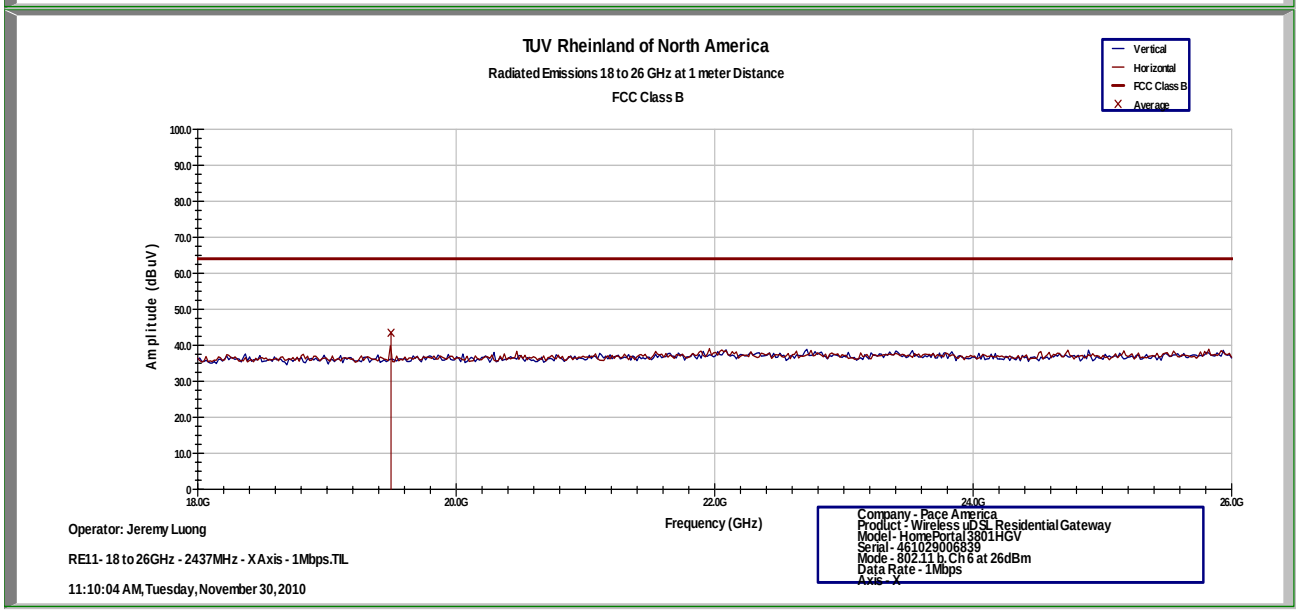
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m and 3m / EMCO3115 & RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 GHz to 25 GHz Plots for Transmit Mode at 2437 MHz





Notes: None.

SOP 1 Radiated Emissions

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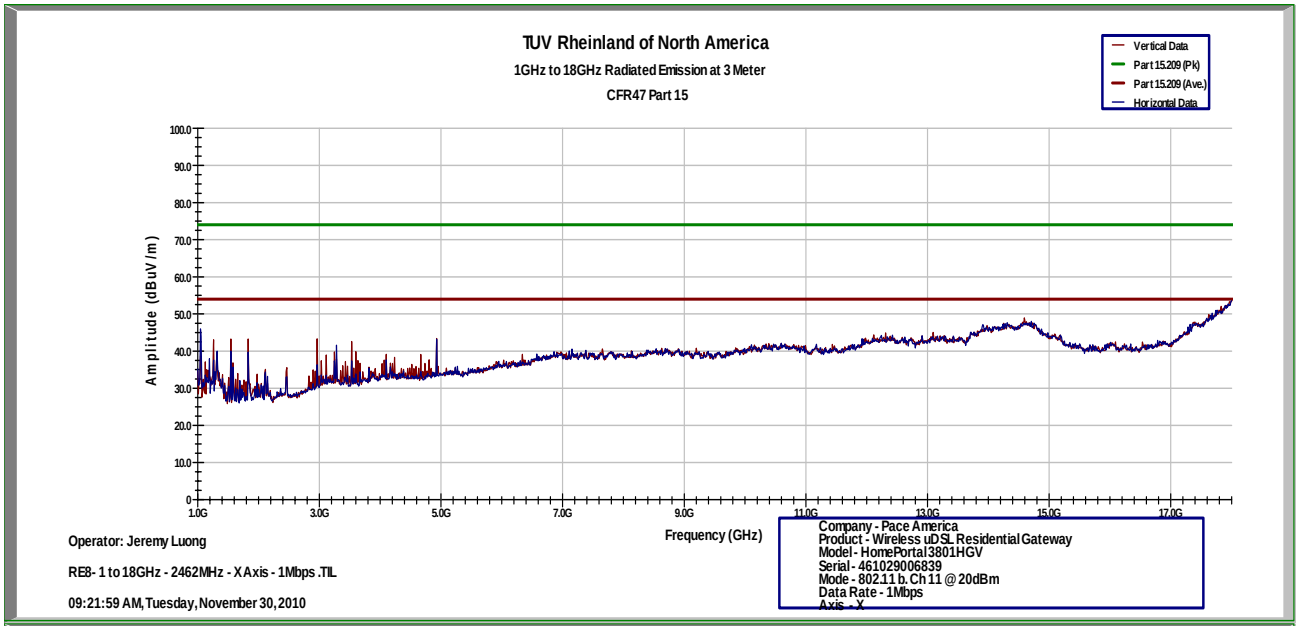
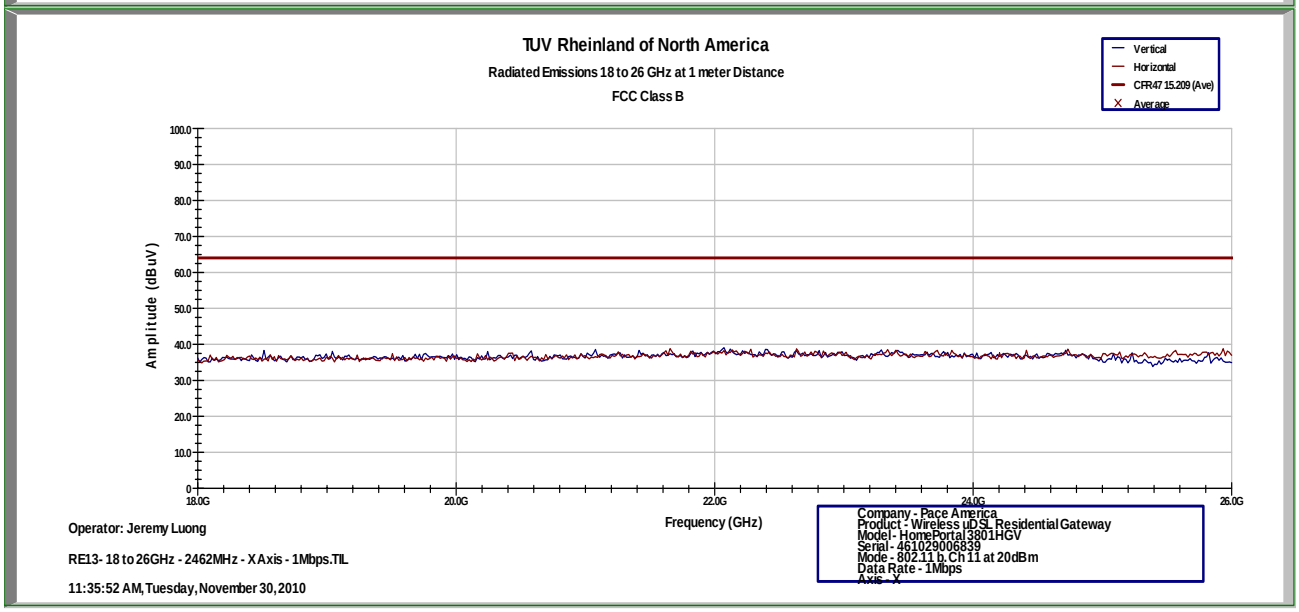
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	1m and 3m / EMCO3115 & RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 GHz to 25 GHz Plots for Transmit Mode at 2462 MHz





Notes: None.

4.4.4 Sample Calculation

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = FIM - AMP + CBL + ACF

Where: FIM = Field Intensity Meter (dBμV)
AMP = Amplifier Gain (dB)
CBL = Cable Loss (dB)
ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

4.5 Receiver Spurious Emissions

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

The spurious emissions of the receiver shall not exceed the values in CFR47 15.109, RSS-GEN Sect.7.2.3

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Preliminary scans performed with EUT positioned horizontal and vertically. Vertical position was worse.

4.5.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final scans performed on Channel 6; 2437 MHz with EUT positioned vertically.

4.5.1.3 Deviations

None.

4.5.2 Receiver Spurious Emission Limit

The spurious emissions of the receiver shall not exceed the values in CFR47 15.109: 2008 and RSS 210:2007 Section 2.6.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

4.5.3 Test Results

The final measurement data indicates the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

4.5.3.1 Final Data

The data recorded in this section contains the final results under the worst-case conditions and without any modifications or special accessories implemented as the manufacturer intends.

SOP 1 Radiated Emissions

Tracking # 31053550.001 Page 1 of 4

EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC / Freq**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

Emission Freq (MHz)	ANT Polar (H/V)	ANT Pos (cm)	Table Pos (deg)	FIM (Pk) Pk (dBuV/m)	FIM QP (dBuV/m)	Total CF dBuV	E-Field QP (dBuV/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	Type
Receive Mode at 2437 MHz										
250.00	V	108	5	54.07	53.40	-10.35	43.05	46.02	-2.97	Spurious
494.56	V	111	281	49.77	47.17	-5.74	41.43	46.02	-4.59	Spurious
524.96	V	195	292	50.65	49.52	-5.49	44.03	46.02	-1.99	Spurious
565.19	V	106	270	48.40	48.20	-4.60	43.60	46.02	-2.42	Spurious
249.99	H	105	62	51.87	50.96	-10.35	40.61	46.02	-5.41	Spurious
350.00	H	105	107	51.34	50.80	-7.42	43.38	46.02	-2.64	Spurious
706.51	H	109	248	47.61	47.07	-1.65	45.42	46.02	-0.60	Spurious
800.00	H	114	244	46.52	44.53	0.04	44.57	46.02	-1.45	Spurious
850.01	H	103	104	44.18	43.47	0.49	43.96	46.02	-2.06	Spurious

Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: RX mode. Vertical Position

SOP 1 Radiated Emissions

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EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC / Freq**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m / EMCO3115	**Performed by**	Jeremy Luong

Emission Freq (MHz)	ANT Polar (H/V)	Table Pos (deg)	ANT Pos (cm)	FIM (Pk) Pk (dBuV/m)	FIM Ave (dBuV/m)	Total CF dBuV	E-Field Ave (dBuV/m)	Spec Limit (dBuV/m)	Spec Margin (dB)	Type
Transmitted Data at 2437 MHz										
1056.00	V	290	193	57.55	49.94	-9.01	40.93	53.98	-13.05	Spurious
1554.36	V	222	102	51.41	47.72	-7.09	40.62	53.98	-13.36	Spurious
2402.18	V	290	237	50.34	47.61	-2.93	44.68	53.98	-9.30	Spurious
2684.75	V	279	244	50.92	47.61	-2.32	45.29	53.98	-8.69	Spurious
3249.38	H	292	243	52.31	49.63	0.11	49.74	53.98	-4.24	Spurious
4097.81	V	292	105	47.11	42.04	2.06	44.09	53.98	-9.89	Spurious

Spec Margin = E-Field Ave - Limit, E-Field Ave = FIM Ave+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: RX mode. Vertical Position

SOP 1 Radiated Emissions

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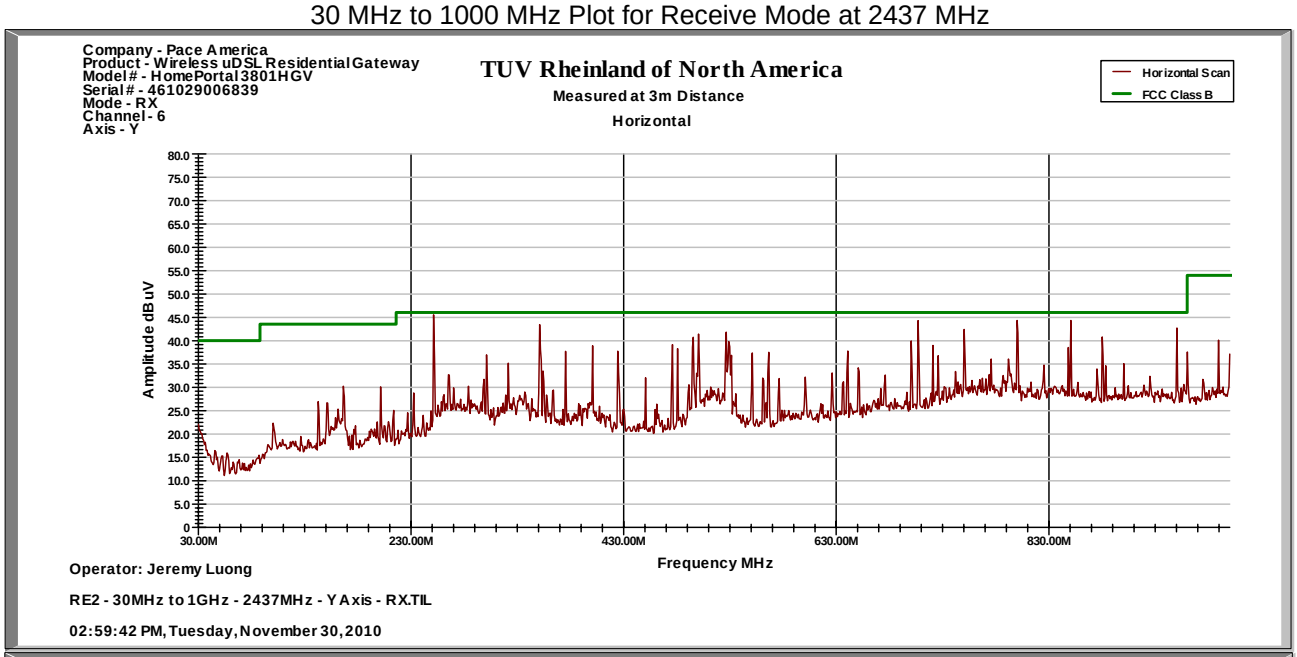
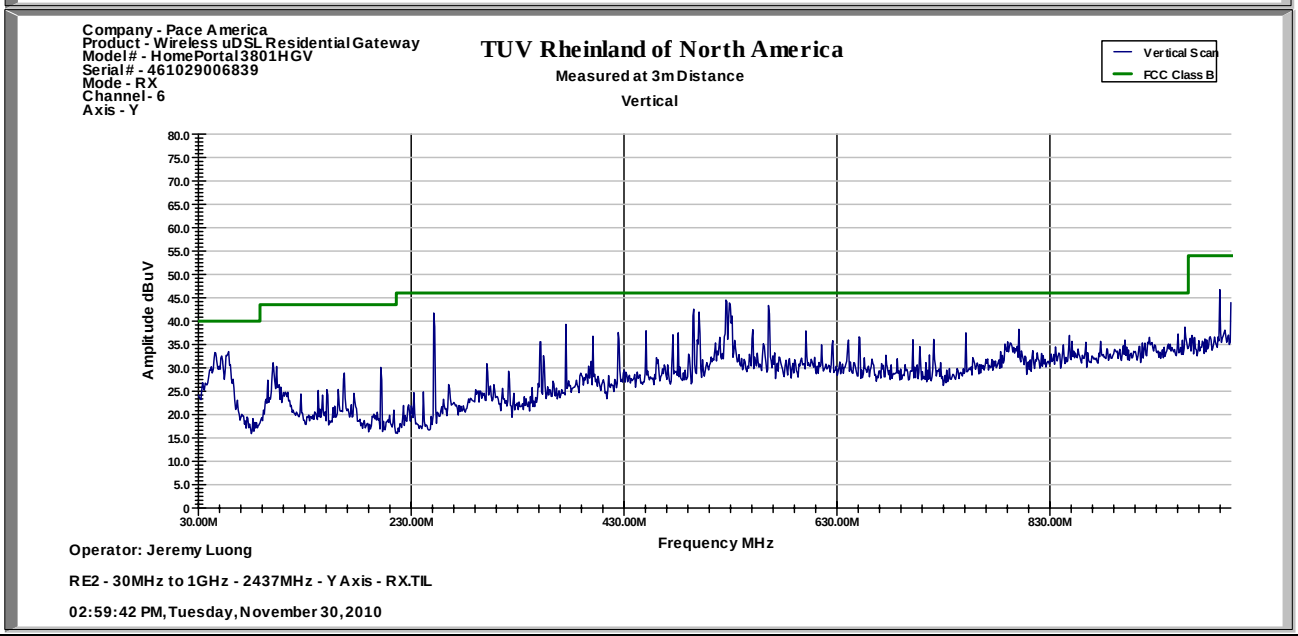
EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz / 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30 MHz to 1000 MHz Plot for Receive Mode at 2437 MHz





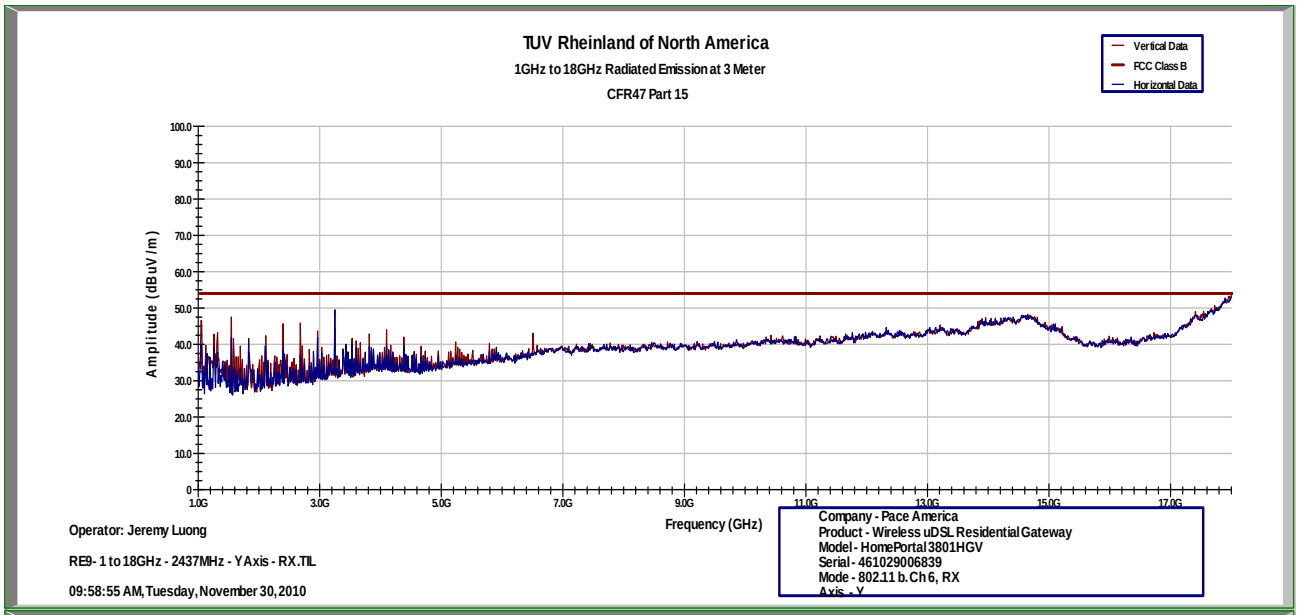
Notes: None.

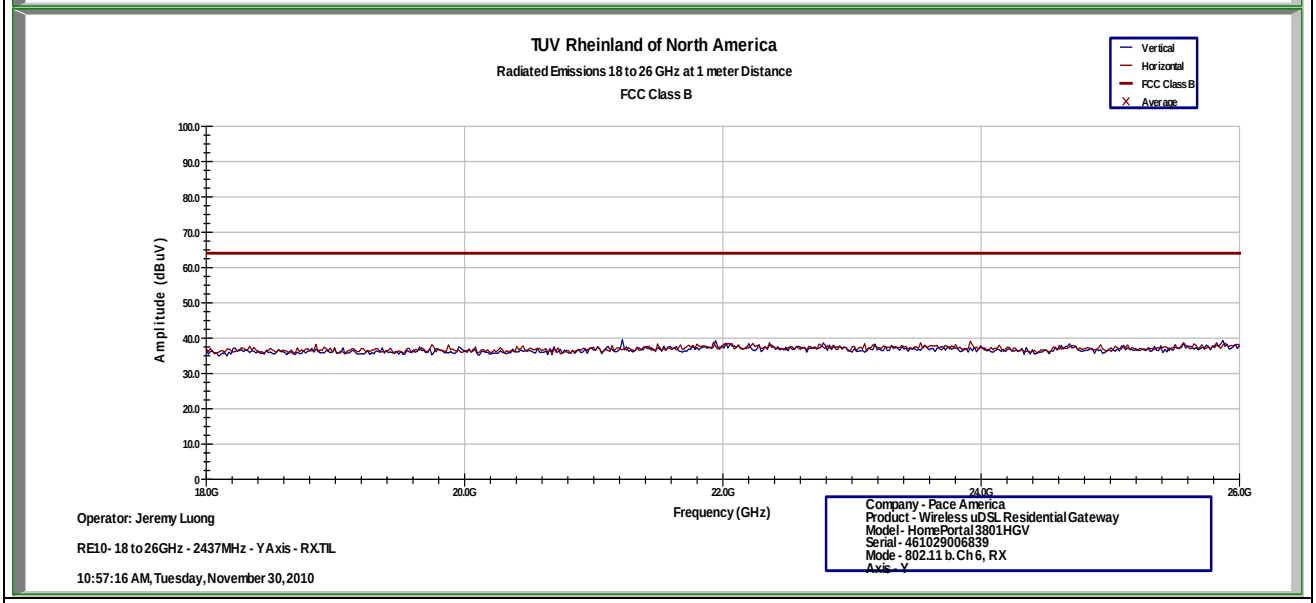
SOP 1 Radiated Emissions

Tracking # 31053550.001 Page 4 of 4

EUT Name	Wireless uDSL Residential Gateway	**Date**	November 30, 2010
EUT Model	HomePortal 3801HGV	**Temp / Hum in**	22°C / 32% RH
EUT Serial	461029006839	**Temp / Hum out**	N/A
EUT Config.	Integrated Antenna, Tabletop Position	**Line AC**	120 Vac, 60 Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m / EMCO3115	**Performed by**	Jeremy Luong

1 GHz to 25 GHz Plot for Receive Mode at 2437 MHz





Notes: None.

5 Test Equipment Use List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy
Bilog Antenna	Sunol Science	JB3	A102606	02/18/10	02/18/12
Bilog Antenna	Sunol Science	JB3	A061907	05/14/10	05/14/12
Tuned Dipole Antenna	A.H Systems, Inc.	TDS-200/535-1	154	01/09/09	01/09/11
Tuned Dipole Antenna	A.H Systems, Inc.	TDS-200/535-2	154	01/09/09	01/09/11
Tuned Dipole Antenna	A.H Systems, Inc.	TDS-200/535-3	154	01/09/09	01/09/11
Tuned Dipole Antenna	A.H Systems, Inc.	TDS-200/535-4	154	01/09/09	01/09/11
Antenna Horn (1-18 GHz)	EMCO	3115	9211-3969	04/15/09	04/15/11
Antenna Horn (1-18 GHz)	AHS	3115	9710-5301	06/30/10	06/30/11
EMI Receiver	Hewlett Packard	8546A	3325A00168	12/03/10	12/03/11
Preselector	Hewlett Packard	85460A	3330A00174	12/03/10	12/03/11
Amplifier	Hewlett Packard	8447D	2944A07996	01/21/10	01/21/11
Spectrum Analyzer	Rhode&Schwarz	ESIB	832427/002	01/22/10	01/22/11
Amplifier	Rhode&Schwarz	TS-PR18	3545.7008.03	09/28/10	09/28/12
Amplifier	Rhode&Schwarz	TS-PR26	100011/3545.7014.03	10/15/10	10/15/11
Notch Filter	Micro-Tronics	BRM50702	037	01/22/10	01/22/11
Power Supplier	Kikosui	PCR8000W	CM000912	01/18/10	01/18/11
Digital Multimeter	Fluke	83 III	84590116	01/21/10	01/21/11

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing. This report includes Permissive Class II Emissions with FCC ID: PGR2W3801HGV, IC ID: 3439B-3801HGV.

6.2 Customer

Table 6: Customer Information

Company Name	Pace Americas
Address	310 Providence Mine Road
City, State, Zip	Nevada City, CA 95959
Country	U.S.A.
Phone	(530) 274-5440
Fax	(530) 273-6340

Table 7: Technical Contact Information

Name	Mark Rieger
E-mail	mrieger@pace.com
Phone	(530) 274-5440
Fax	(530) 273-6340

6.3 Equipment Under Test (EUT)

Table 8: EUT Specifications

3801HGV Dimensions	3.1" x 9.6" x 9.7" (7.8 cm x 24.3 cm x 24.5 cm)
AC Adapter (M/N: EADP-36FB A) (Sample #8)	Input Voltage: 100 – 240 Vac Input Current: 0.8 A Output Voltage: 12 Vdc Ouput Current: 3.0 A
Environment	Indoor
Operating Temperature Range:	0 to 40 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No
Hardware Version	Ver. 4, Rev. 08, X-Patch: X30
SSID	3801_EMC00
RF Software Version	6.3.4.65
Operating Mode	802.11b, g
Transmitter Frequency Band	2.412 GHz to 2.462 GHz (DSSS)
Rated Power Output	0.100 W (+20 dBm) at 2412 MHz and 2462 MHz 0.398 W (+26 dBm) at 2437 MHz
Operating Channel	2412 MHz, 2417 MHz, 2422 MHz, 2427 MHz, 2432 MHz, 2437 MHz, 2442 MHz, 2447 MHz, 2452 MHz, 2457 MHz, 2462 MHz.
Modulation Type	☐ AM ☐ FM ☐ Phase ☒ Other describe: DSSS
Date Rate	802.11b – 1 Mbit/s, 2 Mbit/s, 5.5 Mbit/s, 9 Mbit/s, 11 Mbit/s. 802.11g – 6 Mbit/s, 9 Mbit/s, 12 Mbit/s, 18 Mbit/s, 24 Mbit/s, 36 Mbit/s, 48 Mbit/s, 54 Mbit/s.
RF Output Filter	Soshin Electric Co., LTD. Type No. HMD804G
Antenna Type	Attached on board (Inverted F Type)
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other *describe:*

Table 9: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
Local Ethernet (x3)	unterminated	☒ Na	☒ Na	☒ M
Local Ethernet	CAT5	☒ Yes	☒ 30m	☒ M
Ethernet	unterminated	☒ Na	☒ Na	☒ M
uDSL	unterminated	☒ Na	☒ Na	☒ M
Voice	unterminated	☒ Na	☒ Na	☒ M
HPNA	unterminated	☒ Na	☒ Na	☒ M

Table 10: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell Computer	PP23LB	3894765713	Setting up test mode

Table 11: Description of Sample used for Testing

Device	Serial #	Configuration	Used For
3801HGV	461029006839	Standalone.	Radiated Emission
3801HGV	461029006839	Configured with Microwave Coaxial Connectors (Switch SWD: muRata MM8430-2610)	Output Power, Bandwidth.
Note: None			

Table 12: Description of Test Configuration used for Radiated Measurement

Device	Antenna	Mode	Setup Description
3801HGV	Attached	Transmit	Tabletop. 3801HGV positioned horizontally.
3801HGV	Attached	Receive	Tabletop. 3801HGV positioned vertically.
Note: Test configurations were scanned based on the worst-case in the original report.			

6.4 Test Specifications

Testing requirements

Table 13: Standards

Emissions and Immunity	
Standard	Requirement
CFR 47 Part 15.247 :2008	Output Power, Occupied Bandwidth, Spurious Emission
RSS 210 :2007	Output Power, Occupied Bandwidth, Spurious Emission
Note:	Permissive Class II Emissions Test Report (FCC ID: PGR2W3801HGV)

Pace Americas
310 Providence Mine Road
Nevada City, CA 95959
Tel: 530 274 5400
Fax: 530 273 6340

January 2011

RE: Pace / 2Wire acquisition

We (2Wire, Inc) have recently been acquired by Pace PLC.

2Wire, Inc. is a still-existing Delaware corporation and is still the legal entity. However, it now operates under a fictitious business name – "Pace Americas." There continues to be a "2wire, Inc." but will be known as "2Wire, Inc Doing Business As (DBA) Pace Americas" which is an indirect subsidiary of Pace PLC in the UK.

As a result of this acquisition all contact information, addresses, and assigned company registration numbers shall remain the same (if possible). We have only updated the existing company name from "2Wire, Inc." to "Pace Americas". The Fictitious Name filings are available upon request.

Our corporate offices remain at 1704 Automation Parkway, San Jose, CA, 95131, USA. However, the regulatory compliance office is now in the R&D centre at 310 Providence Mine Road, Nevada City, CA 95959.

Billing will remain at the San Jose office but regulatory issues should be addressed to our facilities in Nevada City.

For additional information on this Pace acquisition please see the following website links...

Pace acquisition announcements:
http://www.pace.com/americas/ or http://www.pace.com/universal/gateways/2wire/

2Wire acquisition announcement:
http://www.2wire.com/

Should you need any additional information please feel free to contact me at any time.

Sincerely,

Mark Rieger
Staff Regulatory Compliance Engineer
Pace Americas

Mob: 530.575.6010
Tel: 530.274.5440
Fax: 530.273.6340
mark.rieger@pace.com

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END OF TEST REPORT