



**MOTOROLA**

**MOBILE DEVICES BUSINESS**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

**EMC TEST REPORT - Addendum**

**Test Report Number** – 23782-1 WLAN

**Report Date** – 2010-06-12

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

Signature:

Name: Lei Yang

Title: EMC Project Manager

Test: 2010-03-01 to 2010-06-12

As the responsible test lab manager, I hereby declare that the model tested as specified in this report conforms to the requirements indicated.

Signature:

Name: Yilin Zhao

Title: Test Lab Manager

Date: 2010-06-22

This report must not be reproduced, except in full, without written approval from this laboratory.

FCC Registration Number: 177885

IC Registration Number: 109AW-1

ADR Testing Service location ADR BJ  
ISO/IEC-17025:2005 accredited by UKAS



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**Test Report Details**

Tests Performed By: Motorola (China) Technologies Ltd.  
Asia Global Compliance Labs  
No.1 Wang Jing East Road  
Chao Yang District  
Beijing, 100102, P. R. China  
Phone: +86 10 8473 2610  
FCC Registration Number: 177885  
IC Registration Number: 109AW-1

Tests Requested By: Motorola Inc.  
Mobile Devices business  
600 North US Hwy 45  
Libertyville, IL 60048  
United States

Product Type: Cell phone with embedded WLAN

Signaling Capability: WCDMA 850, GSM 850 & 1900, EDGE 850 & 1900, HSDPA, GPRS, eCompass/aGPS, Bluetooth, 802.11b & g & n

IMEI: 358342030006161

FCC ID: IHDT56LD2

Project number: 23782-1

Testing Complete Date: 06-12-2010

**Applicable Standards**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

  X   Part 15 Subpart C – Intentional Radiators

Applicable Standards: ANSI C63.4-2003, RSS-Gen Issue 2, RSS-210 Issue 7.

**Summary of Testing**

Test	Test Name	Pass/Fail
1	Spectrum Bandwidth	Pass
2	Peak Power	Pass
3	Power Spectral Density	Pass
4	Spurious RF Conducted Emissions	Pass
5	AC Line Conducted Emissions	Pass

Test	Test Name	Results
1	Spectrum Bandwidth	See plots
2	Peak Power	See plots
3	Power Spectral Density	See tables
4	Spurious RF Conducted Emissions	See plots
5	AC Line Conducted Emissions	See Plots

**General and Special Conditions**

The Cellular Phone hereinafter referred to as the Equipment under Test or EUT was tested using a fully charged Model SNN5819B 1130mAH battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

All testing was done in an indoor controlled environment. The temperature and the relative humidity were maintained within the ANSI C63.4-2003 Standard requirements during the entire duration of testing.

The WLAN conducted power level is measured for all the data rates supported across all modes. The data rate with the higher conducted power level for each mode is evaluated for conducted and radiated requirements.

## **Equipment and Cable Configurations**

The EUT was tested in a stand-alone configuration that is representative of typical use.

## **Measuring Equipment and Calibration Information**

Manufacturer	Equipment Type	Model No.	Serial Number	Date of Calibration
Rohde Schwarz	Receiver	ESU40	100036	05/16/10
Rohde Schwarz	Receiver	ESCI	100650	03/07/10
Agilent	Attenuator	8491A	MY39263202	03/03/10
Rohde Schwarz	LISN	ENV216	100055	12/19/08

All test equipment was within their calibration date during the time of testing. When equipment went out of calibration during testing it was replaced using a similar piece of calibrated equipment. All these equipments are listed in the equipment list. The LISN is on a two-year calibration cycle. All other equipments are on a one-year calibration cycle.

## **Description of WLAN Transmitter**

The EUT offers WLAN as a feature. The WLAN antenna is mounted inside of the EUT. The antenna installation is permanent. For a more thorough description of the functionality please refer to Exhibit 12 of this package.

As a WLAN transmitter, it is designed operate with other WLAN devices as defined by the industrial standard. In this application, the device is battery operated.

### **De Facto EIRP Limit – Pursuant 47 CFR 15.247(b)(4); RSS-210 Section A8.4.**

Criterion: The conducted output power limit of 1-watt is based on the use of antennas with directional gains that do not exceed 6 dB<sub>i</sub>. If transmitting antennas of directional gain greater than 6 dB<sub>i</sub> are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB<sub>i</sub>.

The antenna employed by this transmitter is intended to be omni-directional, and thus will not exhibit directional gain in excess of 6 dB<sub>i</sub>. The conducted power is less than the limits set forth (see elsewhere in this report for details).

## **Measurement Procedures and Data**

### **Spectrum Bandwidth**

CFR 47 Part 15.247

### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 20dB passive attenuator. A fully charged battery was used for the supply voltage.

The WLAN emission of the EUT was enabled. The spectrum analyzer used the following settings:

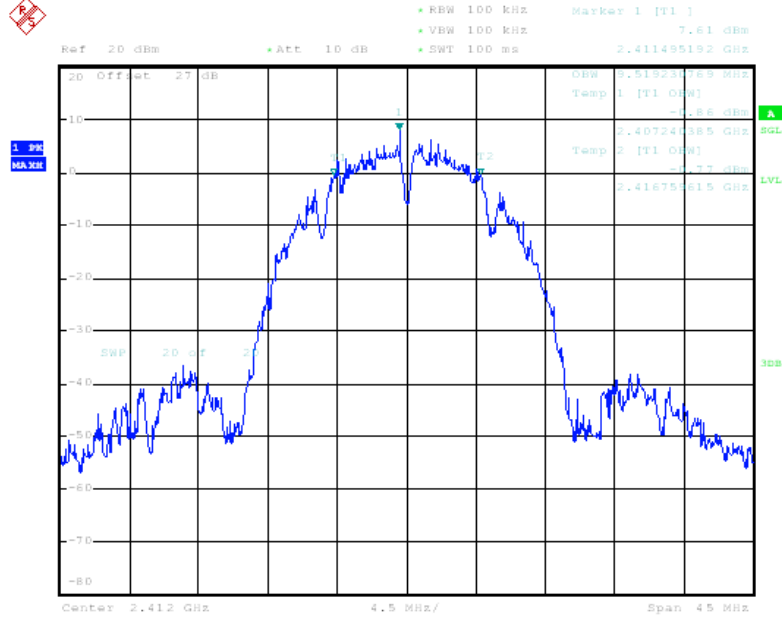
1. RBW  $\geq$  100 kHz
2. VBW  $\geq$  RBW
3. Sweep = auto
4. Detector function = peak
5. Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The n dB down function was used to measure 6 dB down one side of the emission. The n dB down function and marker was moved to the other side of the emission until it was even with the reference marker. The 6 dB down reading at this point was the 6 dB bandwidth of the emission. The same procedure was repeated for 20 dB bandwidth.

### **Measurement Results**

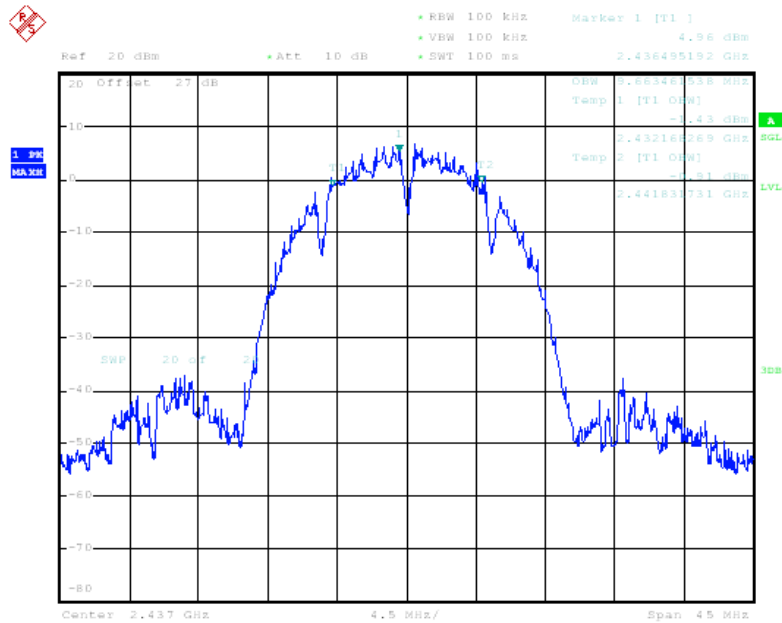
See attached

**802.11 b @ 11Mbps**



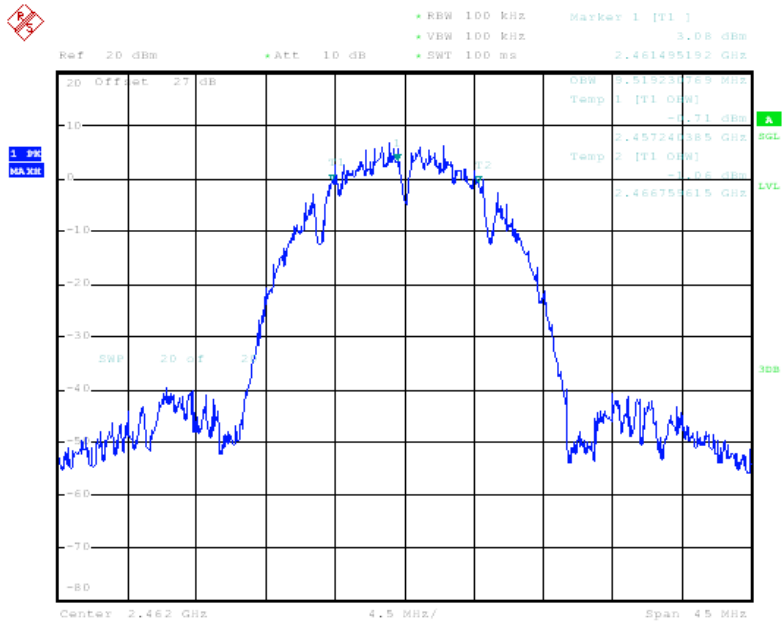
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**6dB Bandwidth Channel 1 @ 11Mbps**



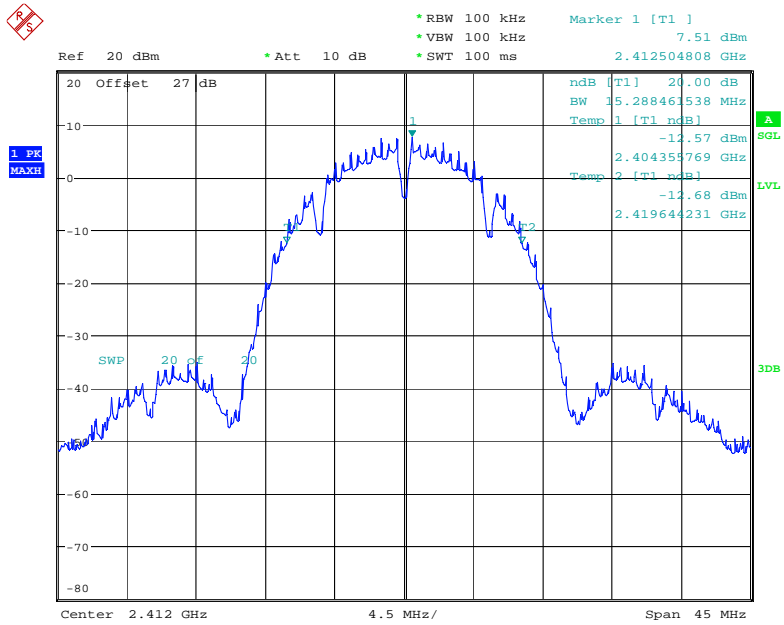
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**6dB Bandwidth Channel 6 @ 11Mbps**



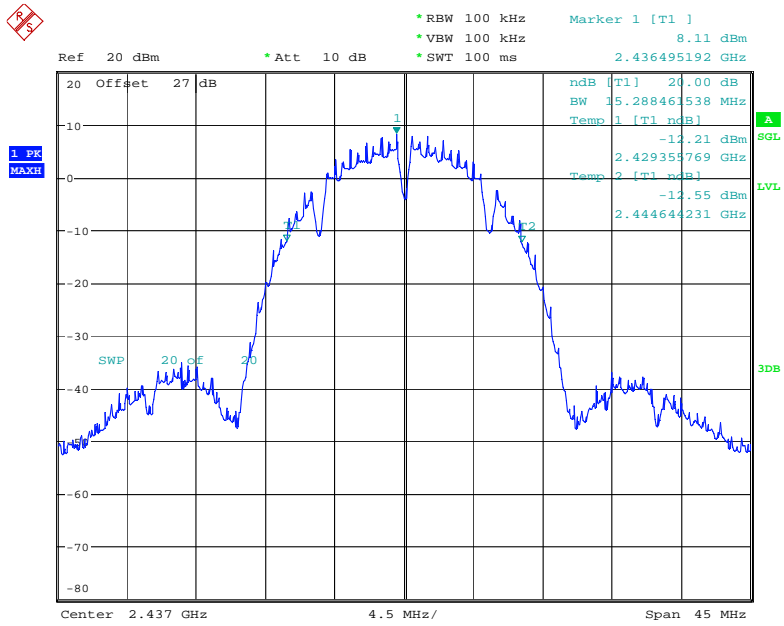
Date: 15. APR. 2010 19:35:08

### 6dB Bandwidth Channel 11 @ 11Mbps



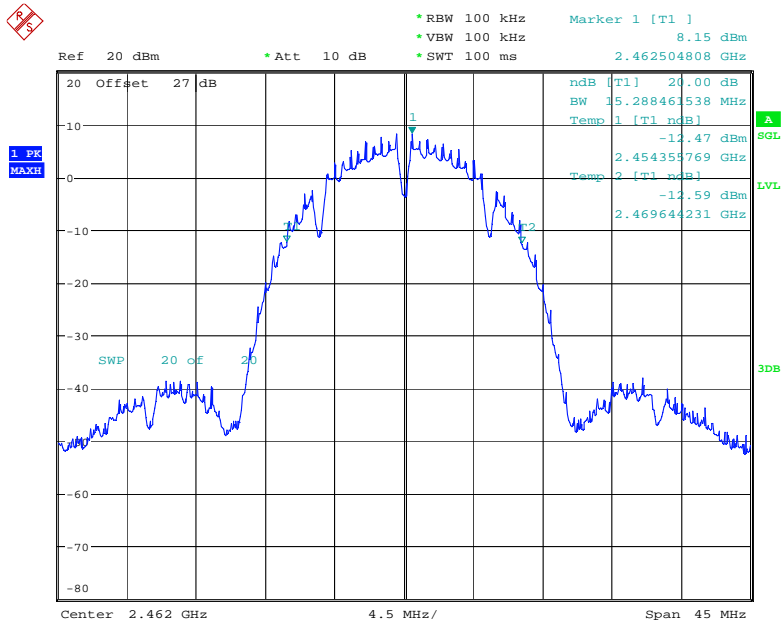
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### 20dB Bandwidth Channel 1 @ 11Mbps



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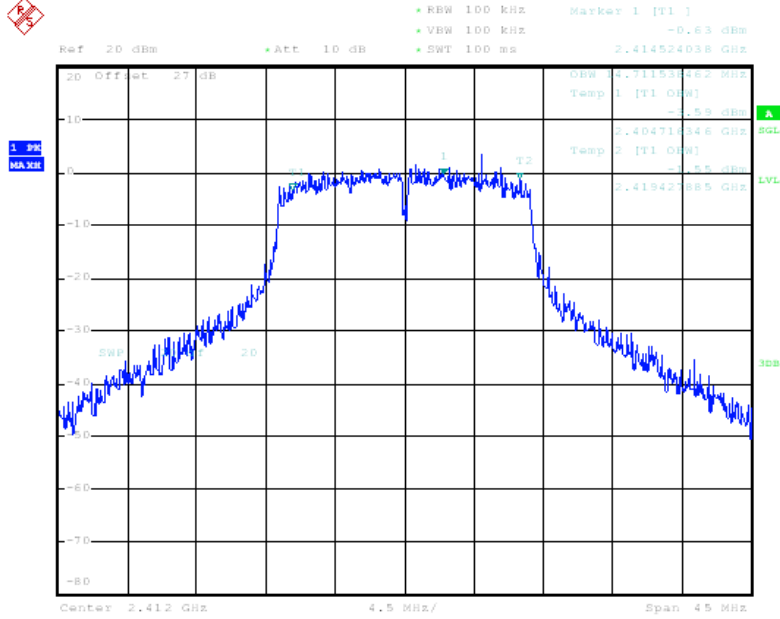
### 20dB Bandwidth Channel 6 @ 11Mbps



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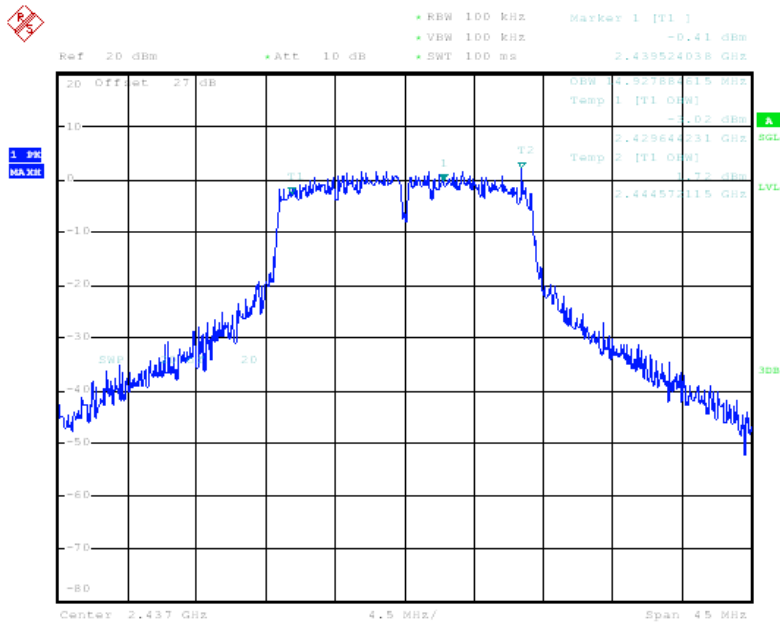
### 20dB Bandwidth Channel 11 @ 11Mbps

**802.11 g @ 6Mbps**



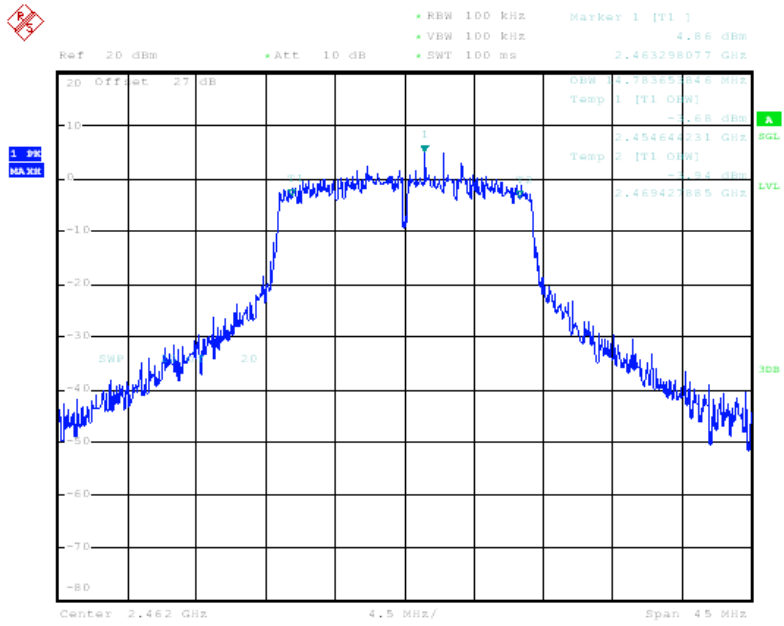
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**6dB Bandwidth Channel 1 @ 6Mbps**



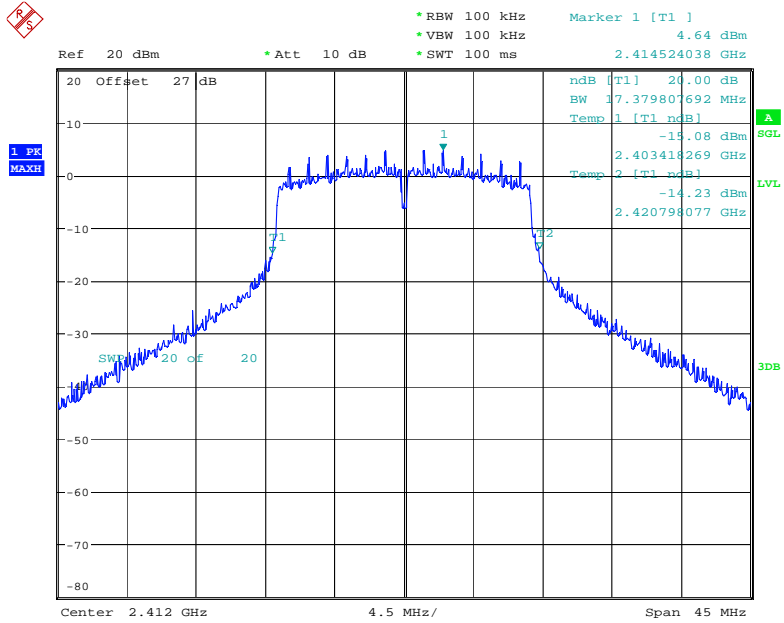
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**6dB Bandwidth Channel 6 @ 6Mbps**



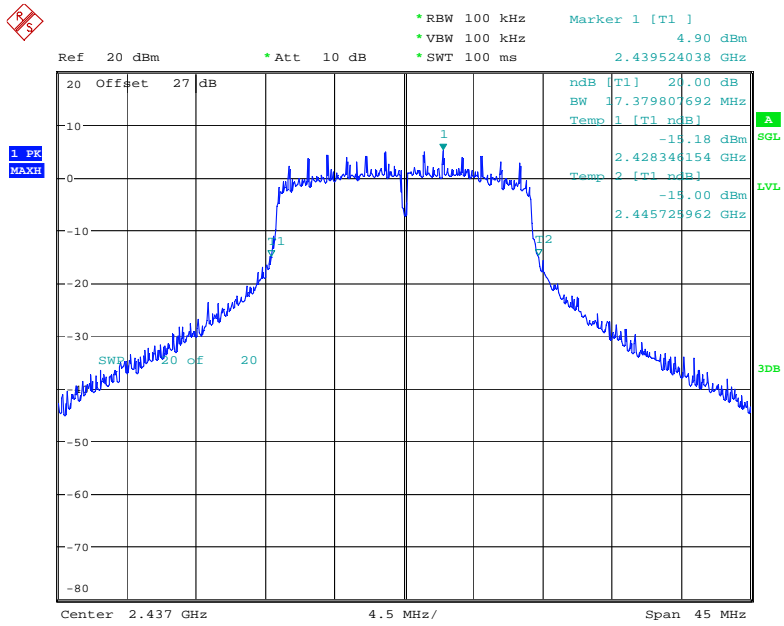
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### 6dB Bandwidth Channel 11 @ 6Mbps



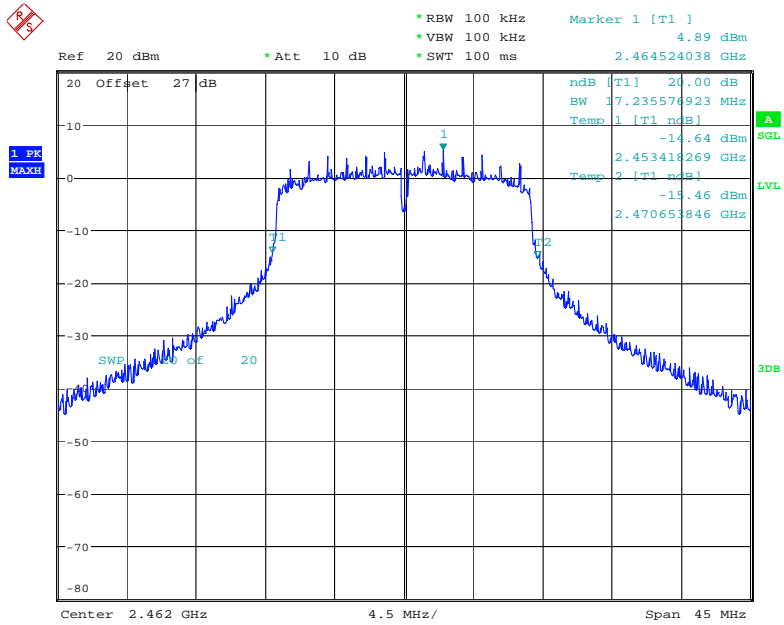
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### 20dB Bandwidth Channel 1 @ 6Mbps



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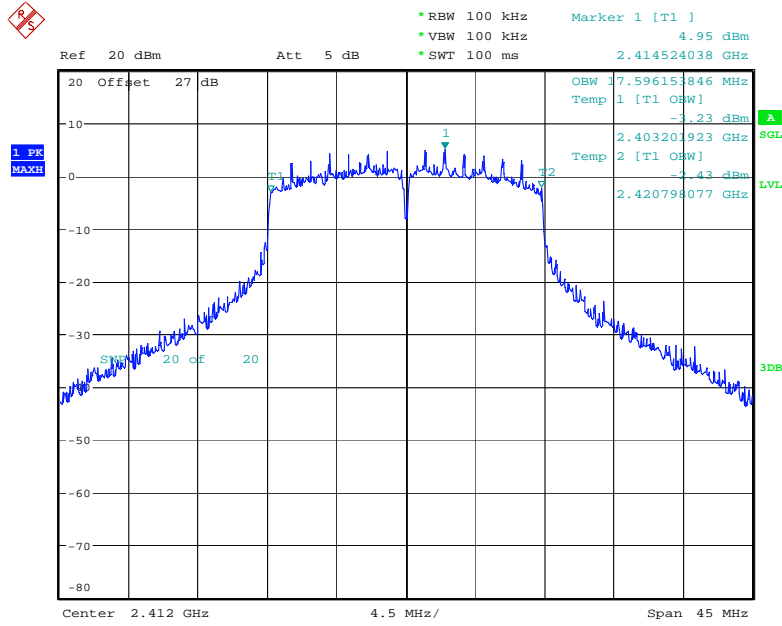
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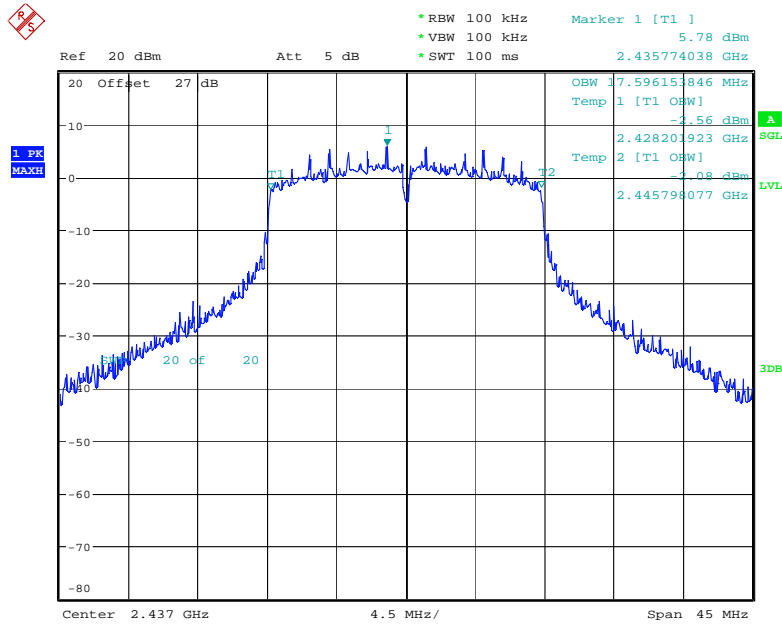
### 20dB Bandwidth Channel 11 @ 6Mbps

**802.11 n @ 7.22 Mbps**



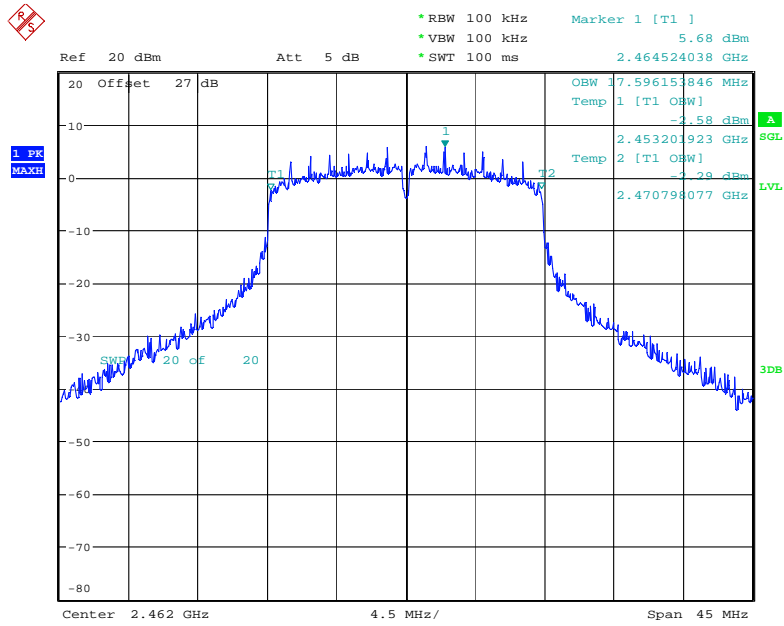
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**6dB Bandwidth Channel 1 @ 7.22Mbps**



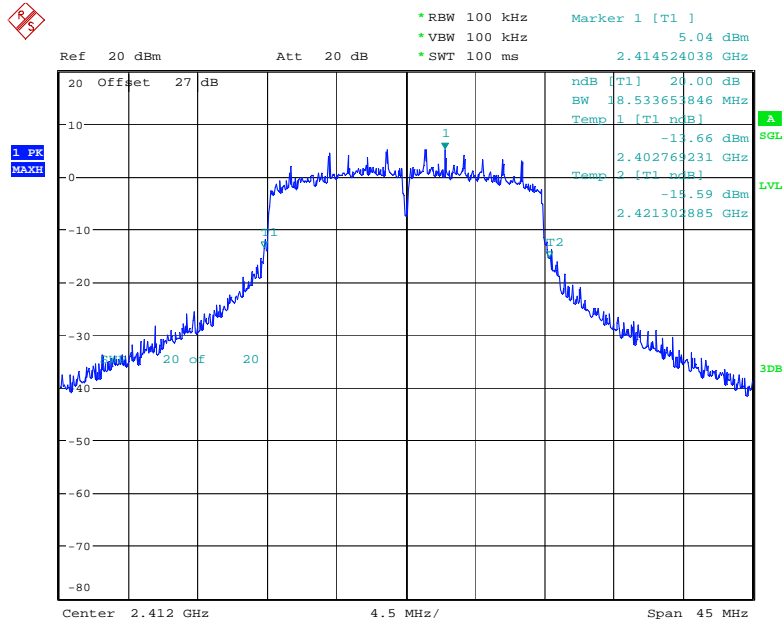
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**6dB Bandwidth Channel 6 @ 7.22Mbps**



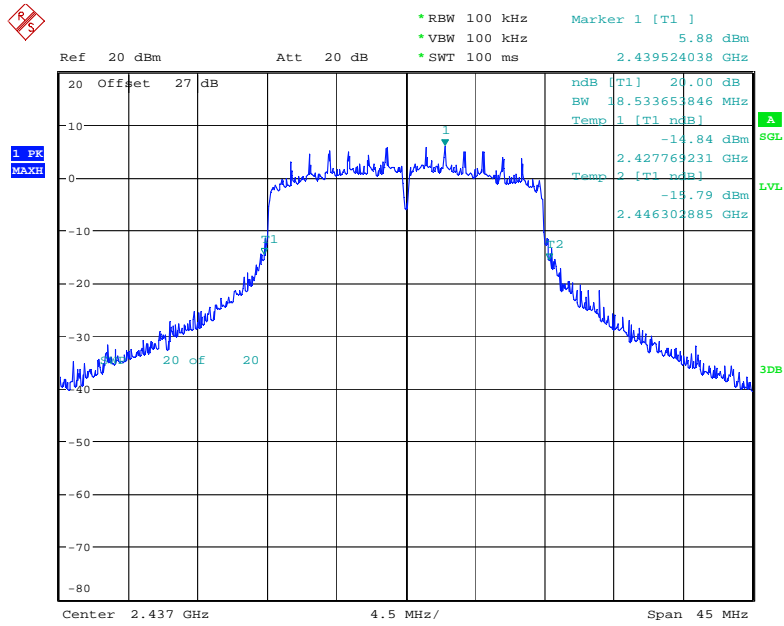
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**6dB Bandwidth Channel 11 @ 7.22Mbps**



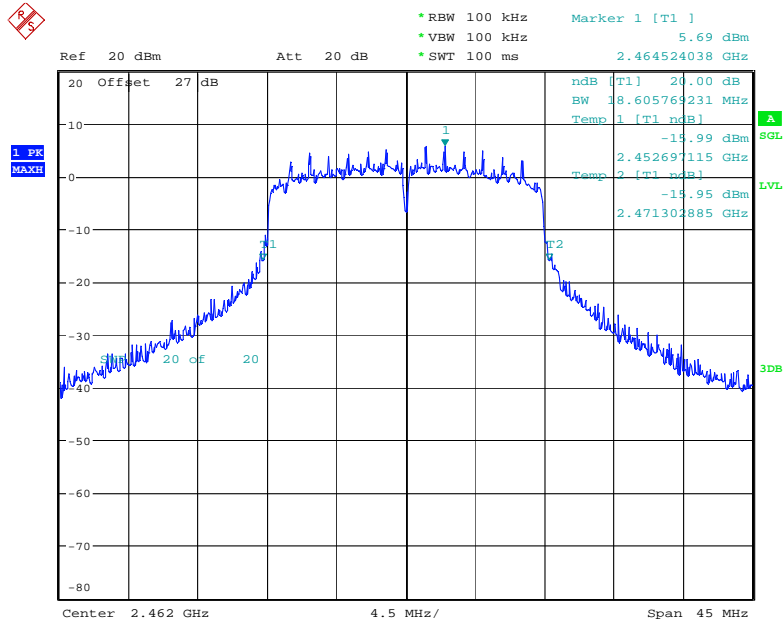
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**20dB Bandwidth Channel 1 @ 7.22Mbps**



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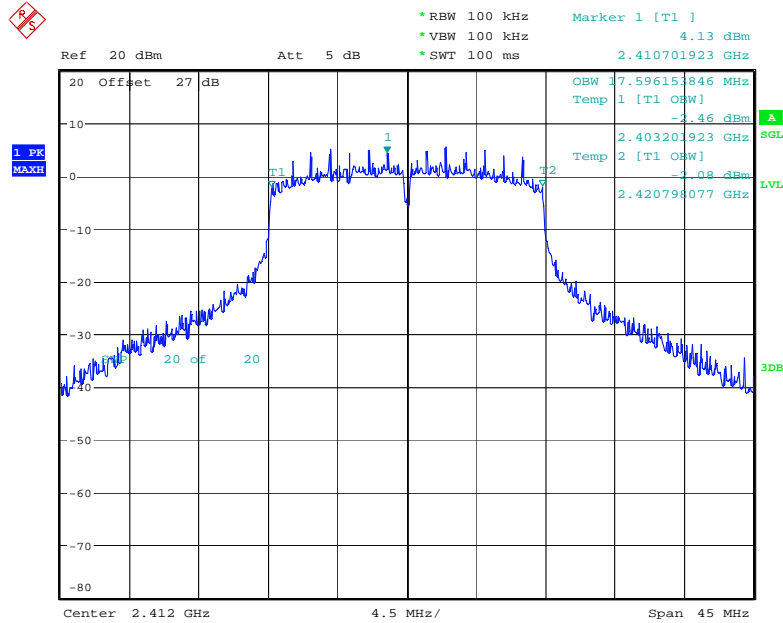
### 20dB Bandwidth Channel 6 @ 7.22Mbps



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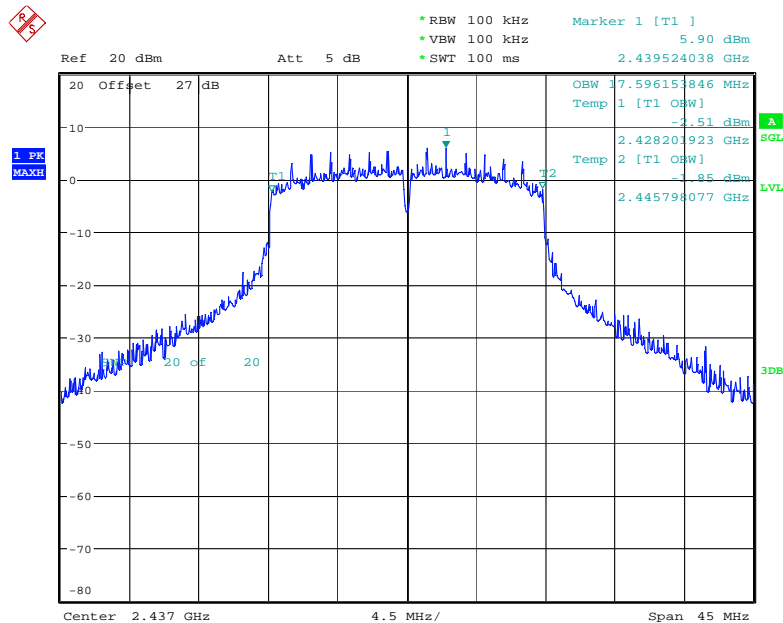
### 20dB Bandwidth Channel 11 @ 7.22Mbps

**802.11 n @ 6.5 Mbps**



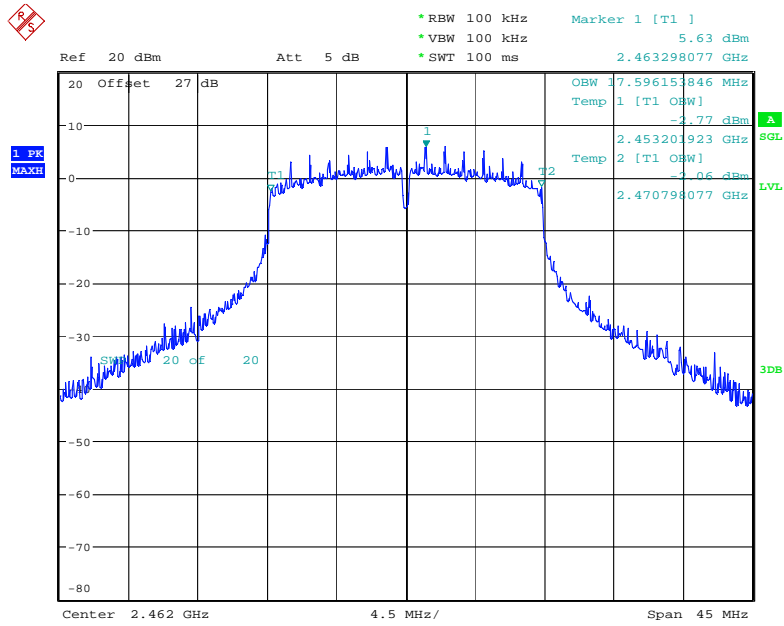
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**6dB Bandwidth Channel 1 @ 6.5Mbps**



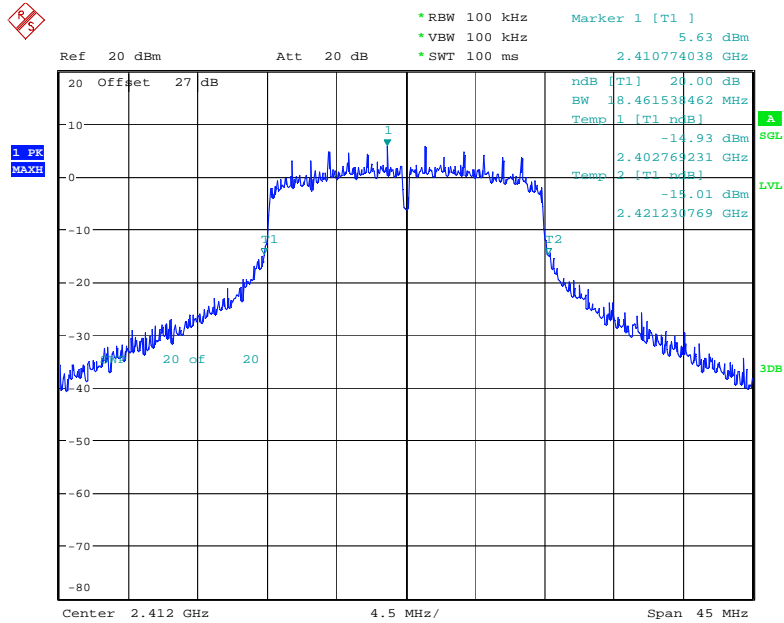
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**6dB Bandwidth Channel 6 @ 6.5Mbps**



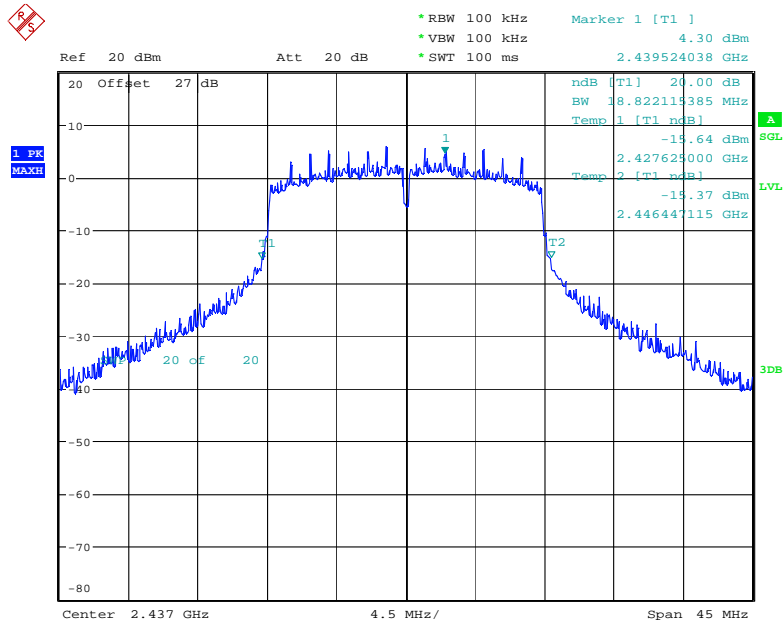
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### 6dB Bandwidth Channel 11 @ 6.5Mbps



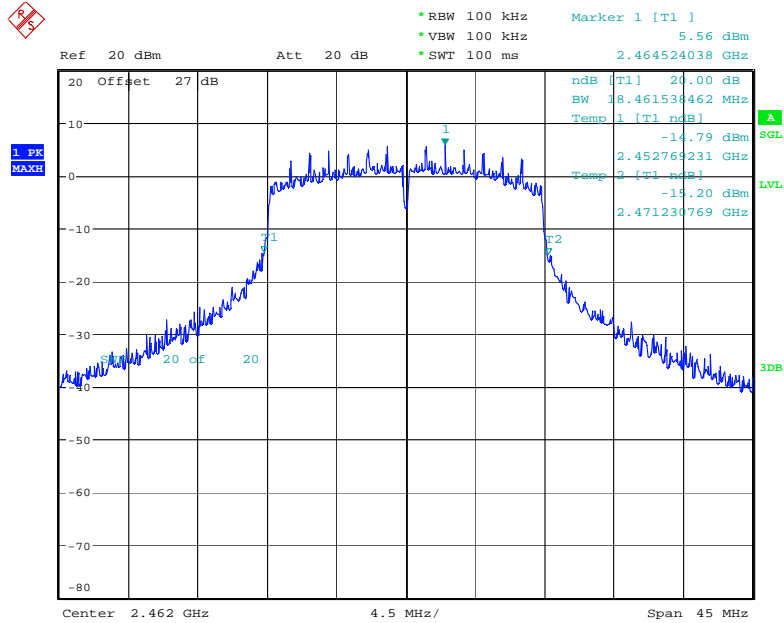
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### 20dB Bandwidth Channel 1 @ 6.5Mbps



Date: 5.MAY.2010 11:06:05

### 20dB Bandwidth Channel 6 @ 6.5Mbps



Date: 5.MAY.2010 11:04:49

### 20dB Bandwidth Channel 11 @ 6.5Mbps

**PEAK OUTPUT POWER**

CFR 47 Part 15.247

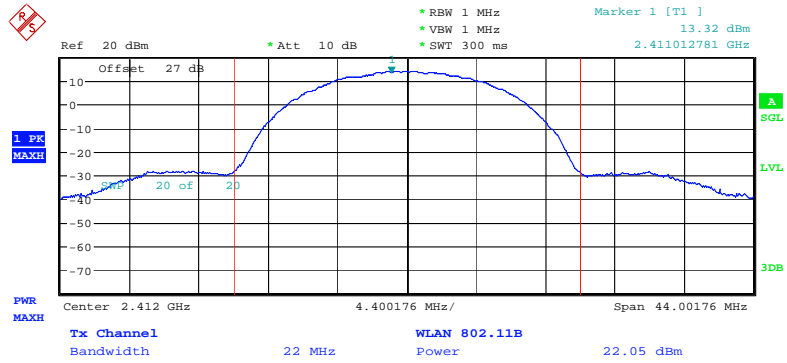
**Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the Spectrum analyzer through a specialized RF connector and a 20dB passive attenuator. A fully charged battery was used for the supply voltage.

**Measurement Results**

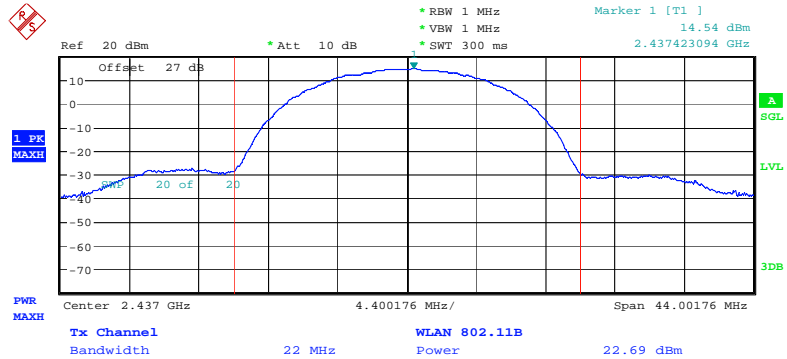
See Attached

**802.11 b @ 11Mbps**



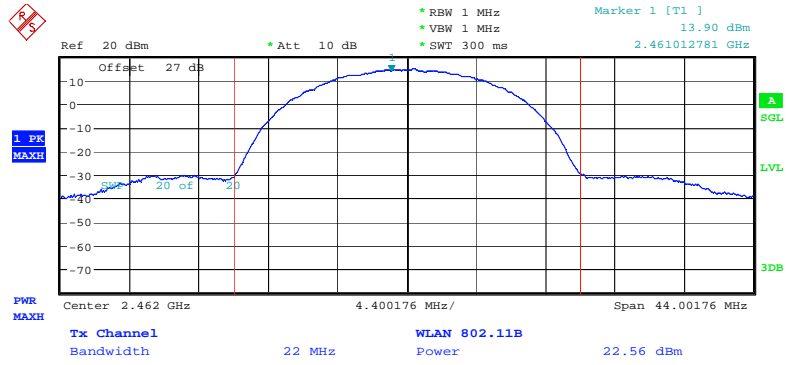
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**Max. Power Channel 1 @ 11Mbps**



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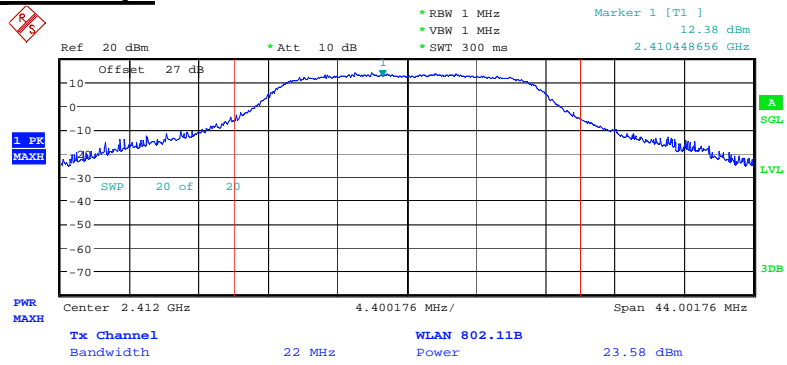
**Max. Power Channel 6 @ 11Mbps**



Date: 11.JUN.2010 09:22:38

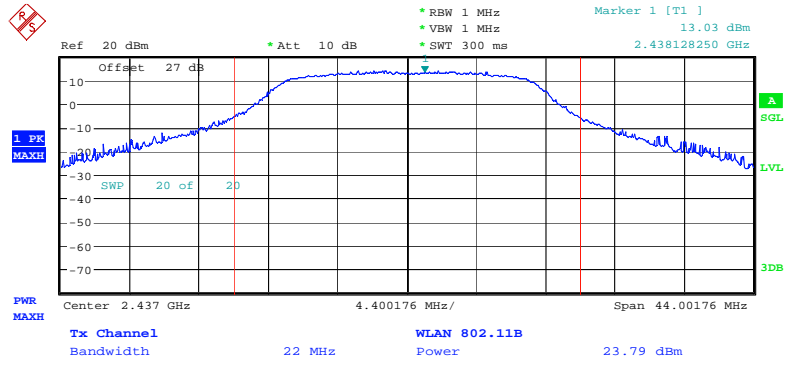
**Max. Power Channel 11 @ 11Mbps**

**802.11 g @ 6Mbps**



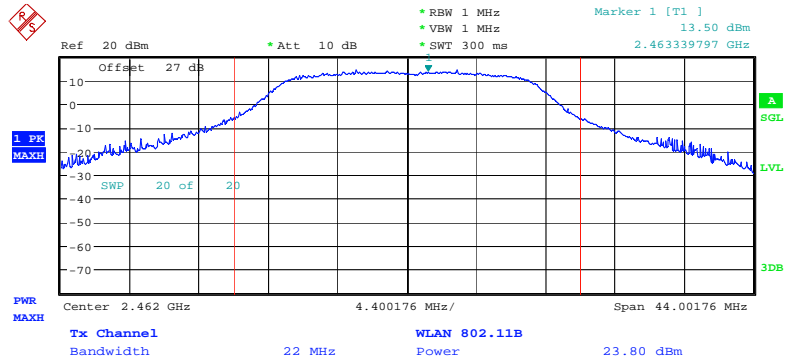
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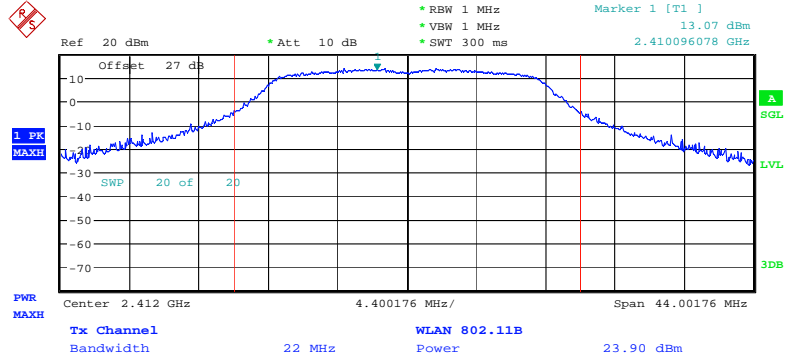
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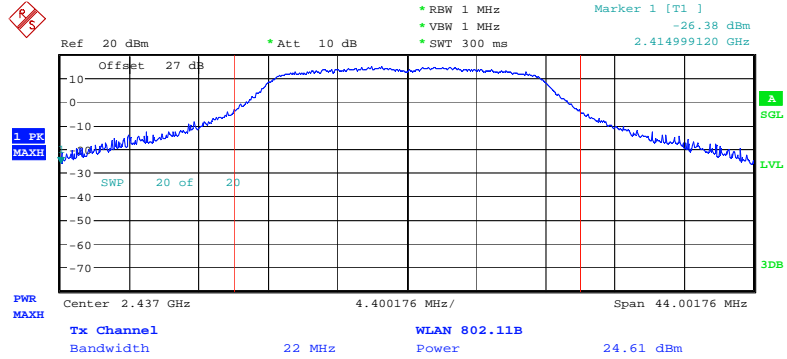
### Max. Power Channel 11 @ 6Mbps

**802.11 n @ 7.22Mbps**



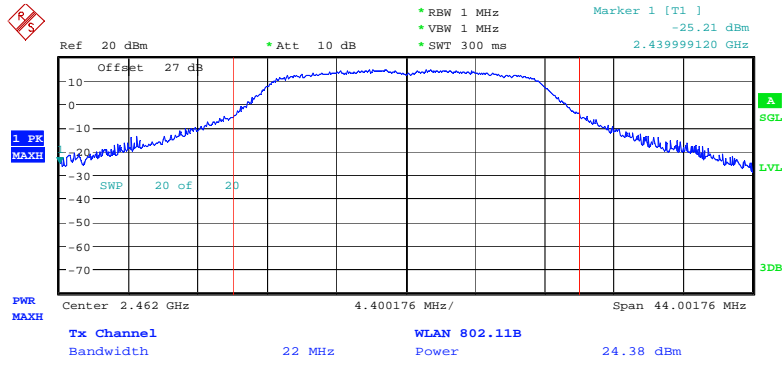
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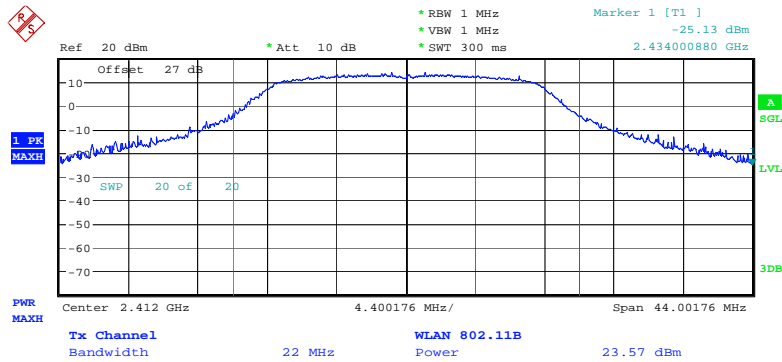
**Max. Power Channel 6 @ 7.22Mbps**



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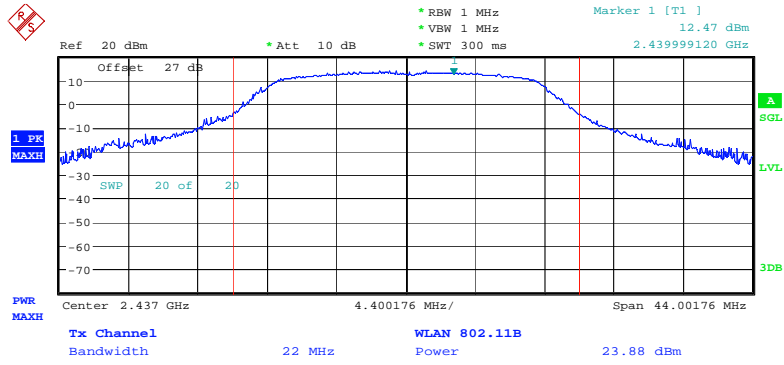
**Max. Power Channel 11 @ 7.22Mbps**

**802.11 n @ 6.5Mbps**



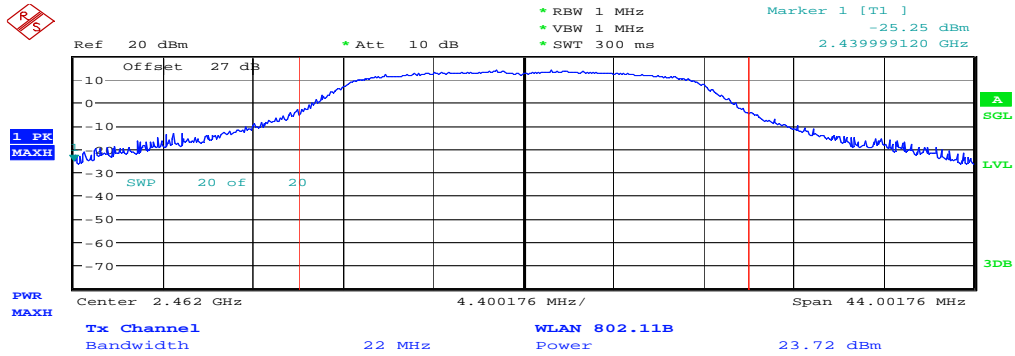
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**Max. Power Channel 1 @ 6.5Mbps**



Date: 11.JUN.2010 09:35:57

### Max. Power Channel 6 @ 6.5Mbps



Date: 11.JUN.2010 09:35:12

### Max. Power Channel 11 @ 6.5Mbps

**Power Spectral Density**

CFR 47 Part 15.247 (d)

**Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 20dB passive attenuator. A fully charged battery was used for the supply voltage.

The WLAN DSSS function of the EUT was enabled. The spectrum analyzer used the following settings:

- Span = 300kHz
- VBW =30kHz
- RBW=3kHz
- Sweep = 50ms
- Detector function = peak
- Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate.

**Measurement Results**

2412 MHz	2437MHz	2462MHz
-6.46	-6.04	-6.18

**802.11 b @ 11Mbps**

2412 MHz	2437MHz	2462MHz
-18.82	-19.12	-18.49

**802.11 g @ 6Mbps**

2412 MHz	2437MHz	2462MHz
-14.40	-14.48	-15.05

**802.11 n @ 7.22Mbps**

2412 MHz	2437MHz	2462MHz
-15.81	-16.61	-16.76

**802.11 n @ 6.5Mbps**

## **SPURIOUS RF CONDUCTED EMISSIONS**

CFR 47 Part 15.247

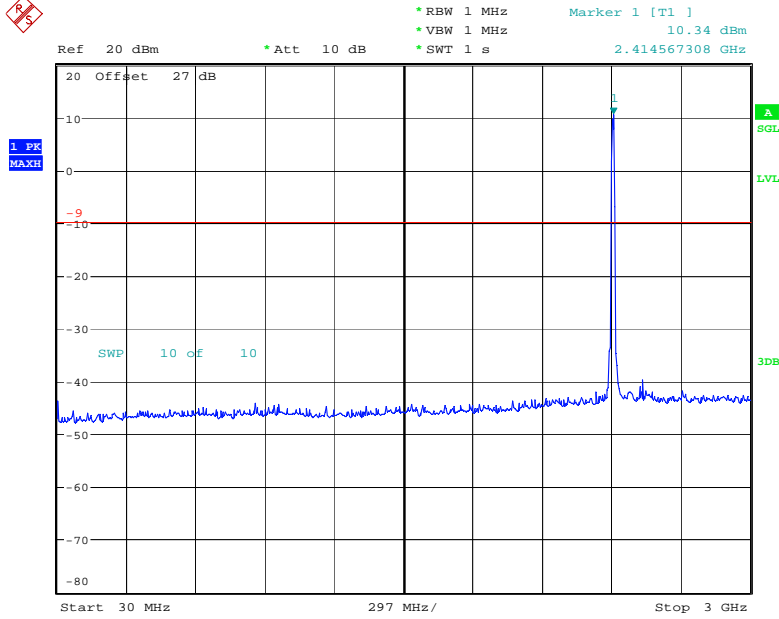
### **Measurement Procedure**

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 20dB passive attenuator. A fully charged battery was used for the supply voltage.

### **Measurement Results**

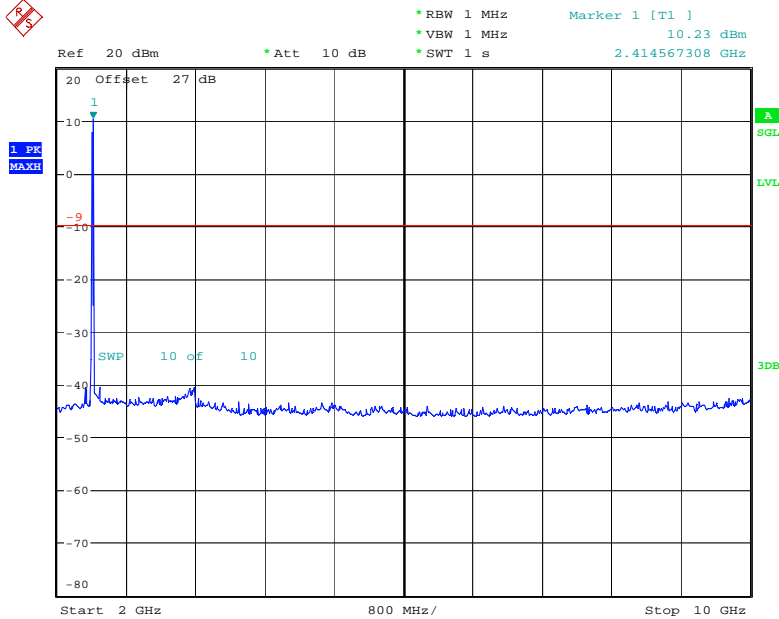
See attached:

802.11 b @ 11Mbps



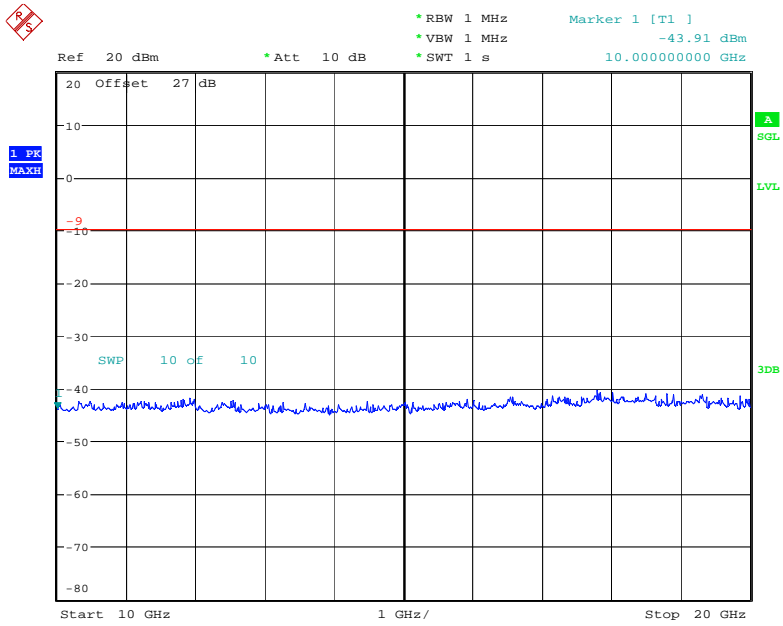
Date: 12.JUN.2010 02:44:24

Conducted Spurious Emissions 30-3000MHz (Low Channel)



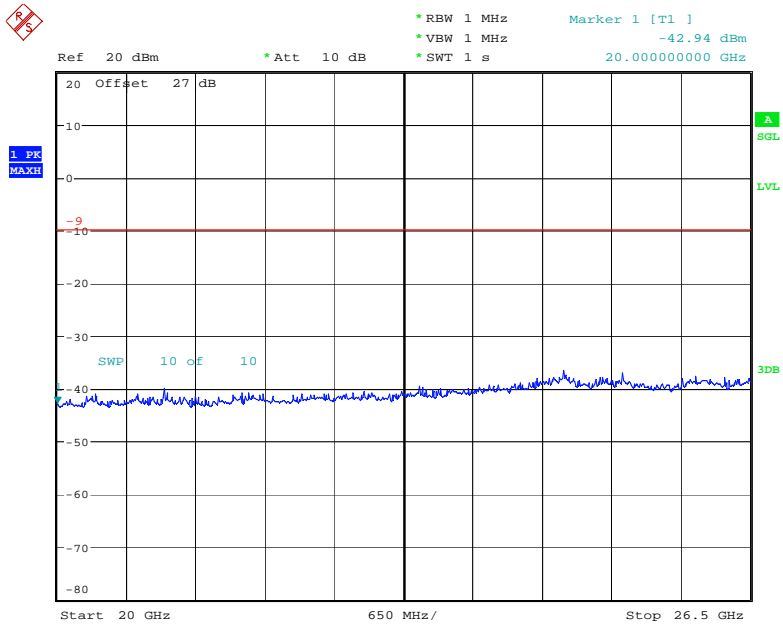
Date: 12.JUN.2010 02:44:59

Conducted Spurious Emissions 2-10GHz (Low Channel)



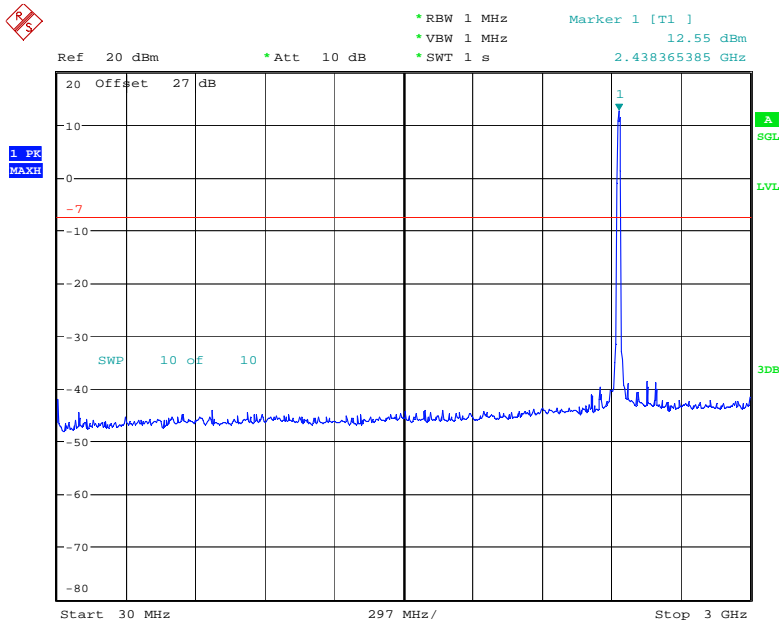
Date: 12.JUN.2010 02:45:42

### Conducted Spurious Emissions 10-20GHz (Low Channel)



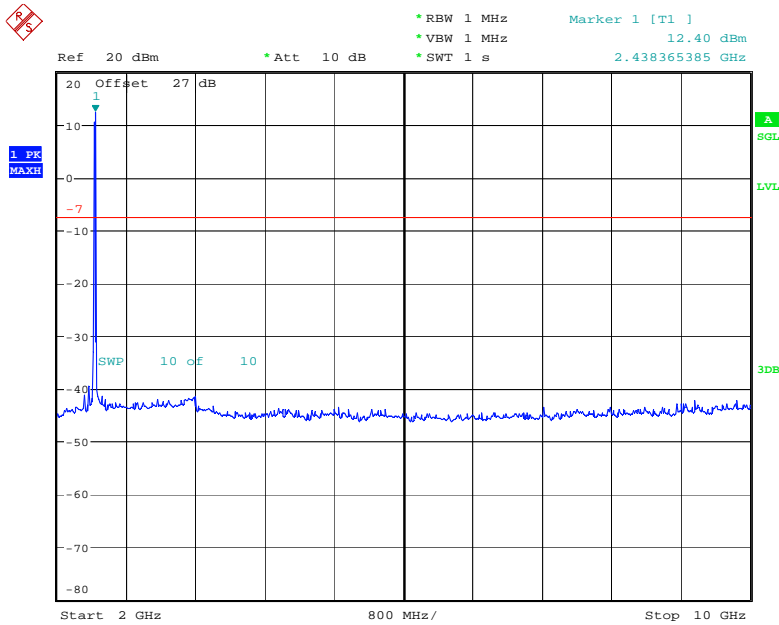
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### Conducted Spurious Emissions 20-26.5GHz (Low Channel)



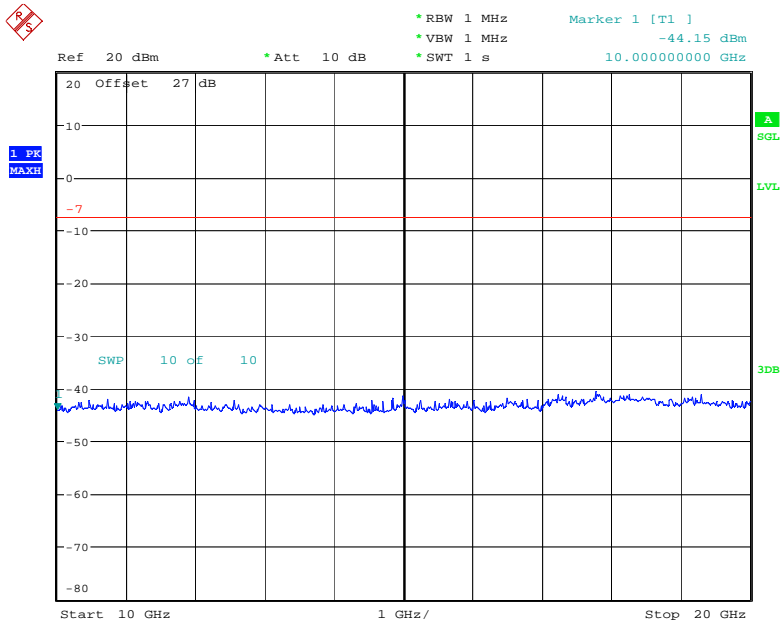
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### Conducted Spurious Emissions 30-3000MHz (Mid Channel)



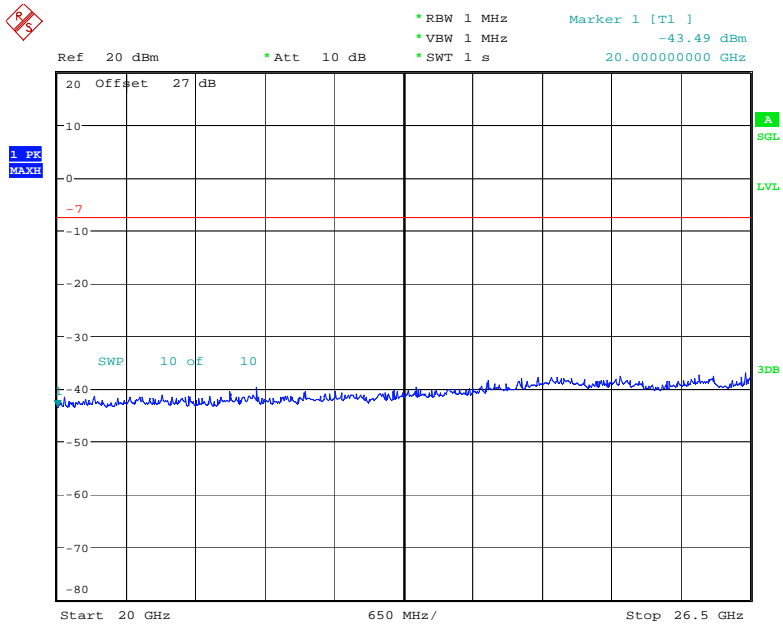
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### Conducted Spurious Emissions 2-10GHz (Mid Channel)



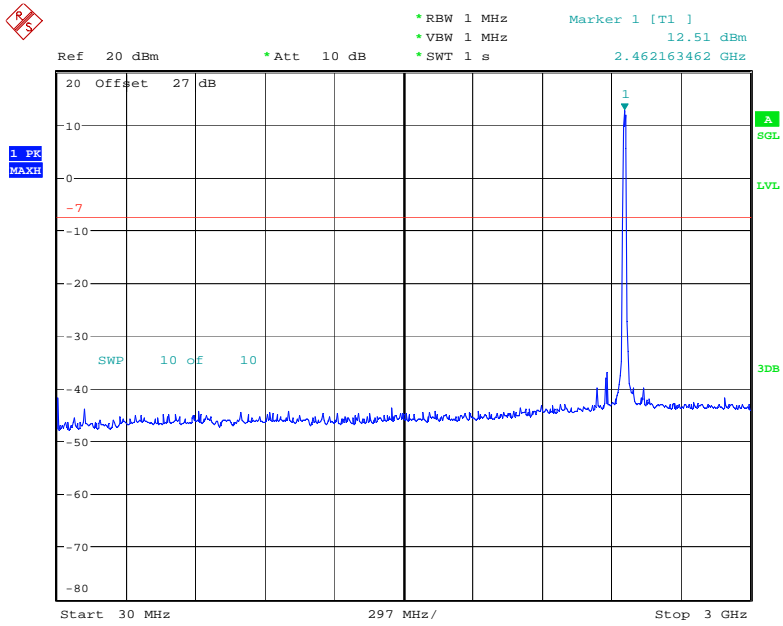
Date: 12.JUN.2010 02:52:02

Conducted Spurious Emissions 10-20GHz (Mid Channel)



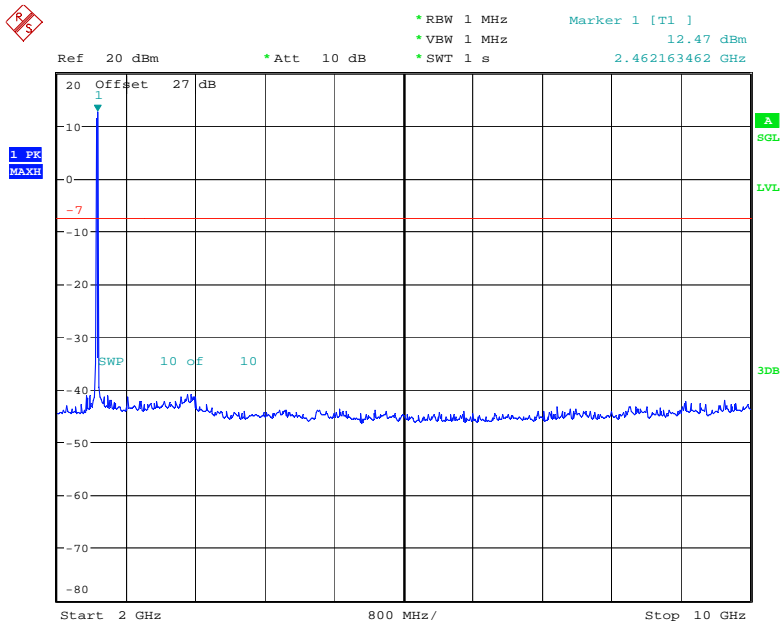
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Conducted Spurious Emissions 20-26.5GHz (Mid Channel)



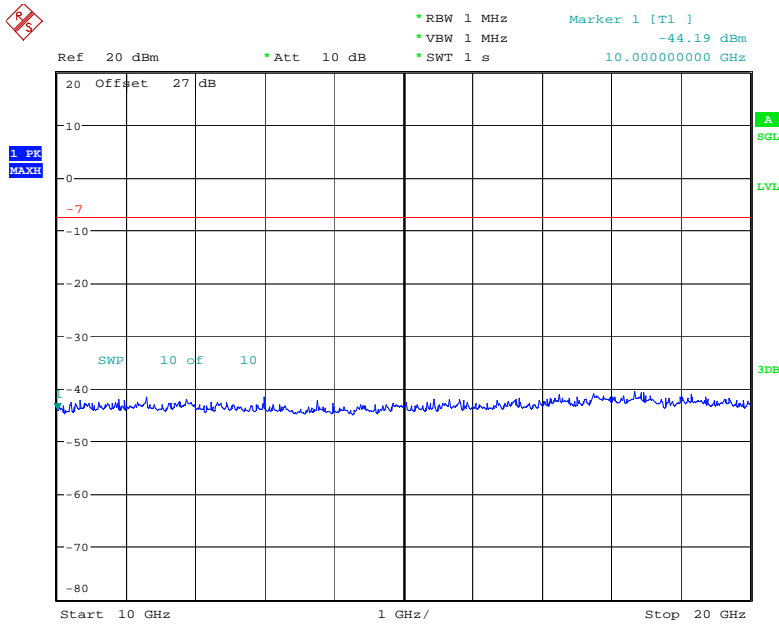
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### Conducted Spurious Emissions 30-3000MHz (High Channel)



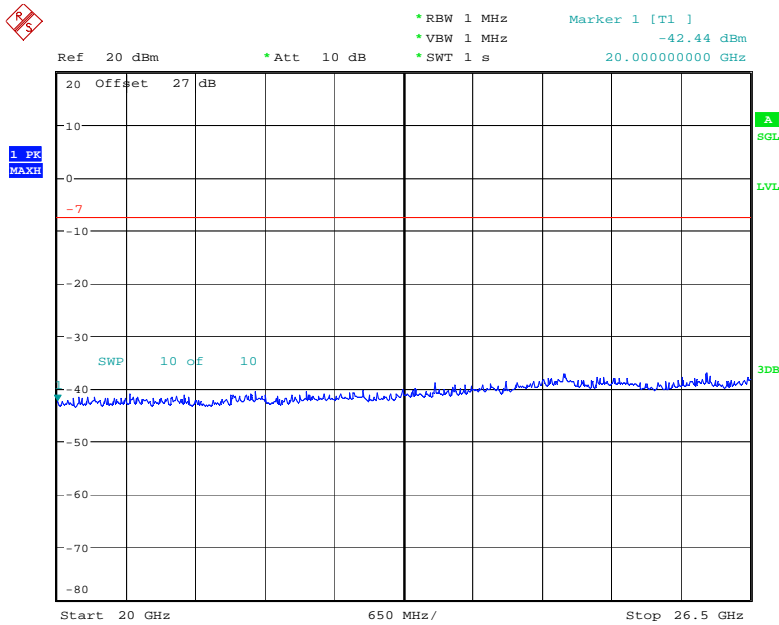
Date: 12.JUN.2010 02:53:50

### Conducted Spurious Emissions 2-10GHz (High Channel)



Date: 12.JUN.2010 02:54:41

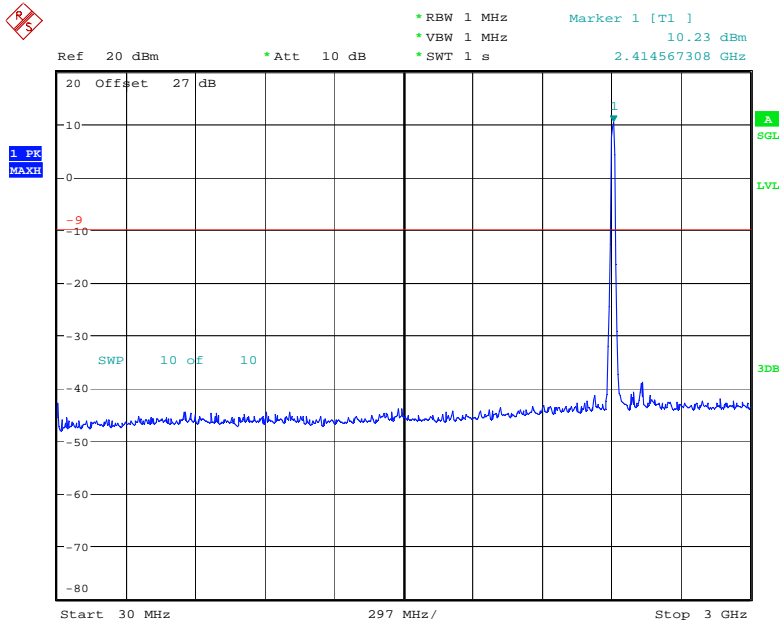
### Conducted Spurious Emissions 10-20GHz (High Channel)



Date: 12.JUN.2010 02:55:09

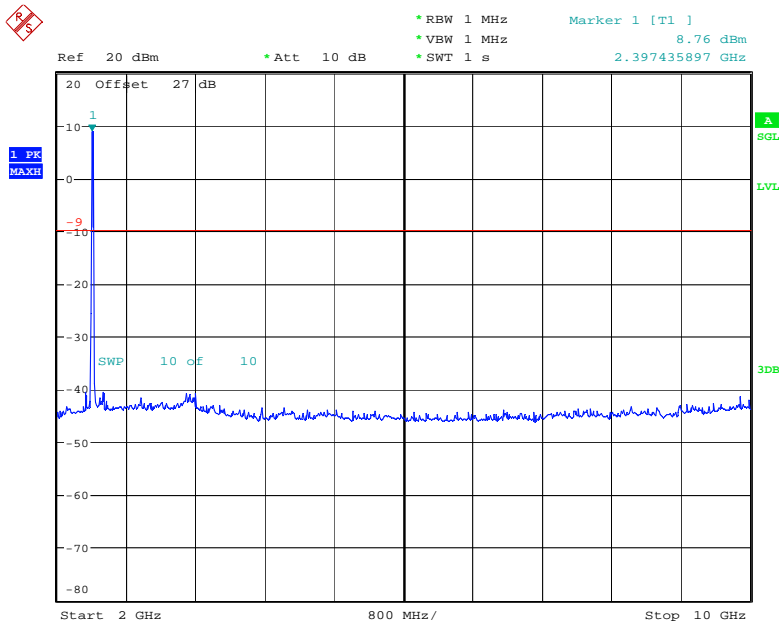
### Conducted Spurious Emissions 20-26.5GHz (High Channel)

802.11 g @ 6Mbps



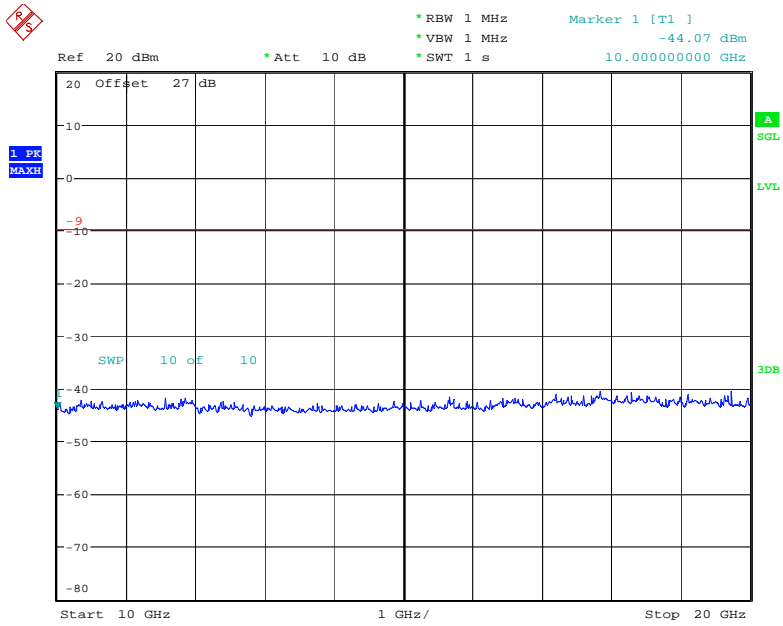
Date: 12.JUN.2010 02:59:09

Conducted Spurious Emissions 30-3000MHz (Low Channel)



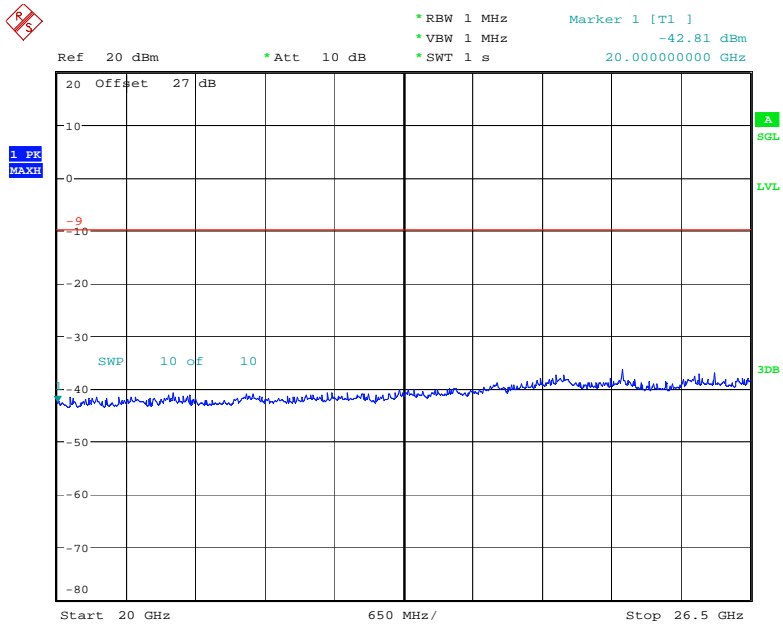
Date: 12.JUN.2010 03:01:22

Conducted Spurious Emissions 2-10GHz (Low Channel)



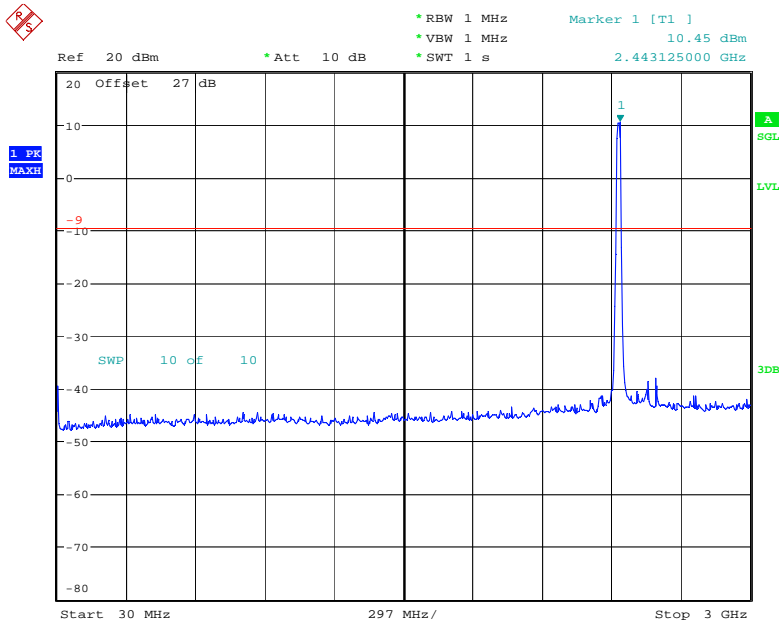
Date: 12.JUN.2010 03:01:58

### Conducted Spurious Emissions 10-20GHz (Low Channel)



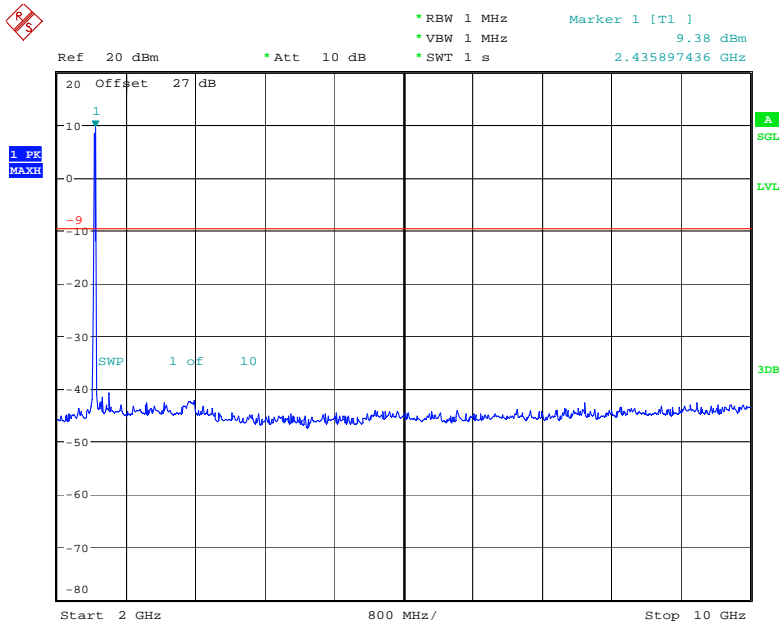
Date: 12.JUN.2010 03:02:27

### Conducted Spurious Emissions 20-26.5GHz (Low Channel)



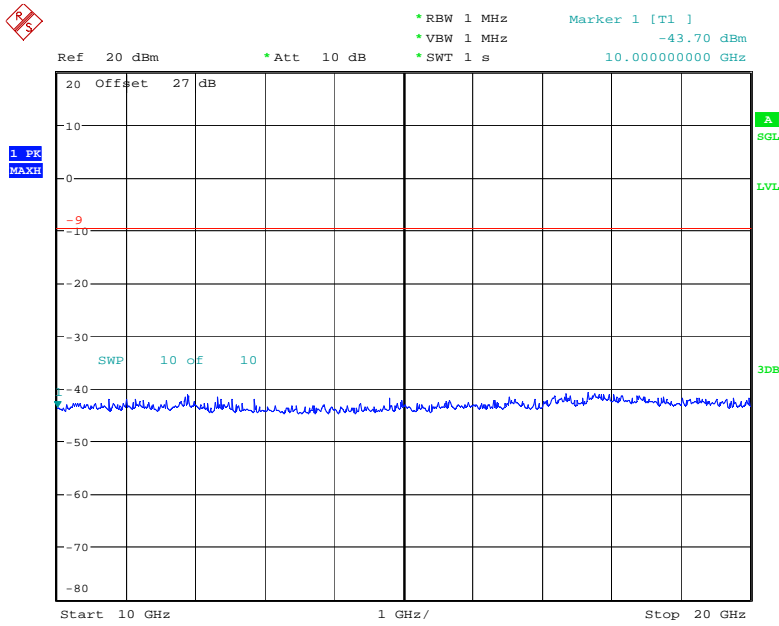
Date: 12.JUN.2010 03:06:23

Conducted Spurious Emissions 30-3000MHz (Mid Channel)



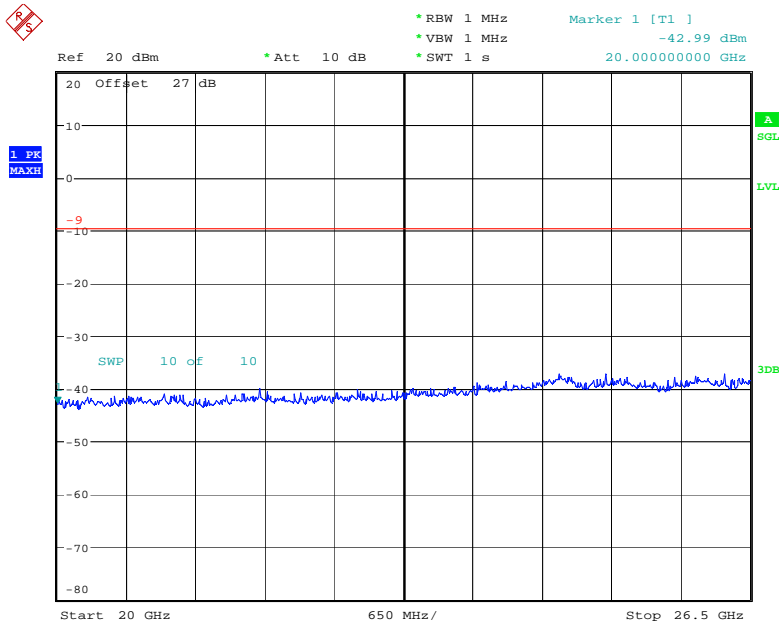
Date: 12.JUN.2010 03:06:48

Conducted Spurious Emissions 2-10GHz (Mid Channel)



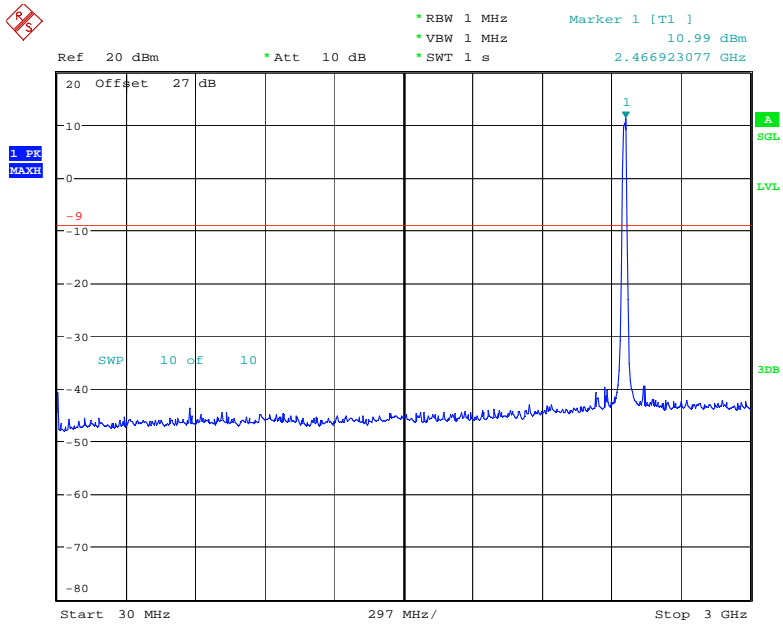
Date: 12.JUN.2010 03:07:17

Conducted Spurious Emissions 10-20GHz (Mid Channel)



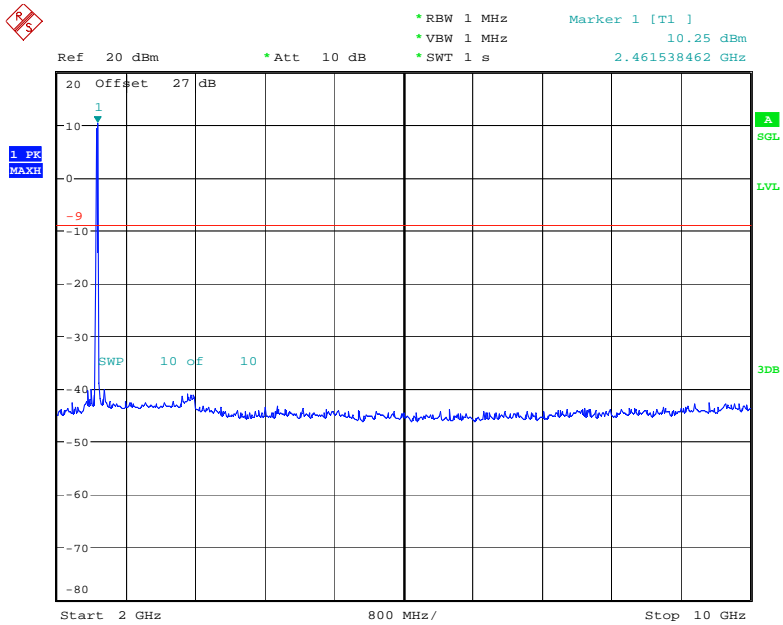
Date: 12.JUN.2010 03:07:45

Conducted Spurious Emissions 20-26.5GHz (Mid Channel)



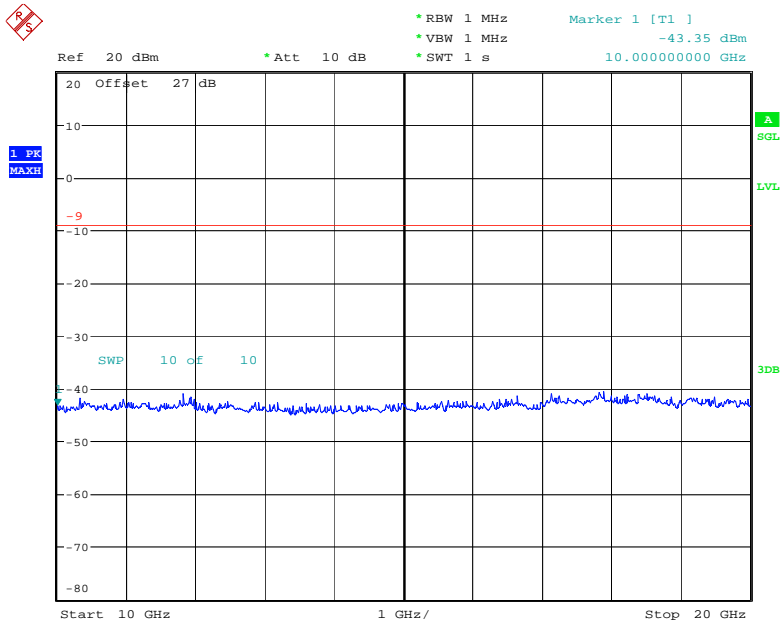
Date: 12.JUN.2010 03:09:56

### Conducted Spurious Emissions 30-3000MHz (High Channel)



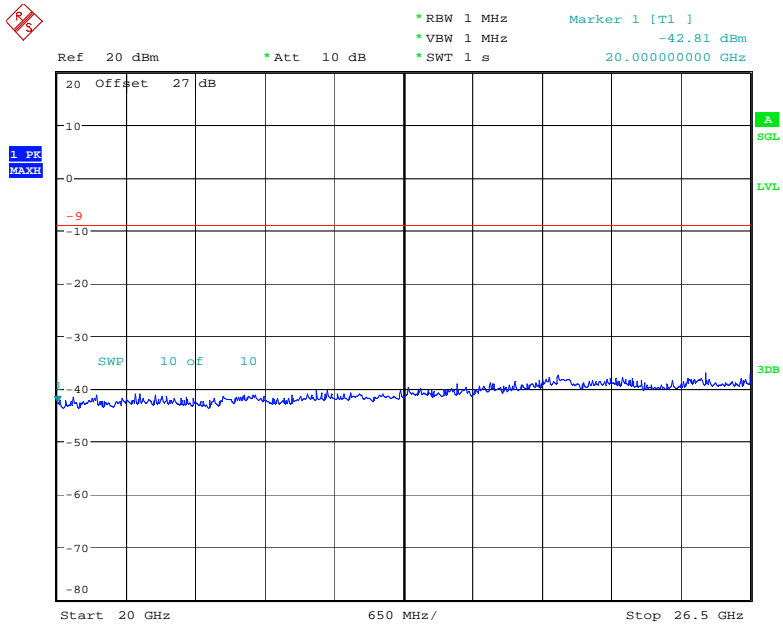
Date: 12.JUN.2010 03:10:28

### Conducted Spurious Emissions 2-10GHz (High Channel)



Date: 12.JUN.2010 03:11:07

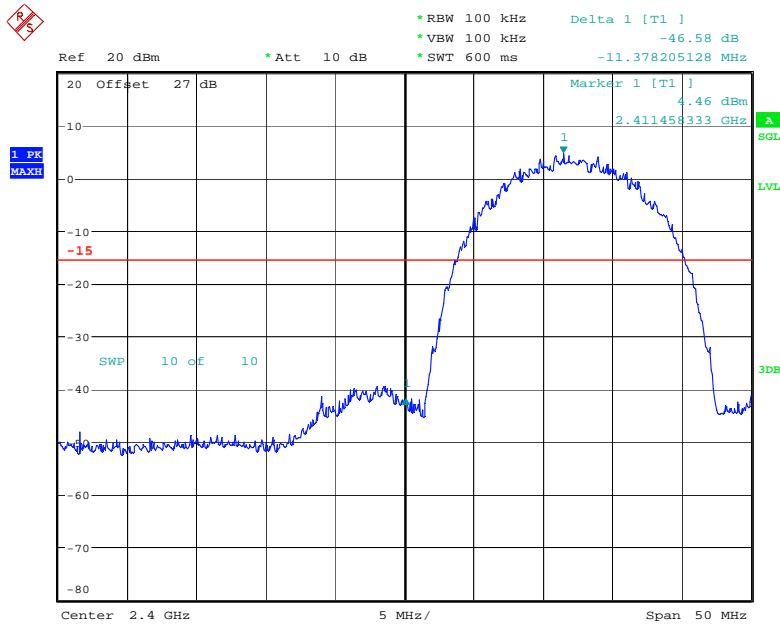
### Conducted Spurious Emissions 10-20GHz (High Channel)



Date: 12.JUN.2010 03:12:02

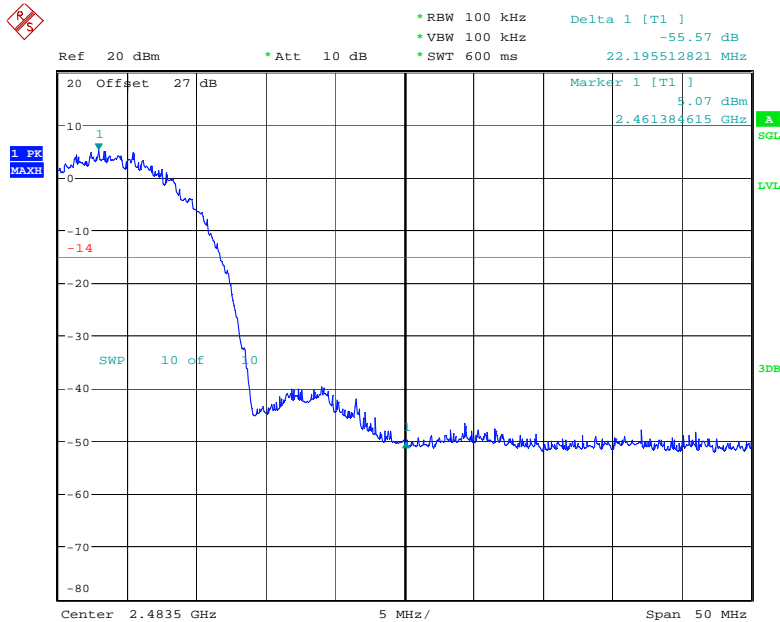
### Conducted Spurious Emissions 20-26.5GHz (High Channel)

**802.11 b @ 11 Mbps Band Edge**



Date: 22.JUN.2010 06:35:14

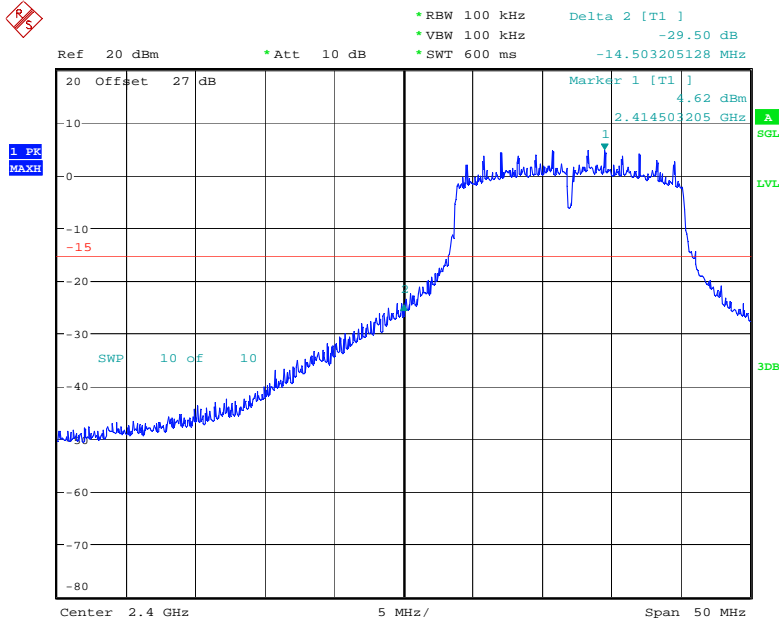
**Channel 1 @ 11 Mbps – Lower Band Edge**



Date: 22.JUN.2010 06:36:55

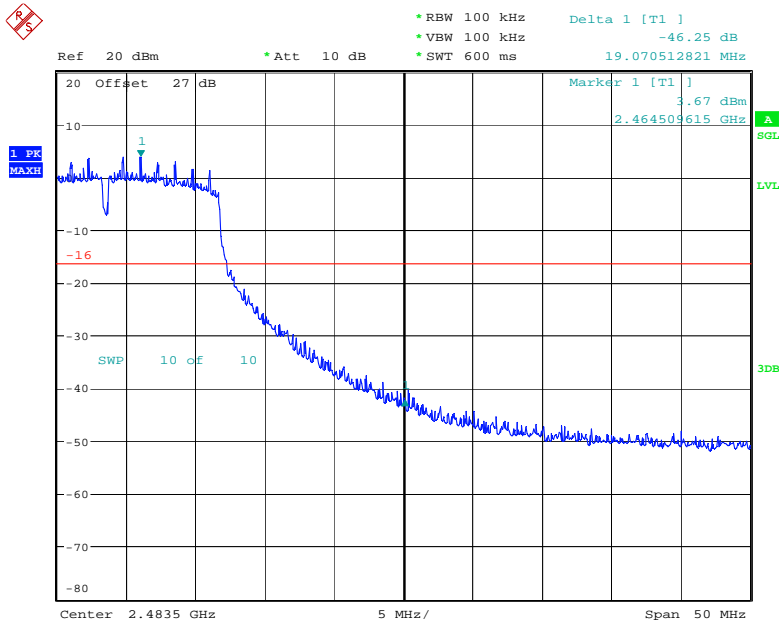
**Channel 11 @ 11 Mbps – Upper Band Edge**

**802.11 g @ 6 Mbps Band Edge**



Date: 11.JUN.2010 08:28:52

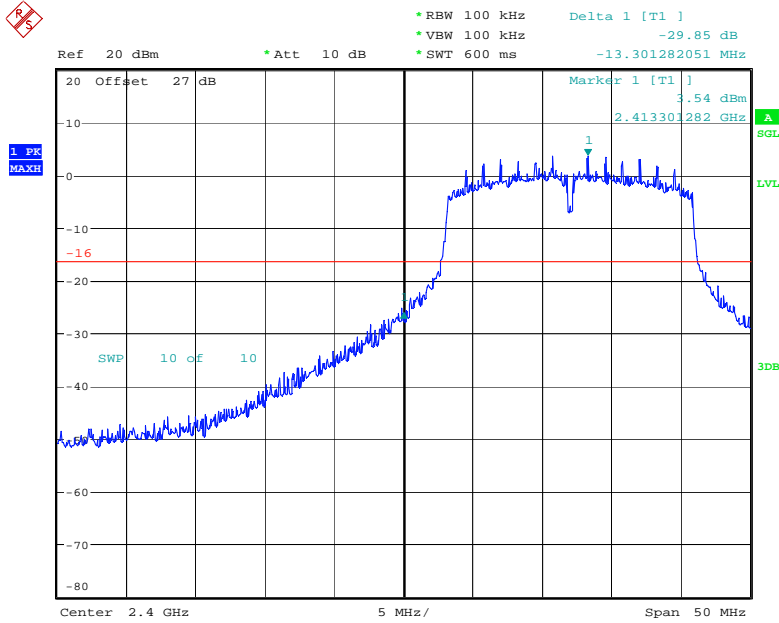
**Channel 1 @ 6 Mbps – Lower Band Edge**



Date: 22.JUN.2010 06:42:31

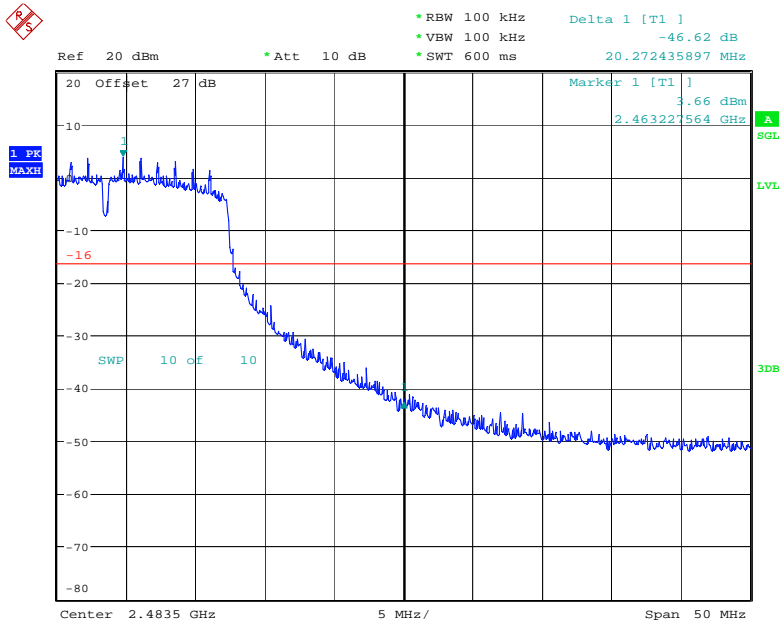
**Channel 11 @ 6 Mbps – Upper Band Edge**

**802.11 n @ 6.5 Mbps Band Edge**



Date: 22.JUN.2010 06:51:27

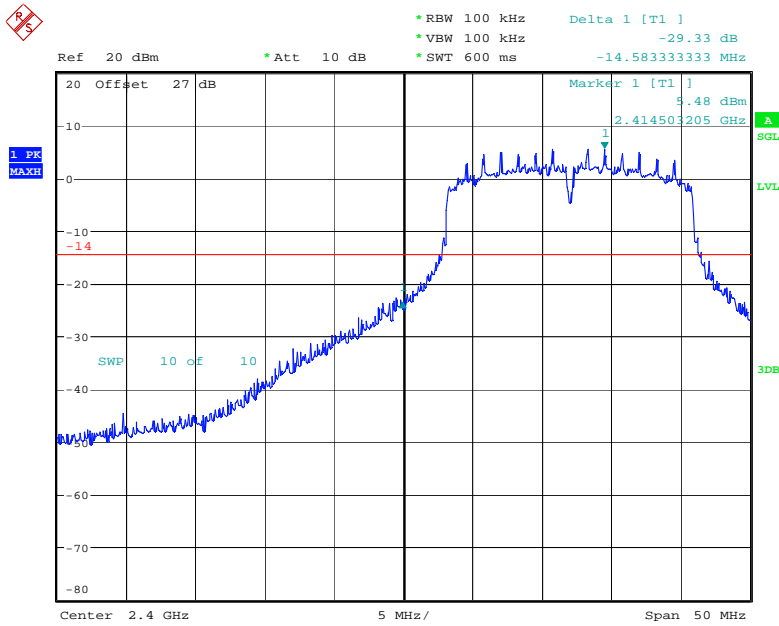
**Channel 1 @ 6.5 Mbps – Lower Band Edge**



Date: 22.JUN.2010 06:52:37

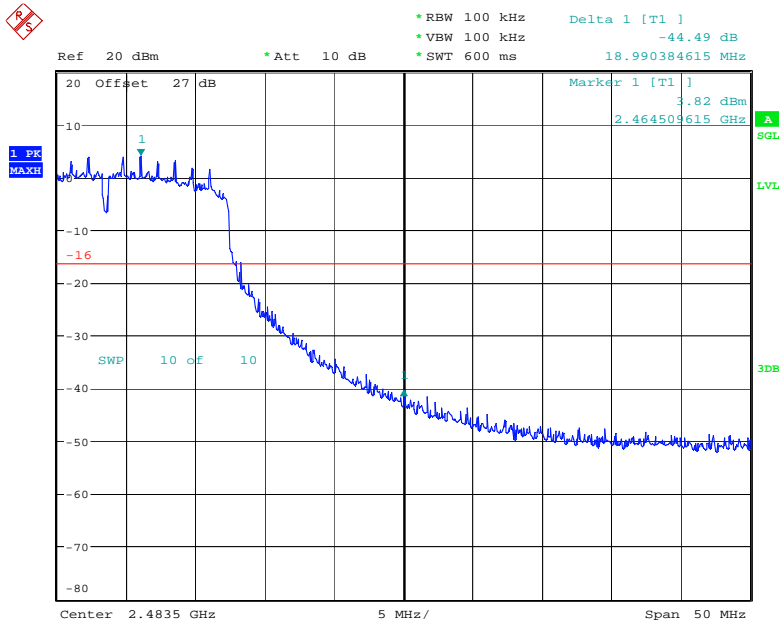
**Channel 11 @ 6.5 Mbps – Upper Band Edge**

**802.11 n @ 7.22 Mbps Band Edge**



Date: 11.JUN.2010 09:14:24

**Channel 1 @ 7.22 Mbps – Lower Band Edge**



Date: 22.JUN.2010 06:54:03

**Channel 11 @ 7.22 Mbps – Upper Band Edge**

## **AC LINE CONDUCTED EMISSIONS**

CFR 47 Part 15.207

### **Measurement Procedure**

Measured levels of ac power line conducted emission shall be the radio-noise voltage from the line probe or across the 50  $\Omega$  LISN port, where permitted, terminated into a 50  $\Omega$  noise meter, or where permitted or required, the radio-noise current on the power line sensed by a current probe.

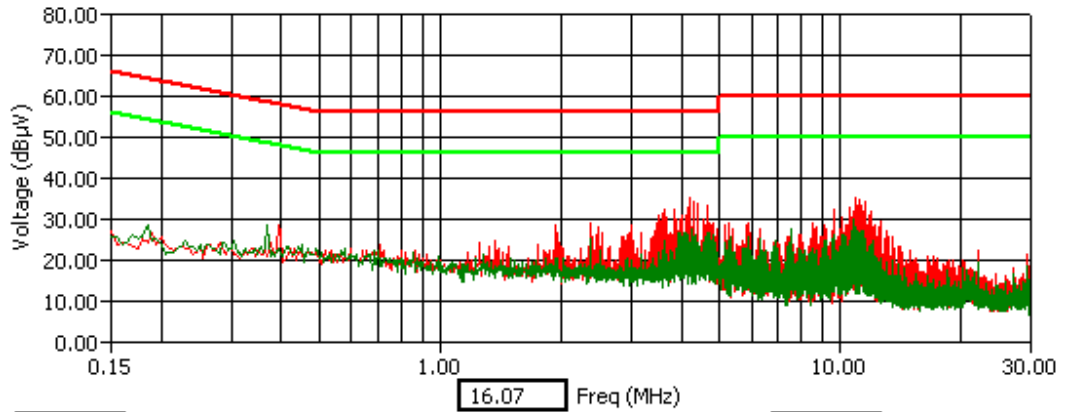
All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using an LISN, the 50  $\Omega$  measuring port is terminated by a 50  $\Omega$  radio-noise meter or a 50  $\Omega$  resistive load. All other ports are terminated in 50  $\Omega$ .

Detectors – Peak and Average Detector

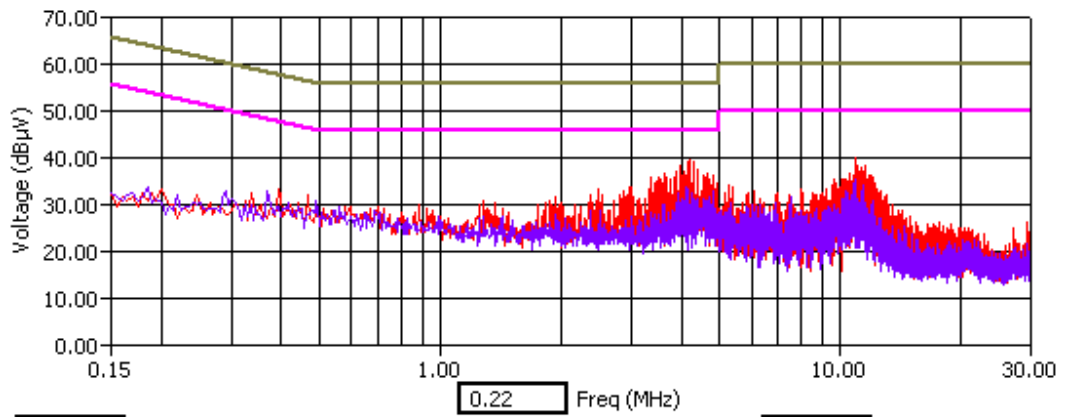
### **Measurement Results**

See attached:

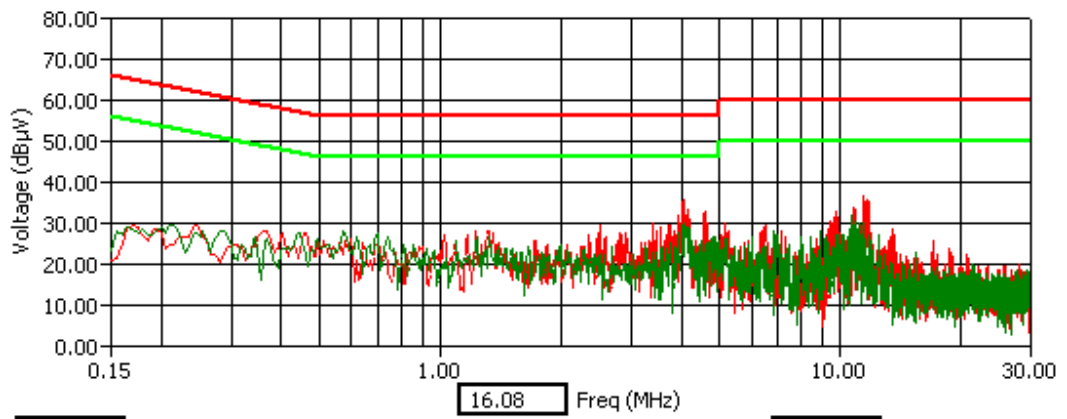
802.11b @ 11Mbps



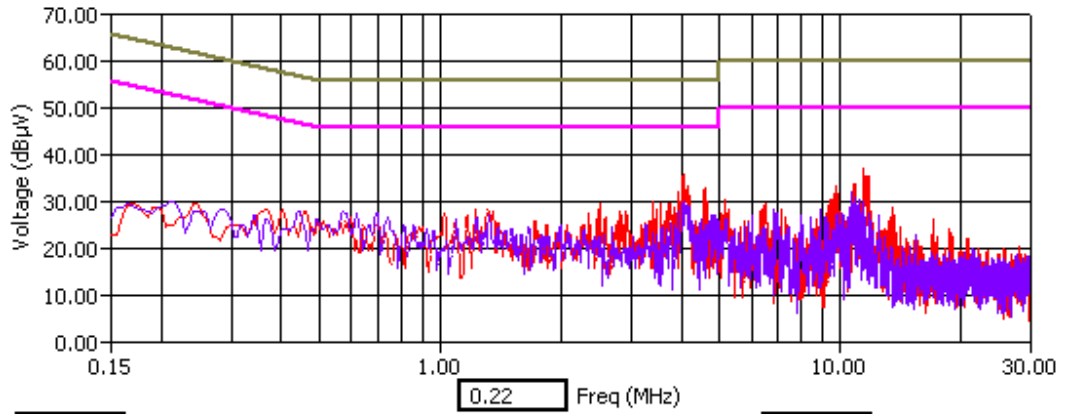
WLAN Channel 1 - Tx Mode - AVG Detector



WLAN Channel 1 - Tx Mode - Peak Detector

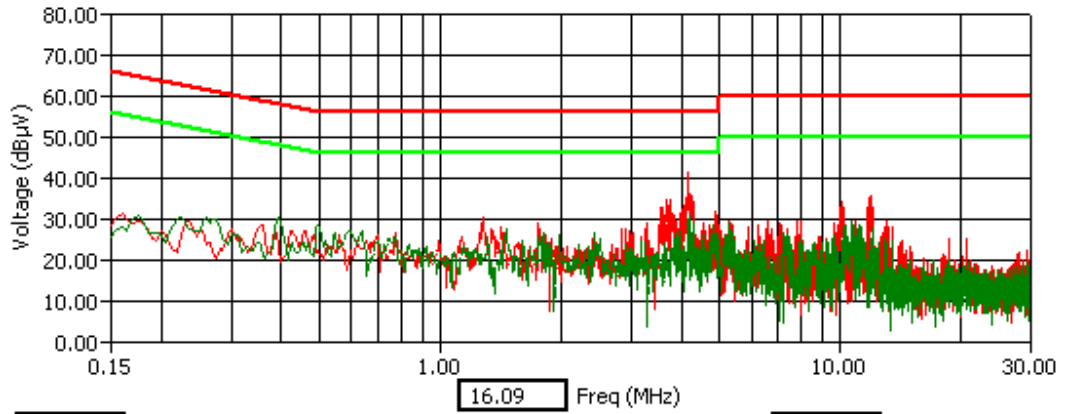


WLAN Channel 6 - Tx Mode - AVG Detector



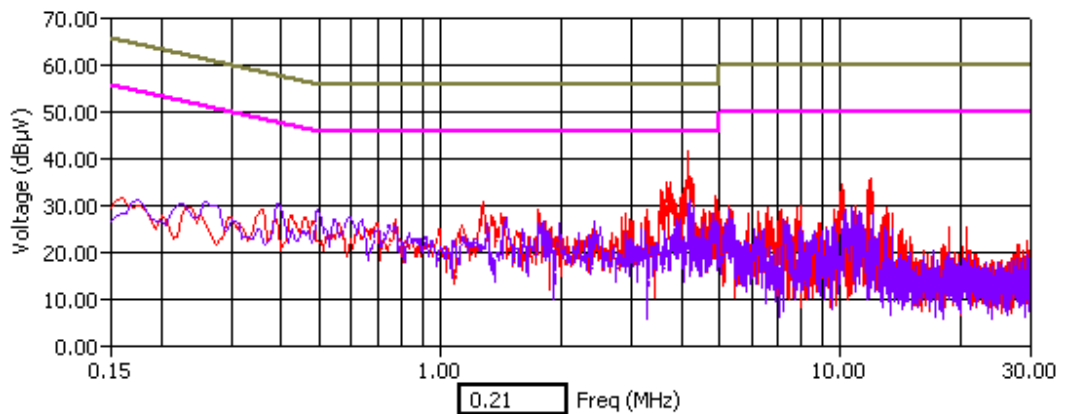
25.18 (PEAK) EMI (N) 63.01 QP Limit  
29.99 (PEAK) EMI (L1) 53.01 AVG Limit

WLAN Channel 6 - Tx Mode - Peak Detector



17.56 (AVG) EMI (N) 50.00 AVG Limit  
15.45 (AVG) EMI (L1) 60.00 QP Limit

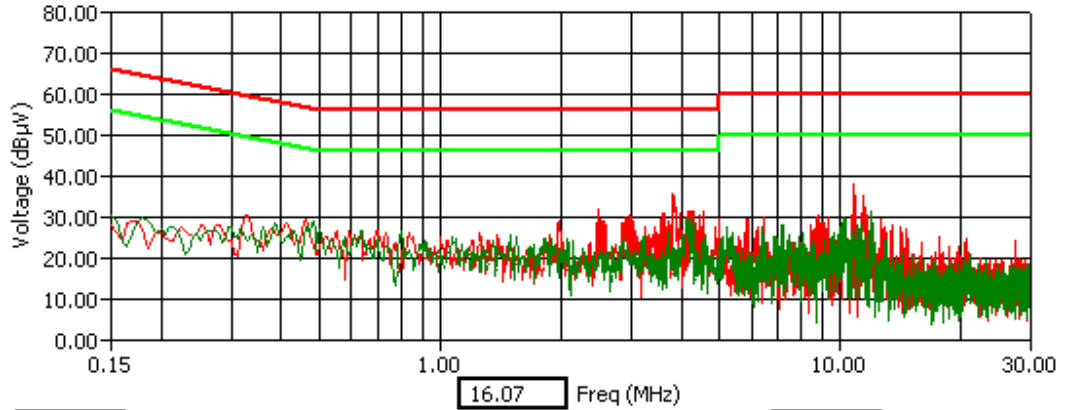
WLAN Channel 11 - Tx Mode - AVG Detector



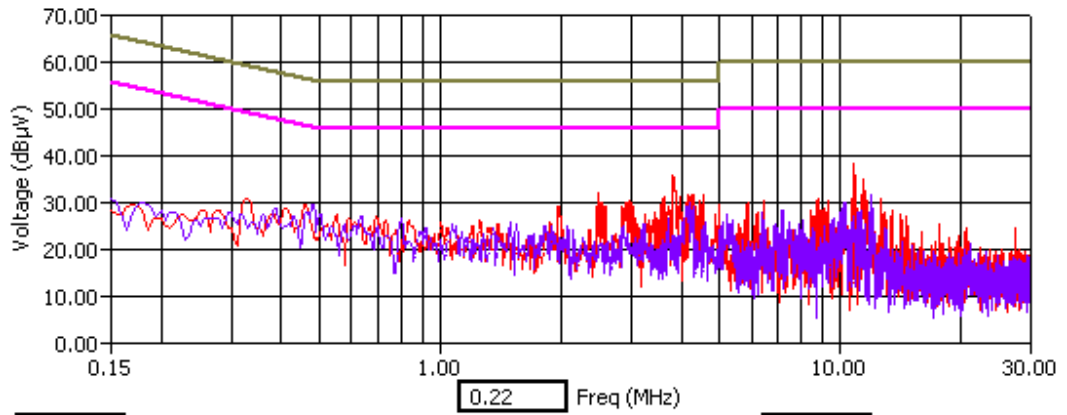
25.18 (PEAK) EMI (N) 63.21 QP Limit  
28.03 (PEAK) EMI (L1) 53.21 AVG Limit

WLAN Channel 11 - Tx Mode - Peak Detector

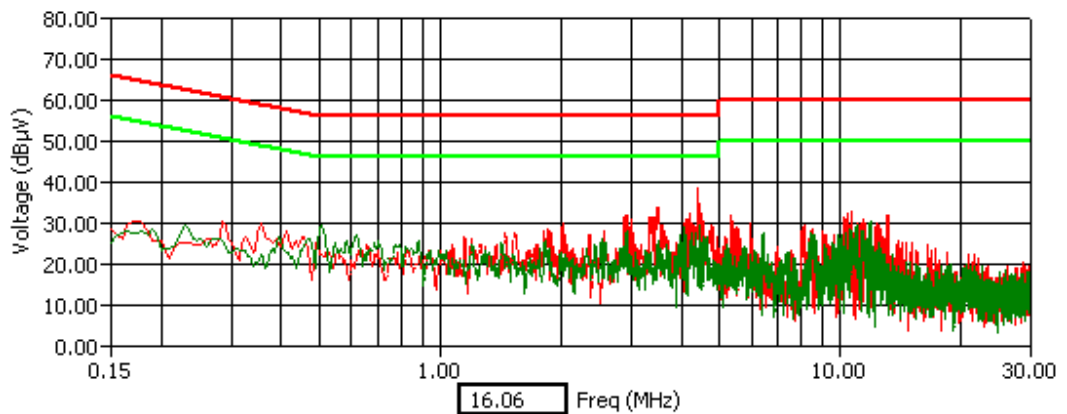
802.11g @ 6Mbps



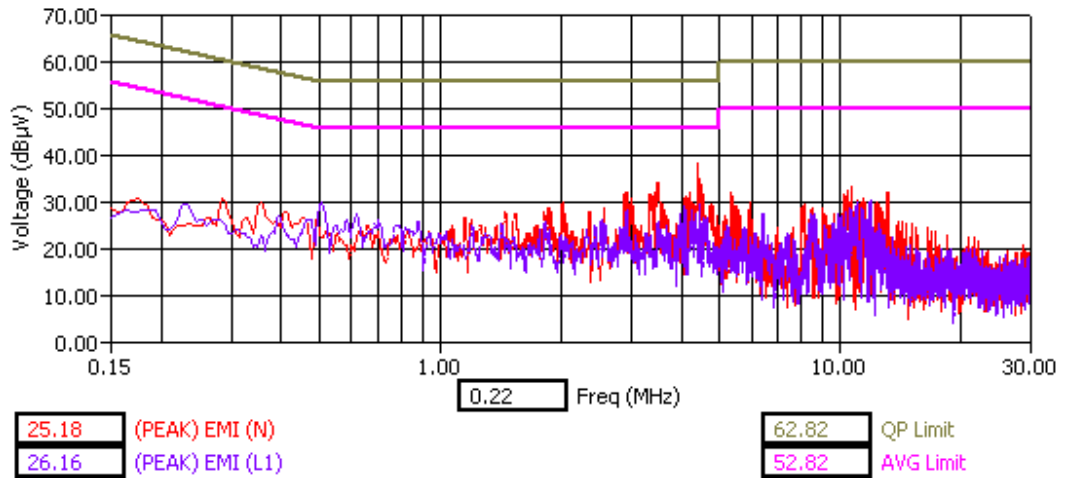
WLAN Channel 1 - Tx Mode - AVG Detector



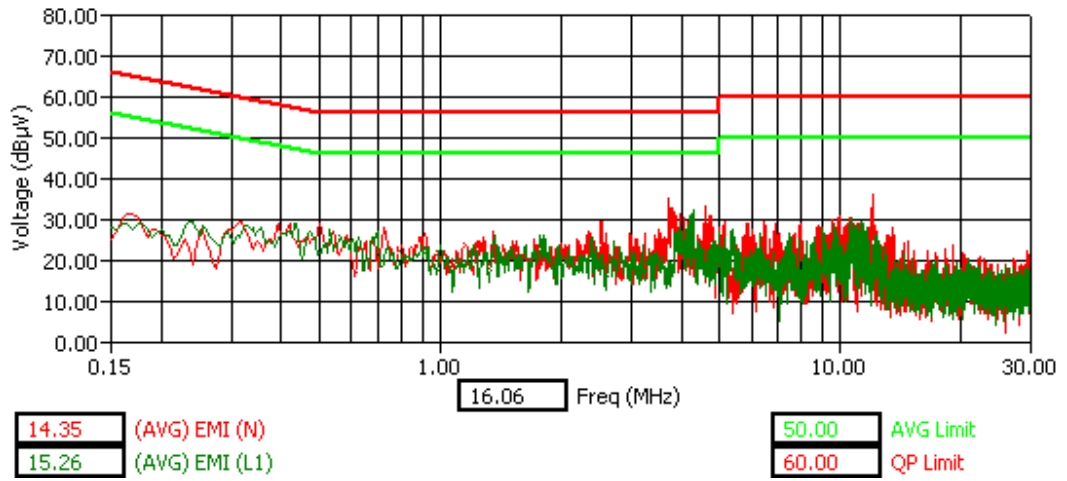
WLAN Channel 1 - Tx Mode - Peak Detector



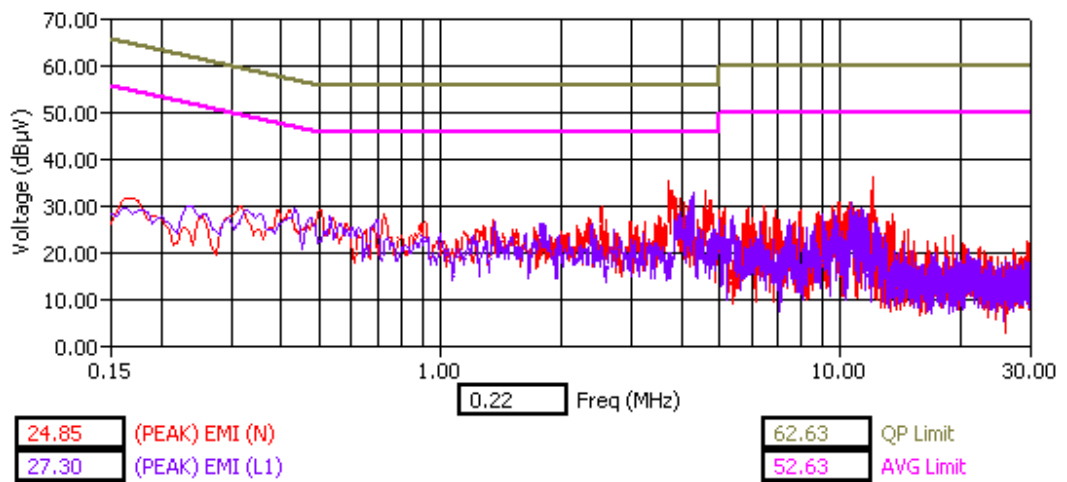
WLAN Channel 6 - Tx Mode - AVG Detector



WLAN Channel 6 - Tx Mode - Peak Detector



WLAN Channel 11 - Tx Mode - AVG Detector



WLAN Channel 11 - Tx Mode - Peak Detector

**End of Test Report**