



**MOBILE DEVICES BUSINESS**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

**EMC TEST REPORT**

**Test Report Number** – 23164-1 WLAN

**Report Date** – July 29, 2009

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.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature:

A handwritten signature in black ink that reads 'Albert J. Patapack'.

Name: Albert J. Patapack

Title: EMC Engineer

Date: July 29, 2009

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

**THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR ANY AGENCY OF THE U.S. GOVERNMENT.**

A2LA Certificate Number: 2518-02

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**Test Report Details**

Tests Performed By: Motorola Mobile Devices business (Mdb)  
Product Safety and Compliance Group  
600 North US Hwy 45  
Libertyville, IL 60048  
PH (847) 523-6167 Fax (847) 523-4538  
Motorola MDb FRN: 0004321311  
FCC Registration Number: 316588  
Industry Canada Number: 1090-1

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

Product Type : Cellular Phone

Signaling Capability: CDMA 800/1900, CDMA 1X/EV-DO Release A,  
Bluetooth Class 2 Version 2.0+EDR, 802.11b/802.11g

FCC ID: IHDP56KC1

Serial Numbers: LSW330044

Testing Complete Date: July 29, 2009

**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 63.4 2003

**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 battery.

The temperature and the relative humidity were maintained within the ANSI C63.4 2003 Standard requirements during the entire duration of testing.

**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	Calibration Due Date
Rohde Schwarz	Receiver	ESI26	838786/010	5/01/2010
Agilent	MXA Signal Analyzer	N9020A	US46470586	12/10/2009
Attenuator	Weinschel	AS-6	6675	NCR
Attenuator	Weinschel	AS-6	6677	NCR
ETS	LISN	3810/2NM	00062907	12/10/2009
ETS	LISN	3810/2NM	00062912	12/10/2009

All testing was performed using equipment that was within calibration at the time that the test was performed. No equipment listed in the table above was used after the specified calibration due date. If, during the course of product testing, a piece of equipment went out of calibration and that piece of equipment was needed to complete product testing, a similar piece of calibrated equipment was substituted. If a substitution was made, that new piece of equipment would be listed in the above table along with the piece that was removed from service. All equipment is 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 10dB passive attenuator. A fully charged battery was used for the supply voltage.

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

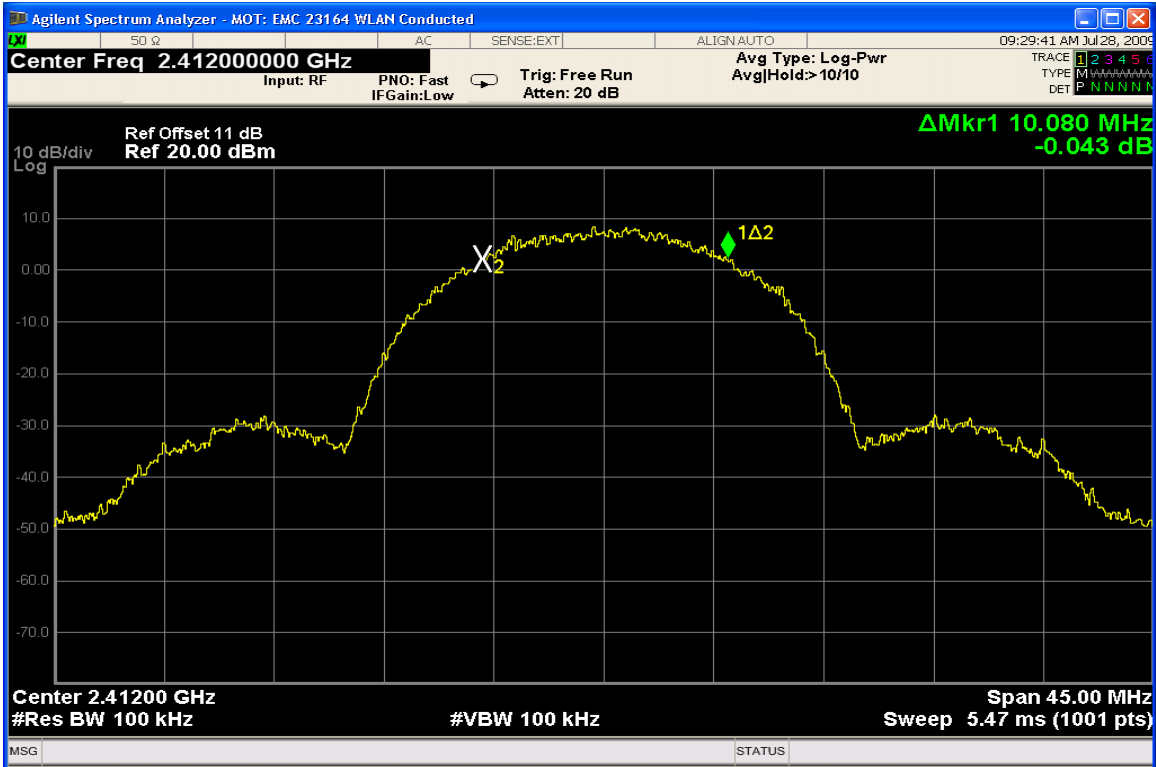
1. RBW  $\geq$  100 kHz
2. VBW  $\geq$  RBW
3. Sweep = auto
4. Detector function = peak
5. Trace = max hold

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 marker-delta function was used to measure 6 dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 6 dB bandwidth of the emission. The same procedure was repeated for 20 dB bandwidth.

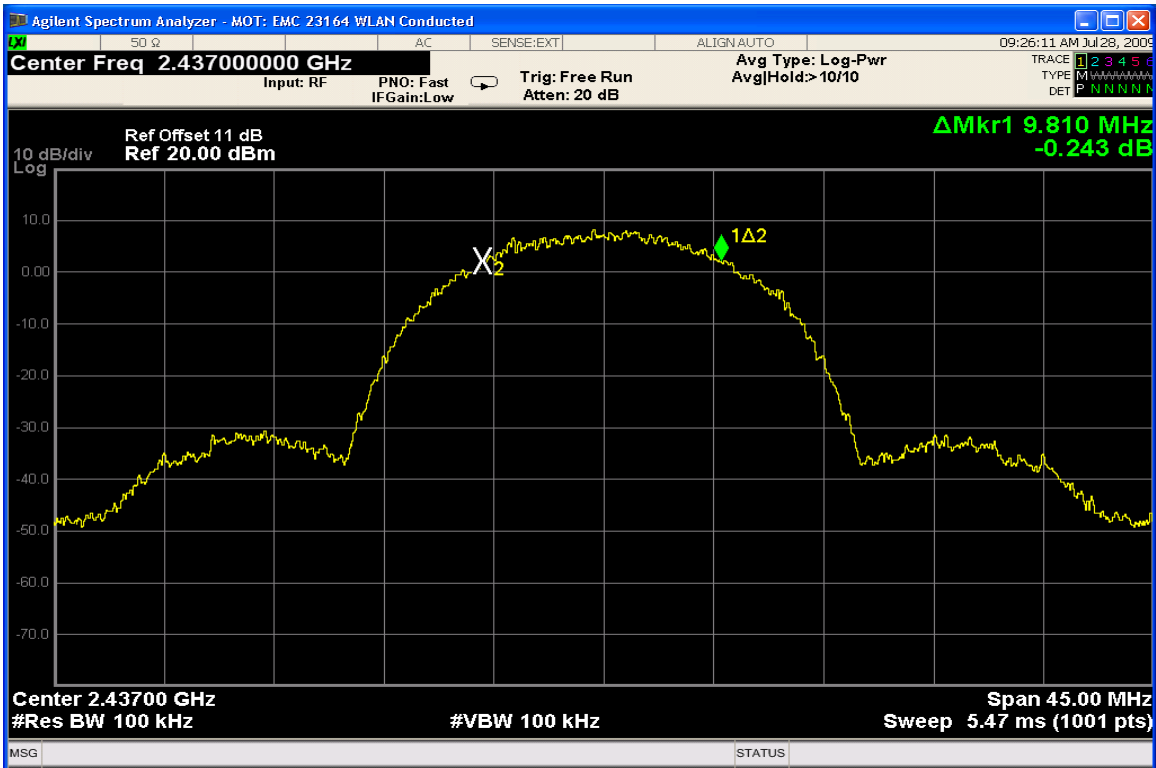
### **Measurement Results**

See attached

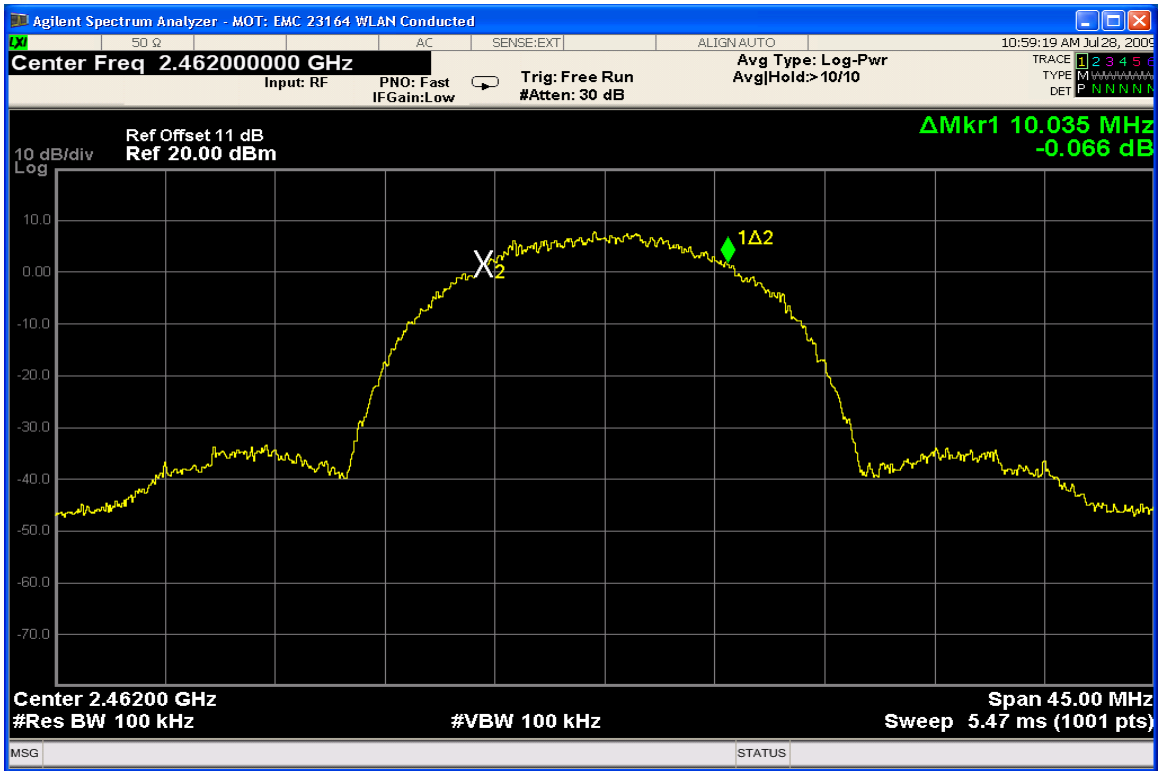
**802.11 b @ 11 Mbps**



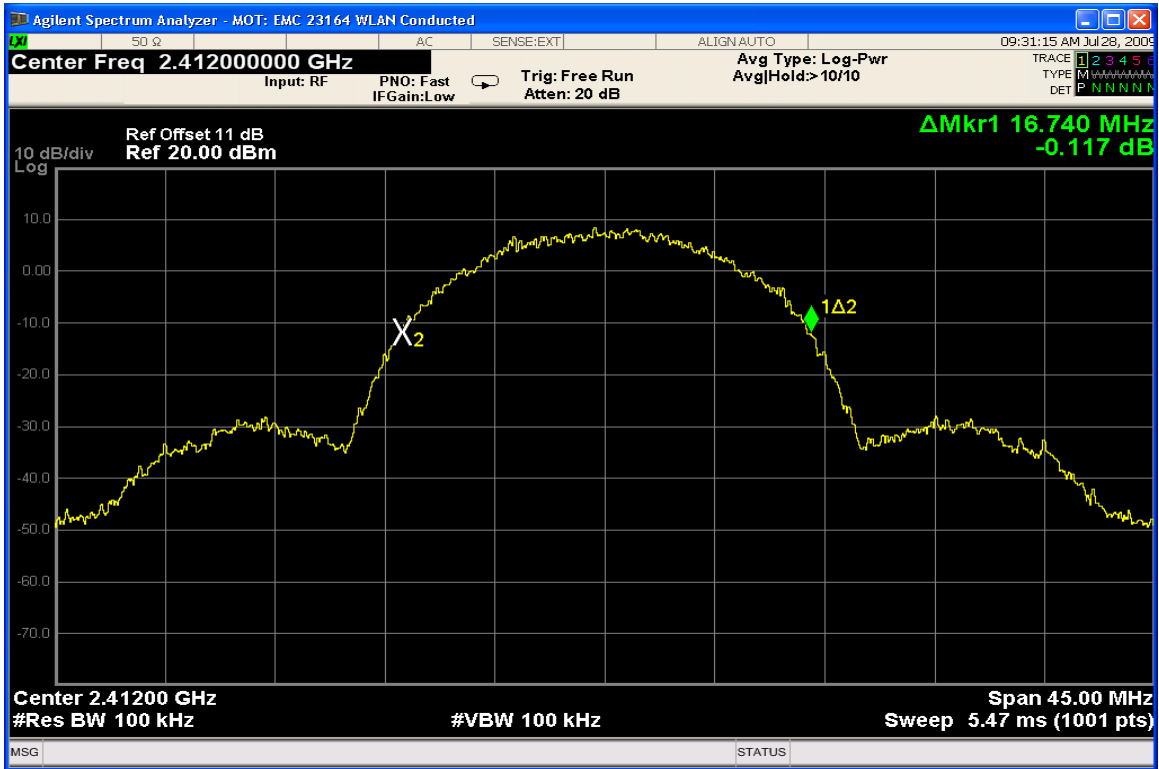
**6dB Bandwidth Channel 1 @ 11Mbps**



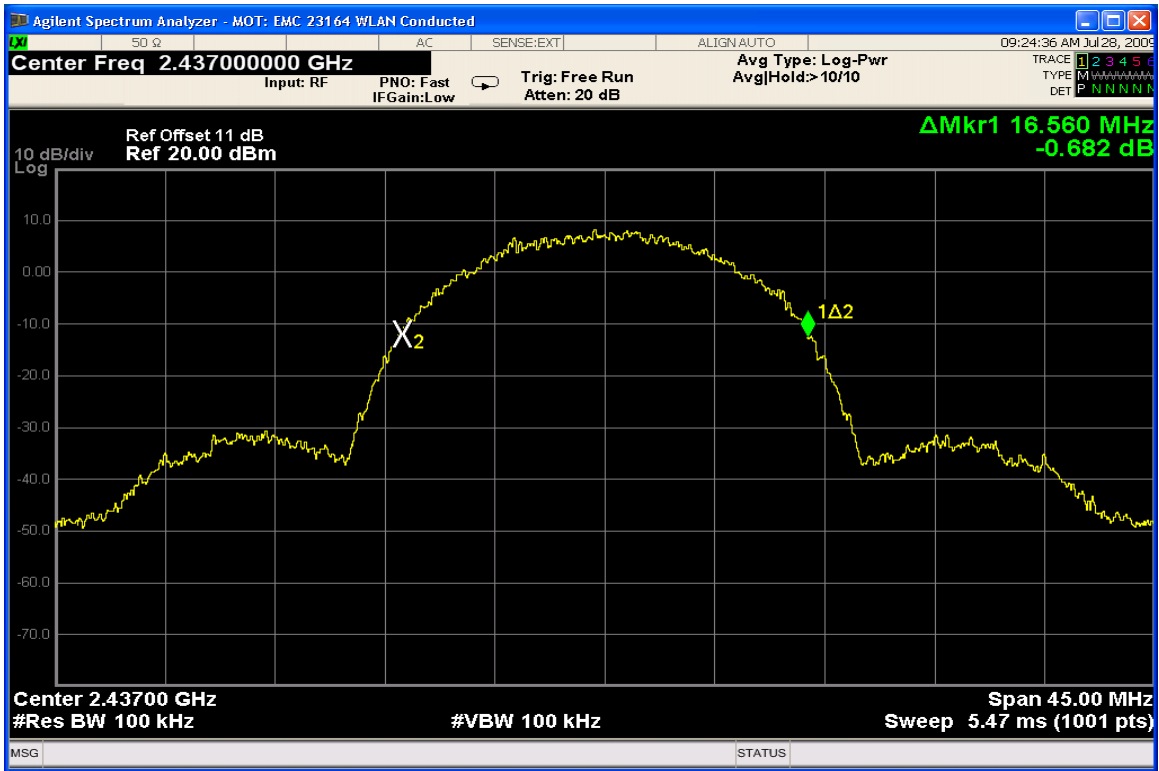
**6dB Bandwidth Channel 6 @ 11Mbps**



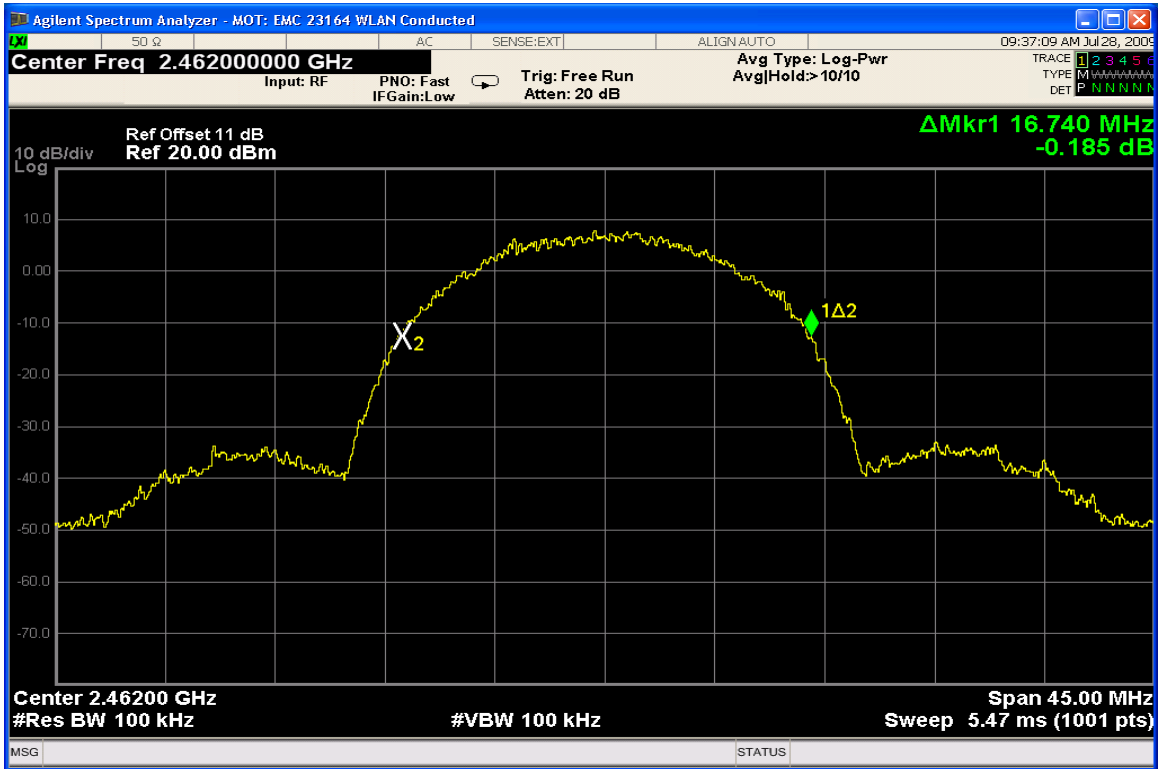
6dB Bandwidth Channel 11 @ 11Mbps



20dB Bandwidth Channel 1 @ 11Mbps

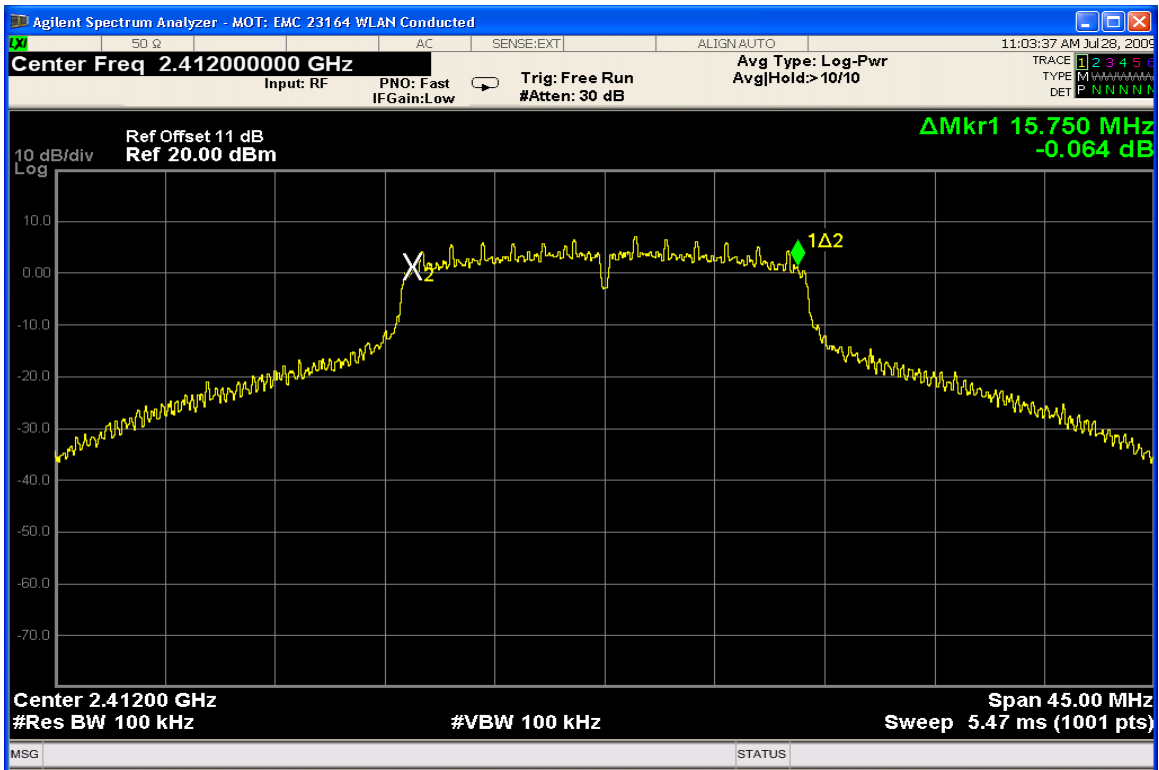


20dB Bandwidth Channel 6 @ 11Mbps

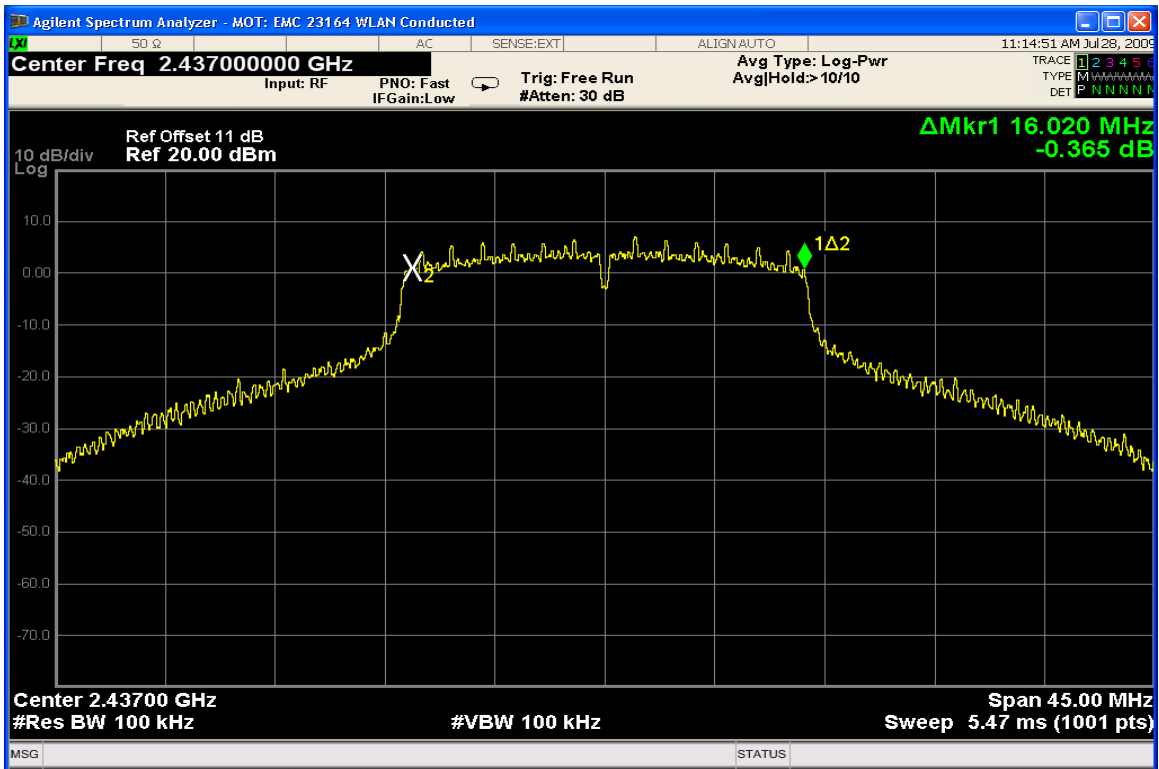


20dB Bandwidth Channel 11 @ 11Mbps

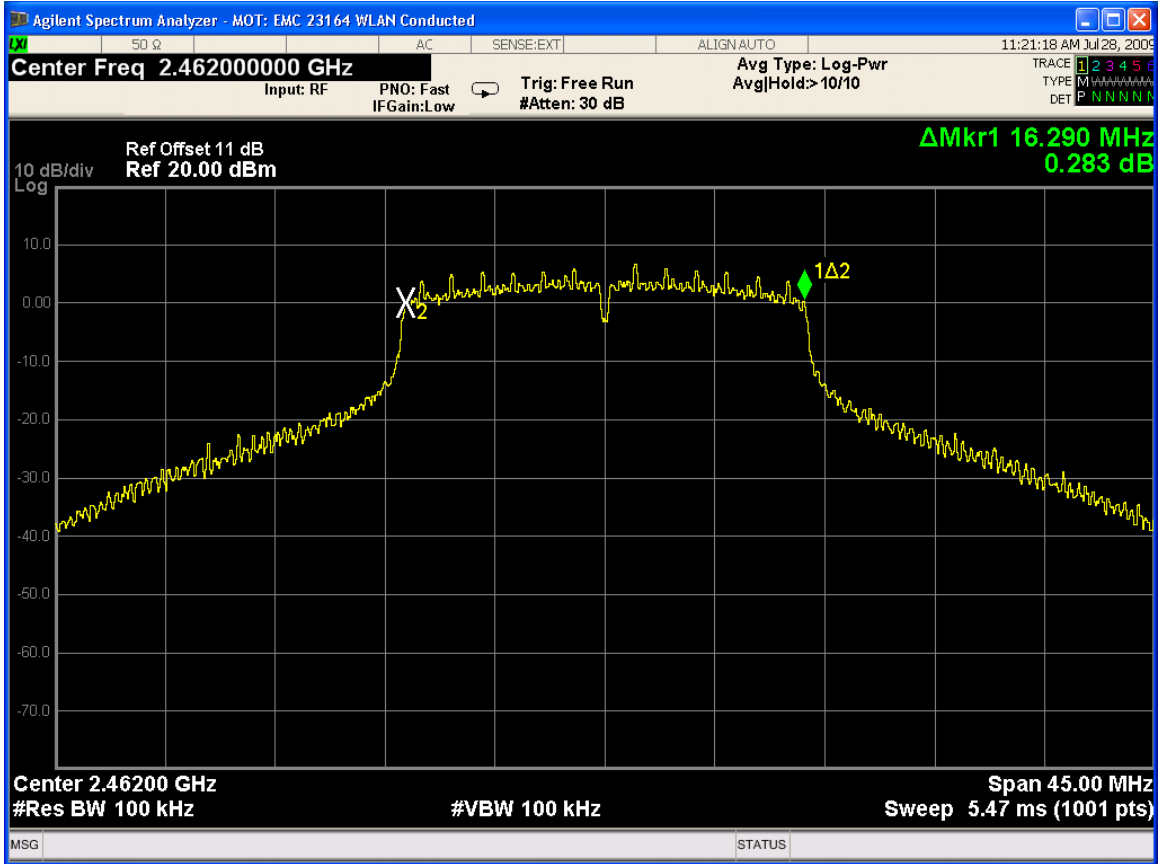
**802.11 g @ 9 Mbps**



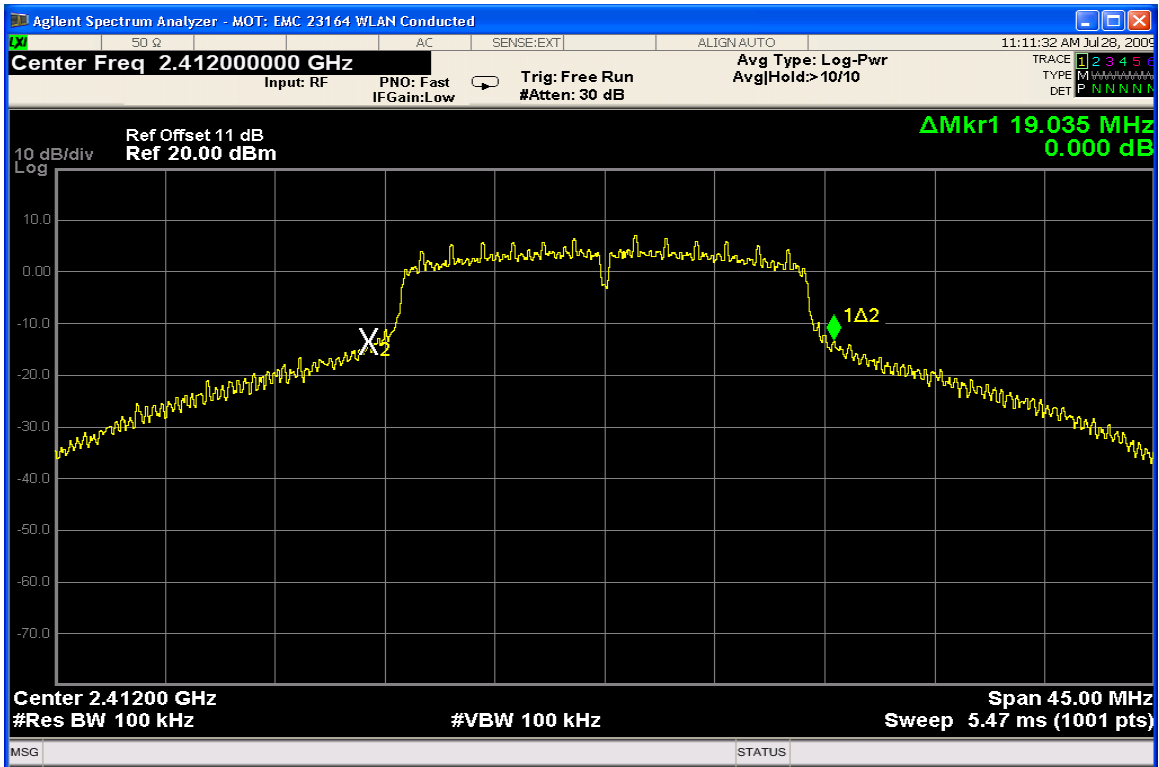
**6dB Bandwidth Channel 1 @ 9Mbps**



**6dB Bandwidth Channel 6 @ 9Mbps**



6dB Bandwidth Channel 11 @ 9Mbps



20dB Bandwidth Channel 1 @ 9Mbps



## **PEAK OUTPUT POWER**

CFR 47 Part 15.247

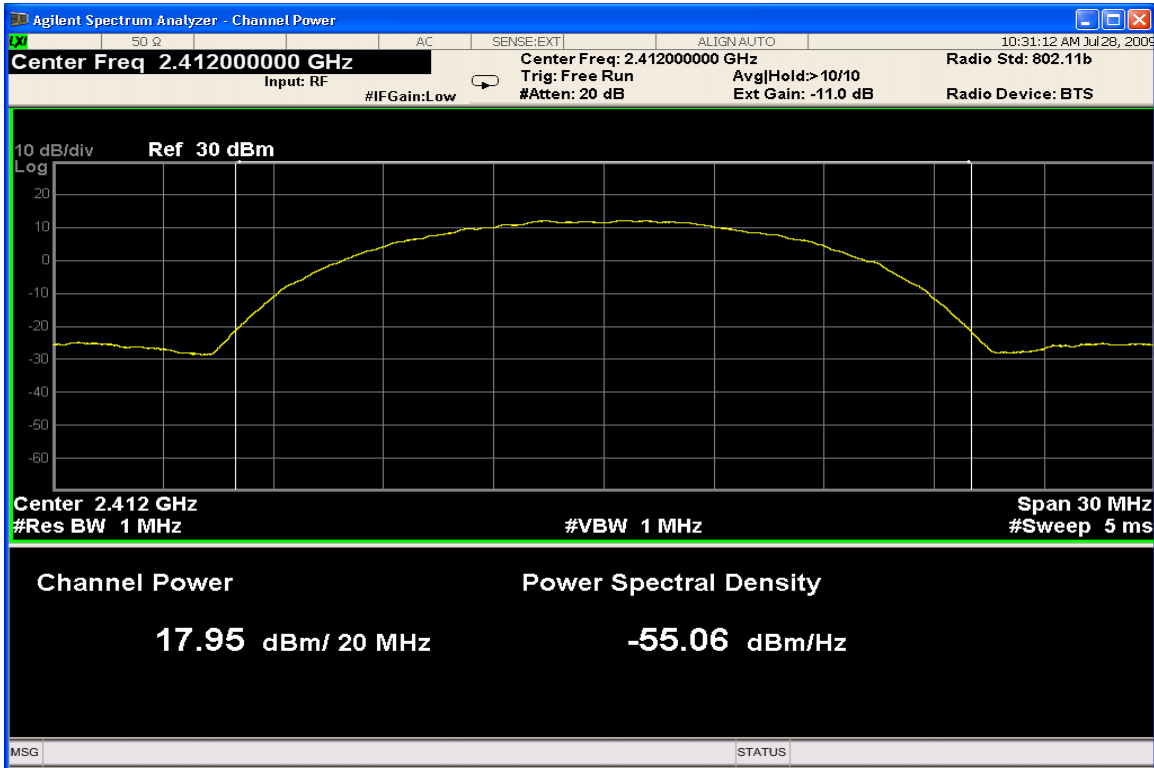
### **Measurement Procedure**

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 10dB passive attenuator. A fully charged battery was used for the supply voltage.

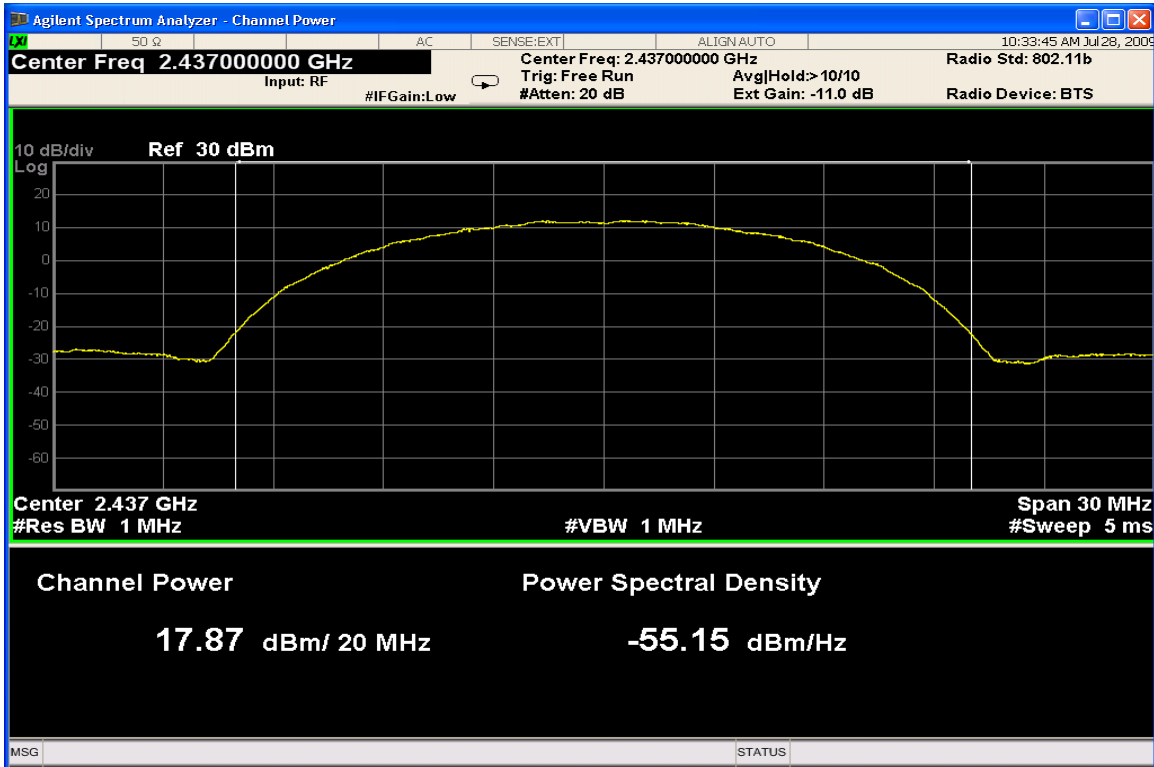
### **Measurement Results**

See Attached

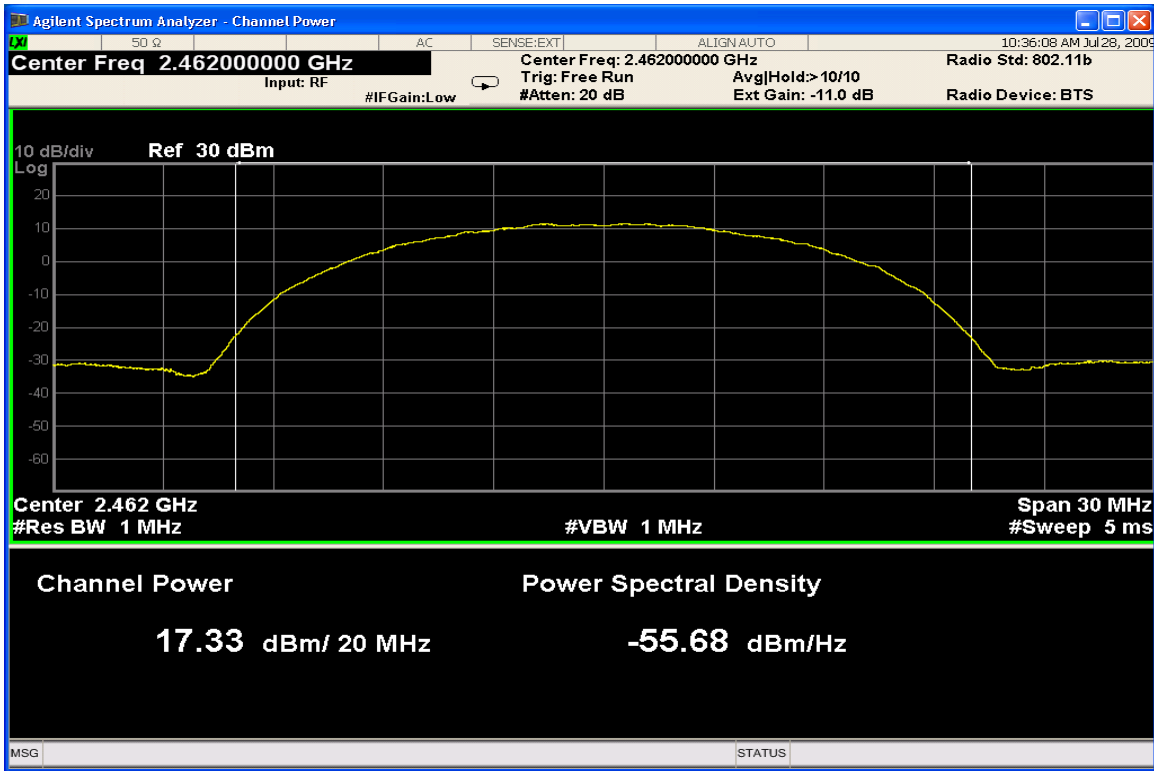
**802.11 b @ 11Mbps**



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

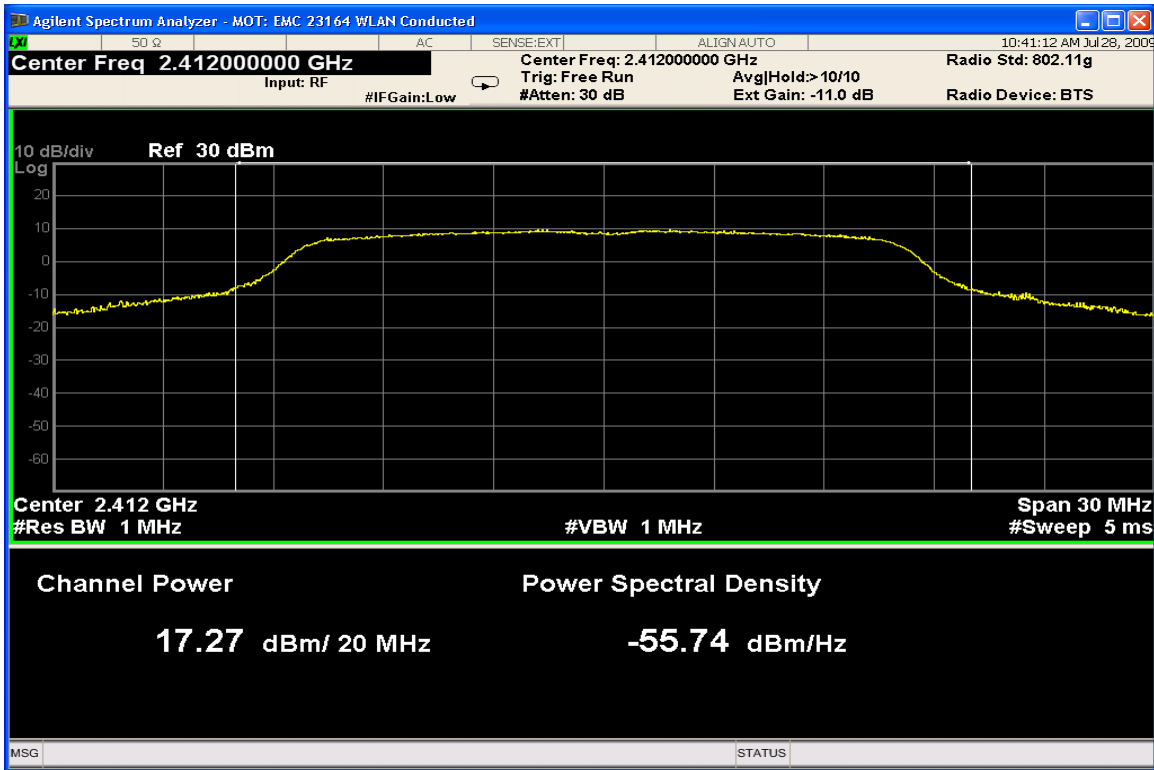


**Max. Power Channel 6 @ 11Mbps**

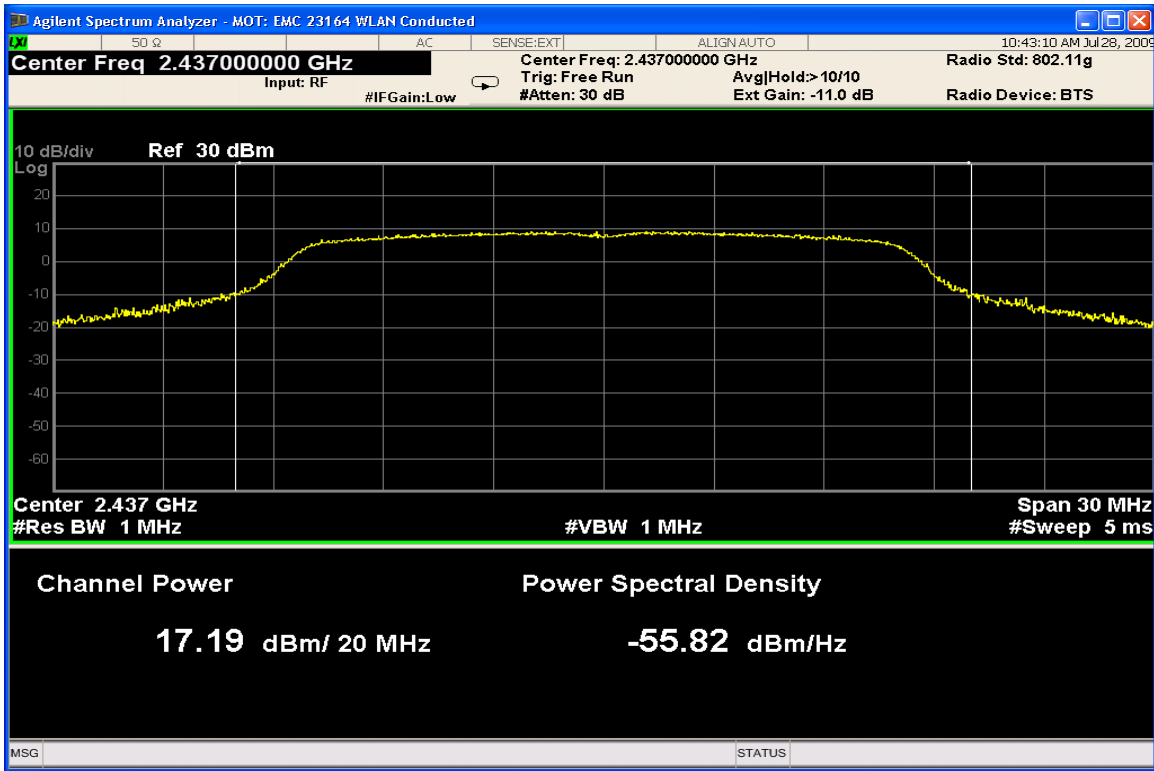


Max. Power Channel 11 @ 11Mbps

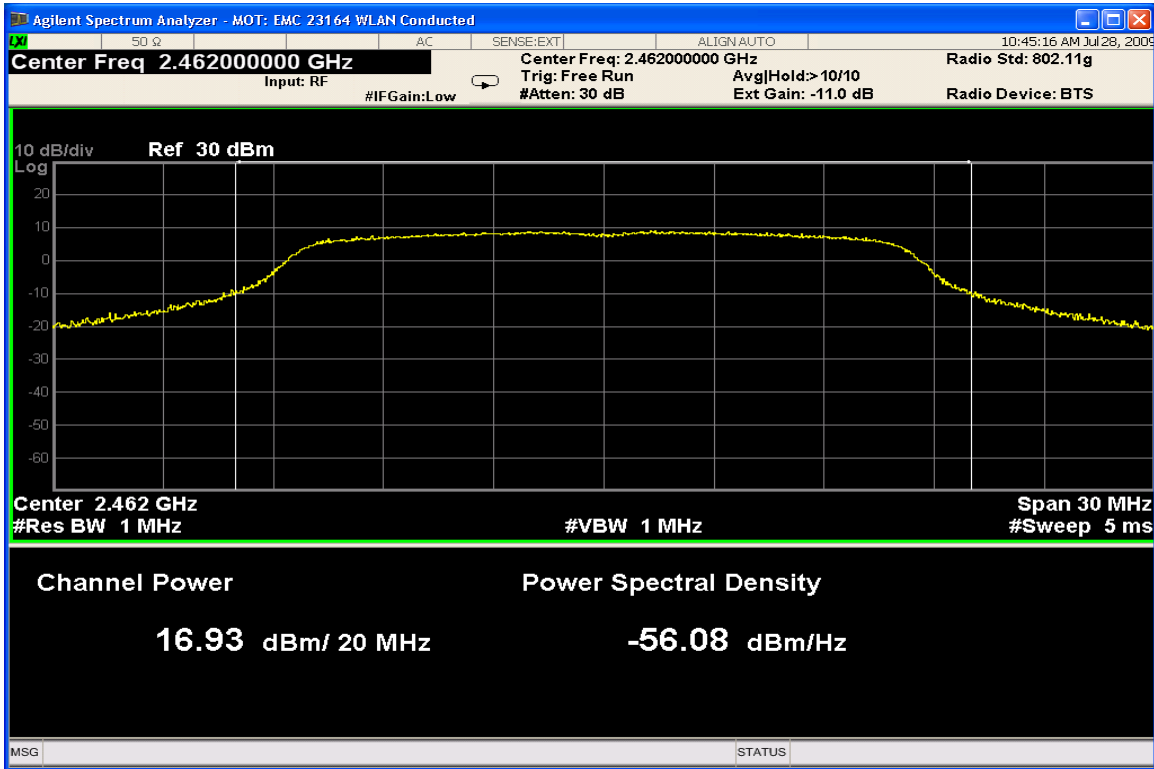
**802.11 g @ 9Mbps**



Max. Power Channel 1 @ 9Mbps



Max. Power Channel 6 @ 9Mbps



Max. Power Channel 11 @ 9Mbps

**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 10dB 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:

1. Span = 300KHz
2. VBW =30KHz
3. RBW=3KHz
4. Sweep = 50ms
5. Detector function = peak
6. Trace = max hold

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

**Measurement Results**

<b>2412 MHz</b>	<b>2437MHz</b>	<b>2462MHz</b>
-5.550 dBm	-5.653 dBm	-6.022 dBm

**802.11 b 11Mbps**

<b>2412 MHz</b>	<b>2437MHz</b>	<b>2462MHz</b>
-16.393dBm	-15.447 dBm	-16.493dBm

**802.11 g 9Mbps**

## **SPURIOUS RF CONDUCTED EMISSIONS**

CFR 47 Part 15.247

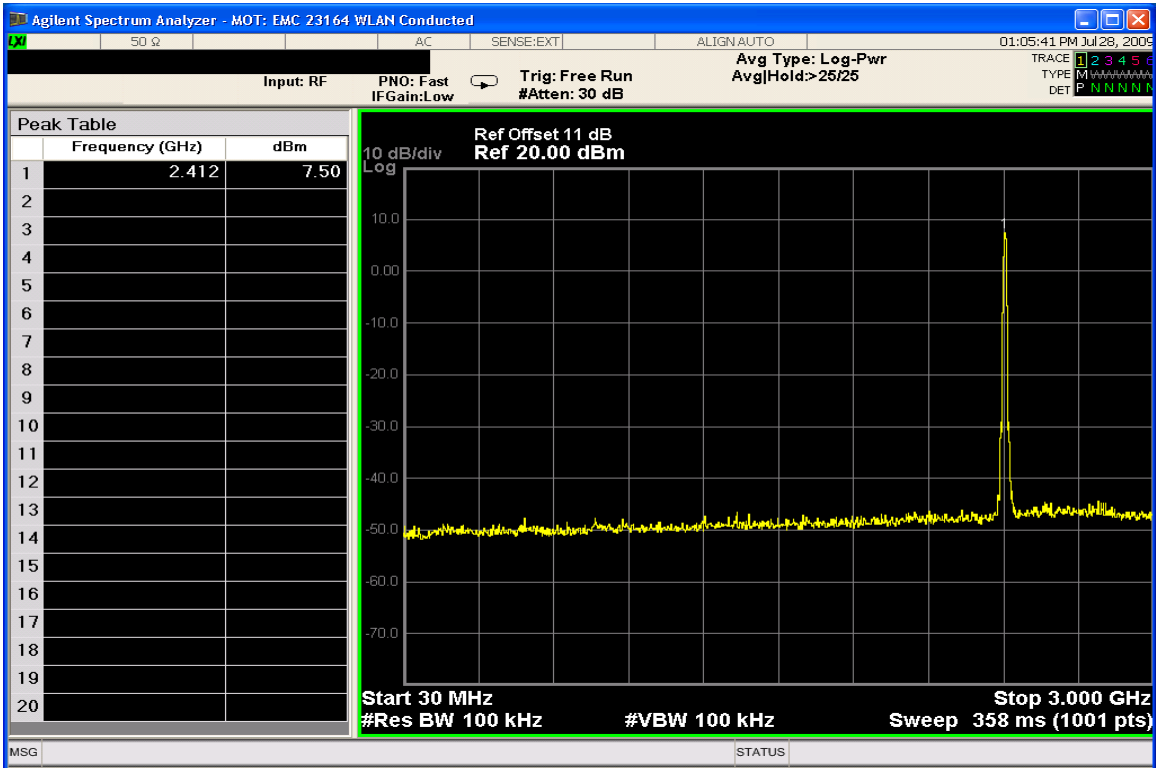
### **Measurement Procedure**

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 10dB passive attenuator. A fully charged battery was used for the supply voltage.

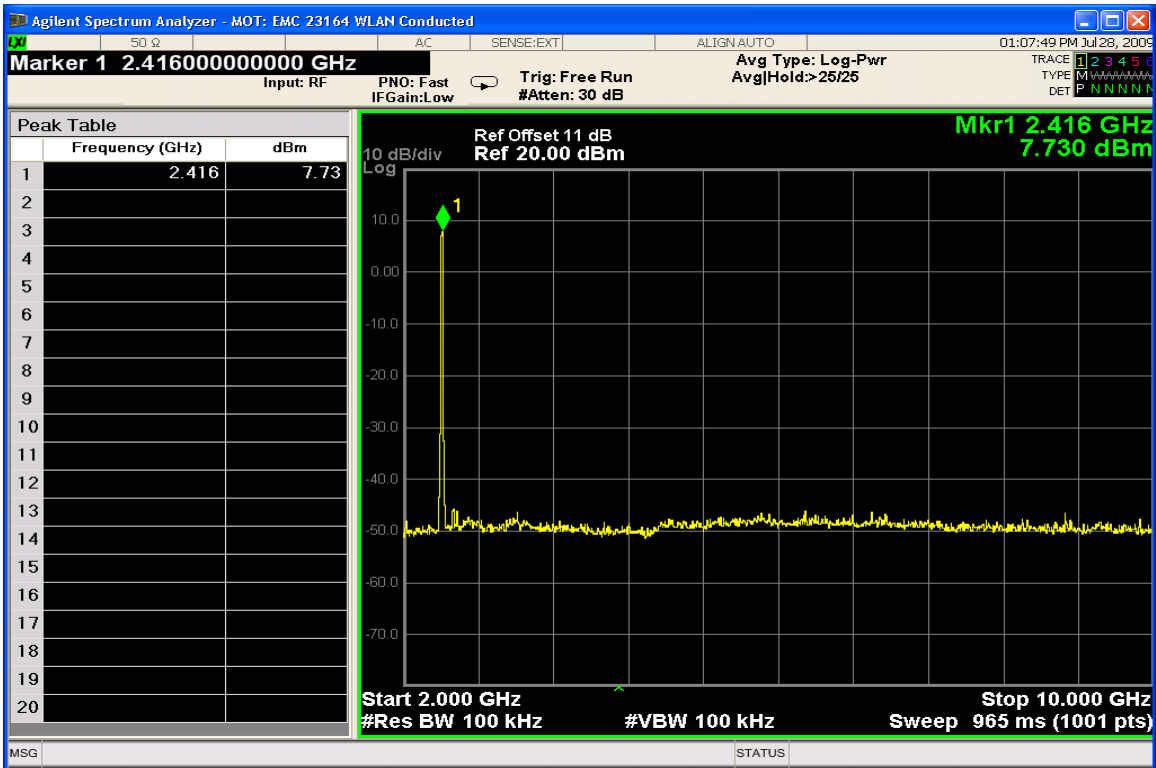
### **Measurement Results**

See attached:

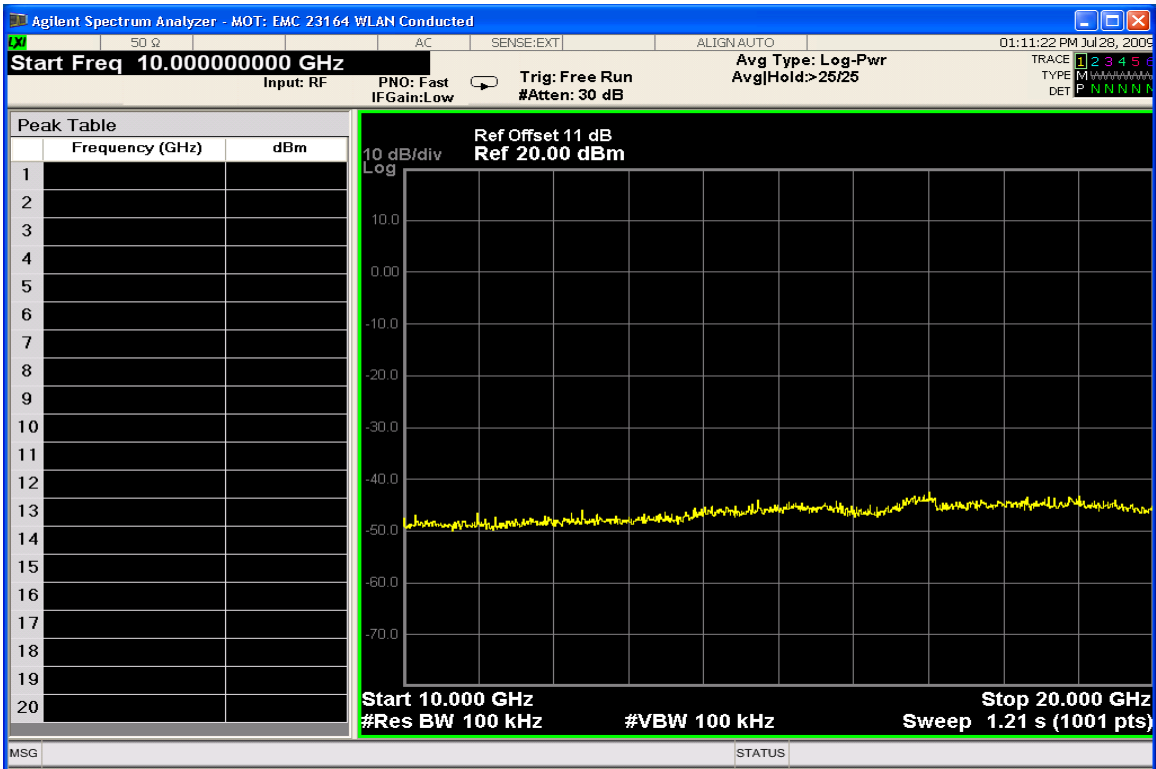
**802.11 b @ 11Mbps**



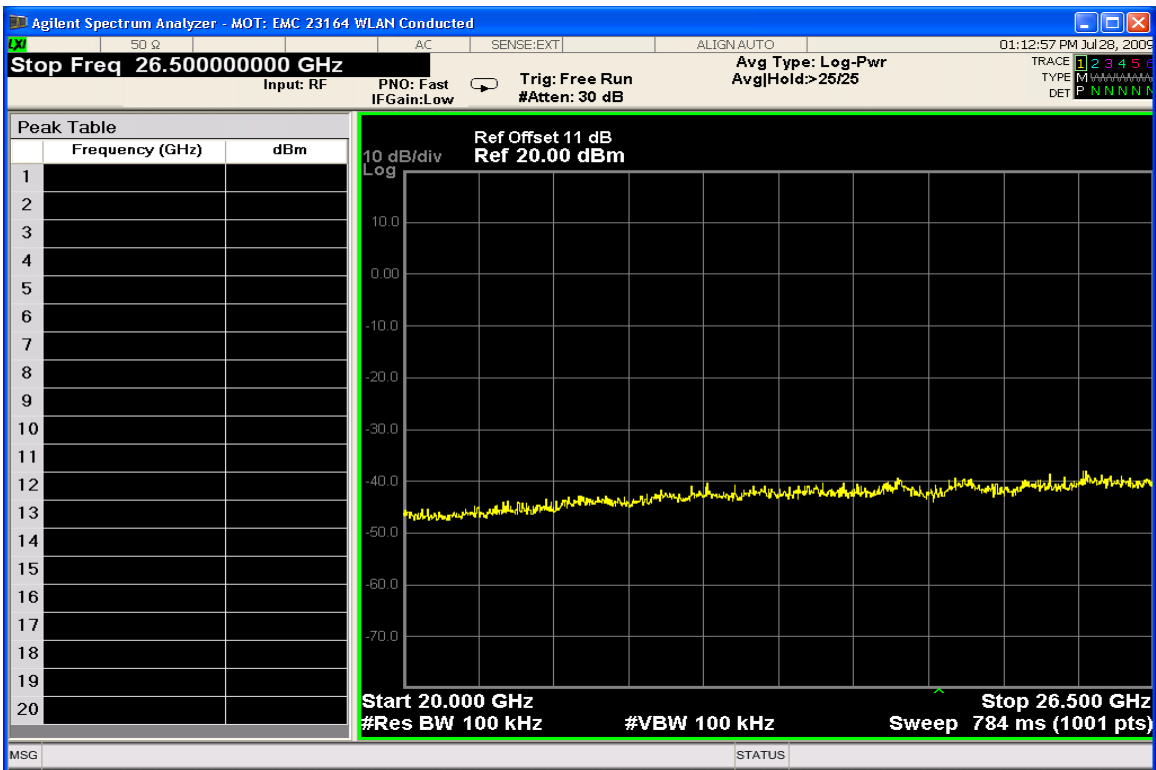
**Conducted Spurious Emissions 30-3000MHz (Low Channel)**



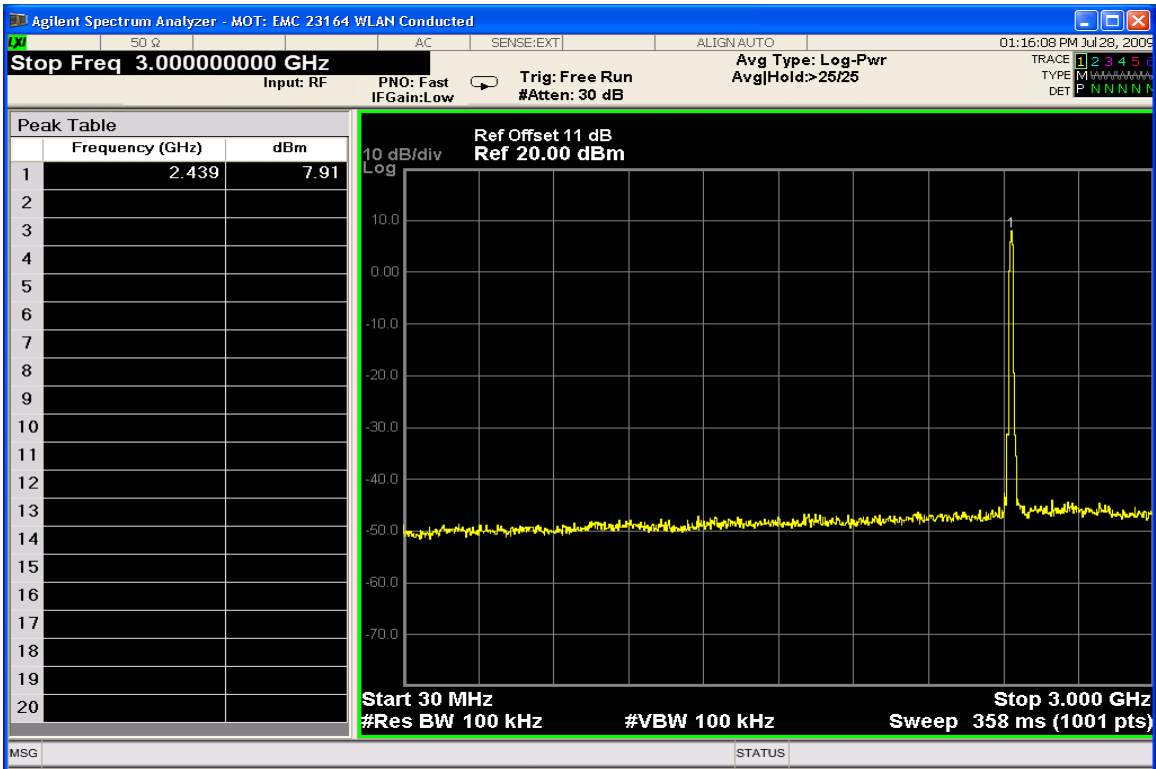
**Conducted Spurious Emissions 2-10GHz (Low Channel)**



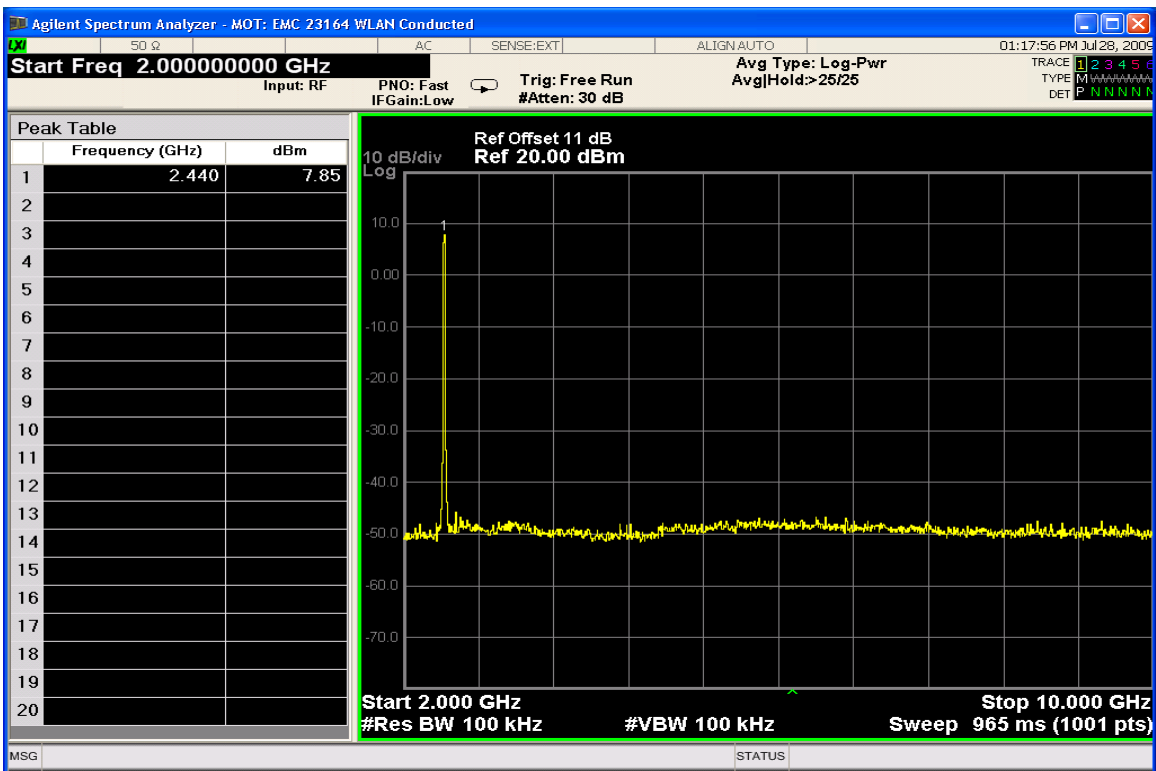
**Conducted Spurious Emissions 10-20GHz (Low Channel)**



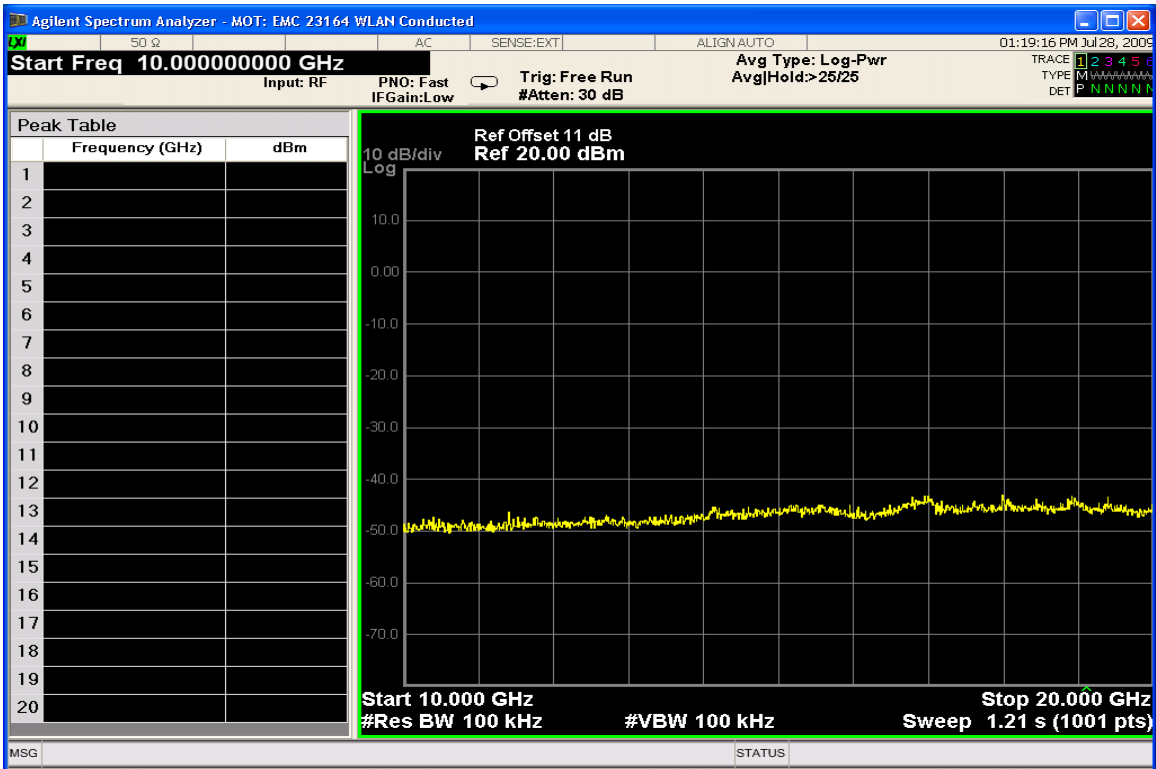
**Conducted Spurious Emissions 20-26.5GHz (Low Channel)**



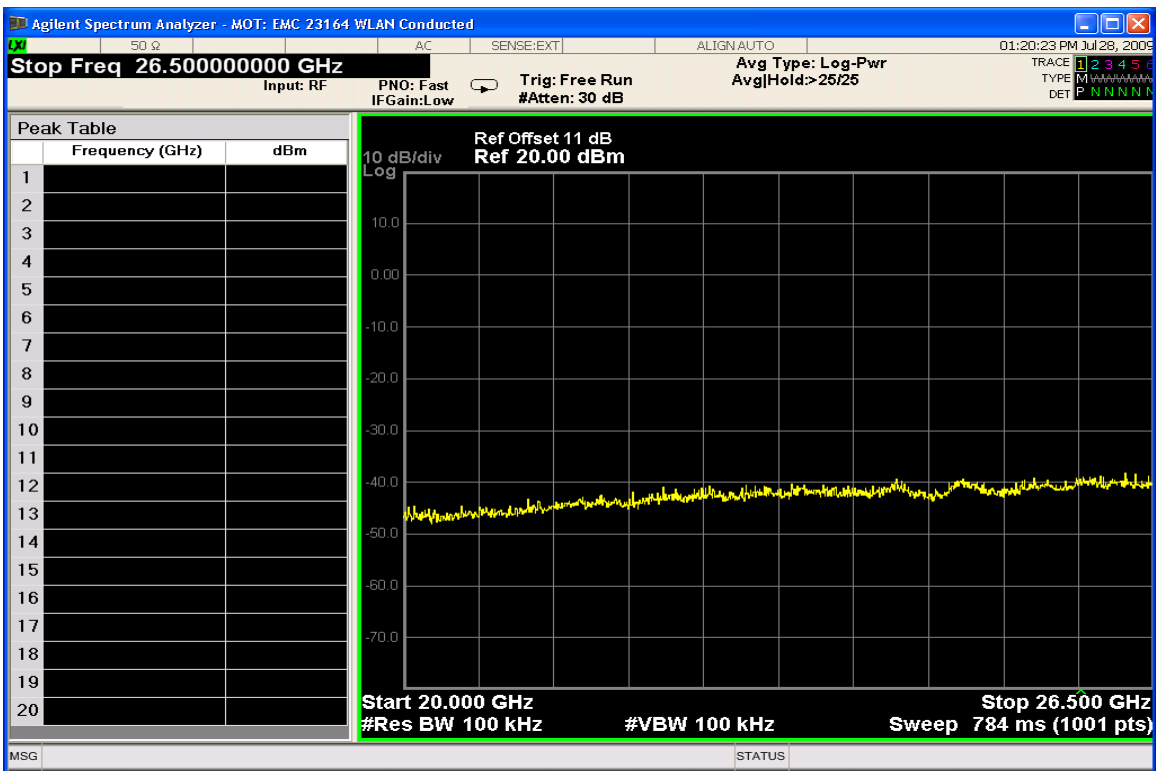
**Conducted Spurious Emissions 30-3000MHz (Mid Channel)**



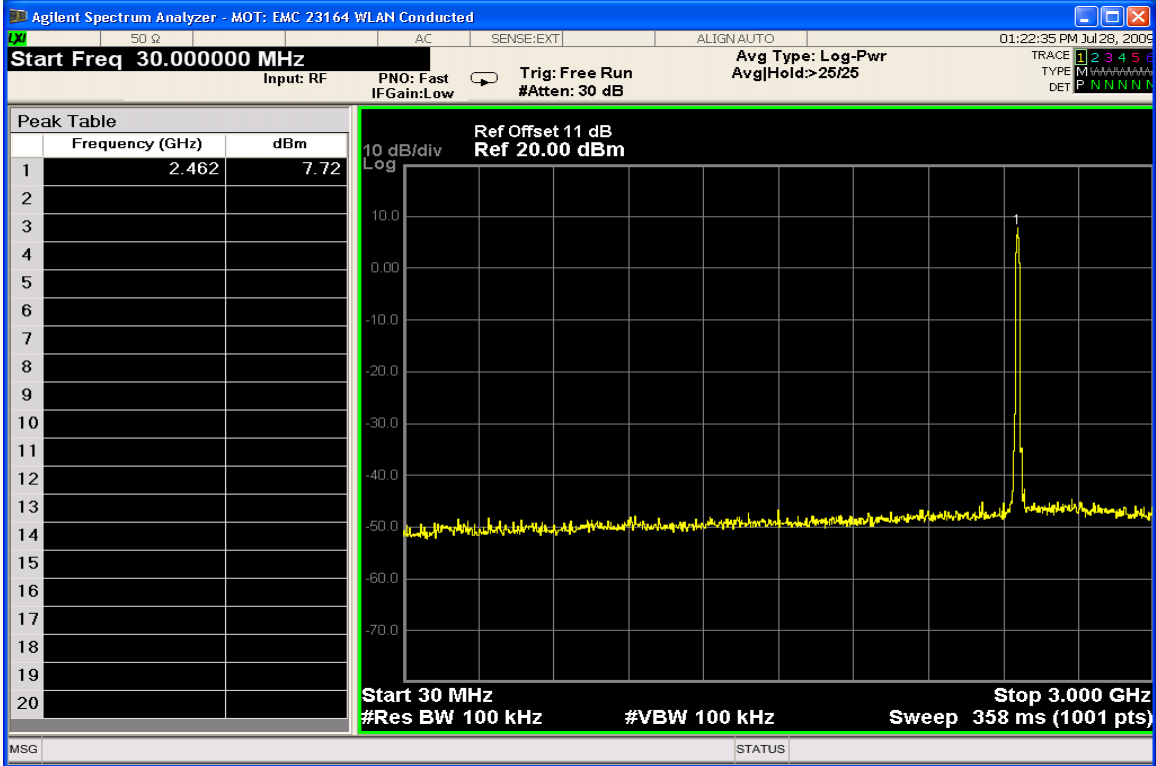
**Conducted Spurious Emissions 2-10GHz (Mid Channel)**



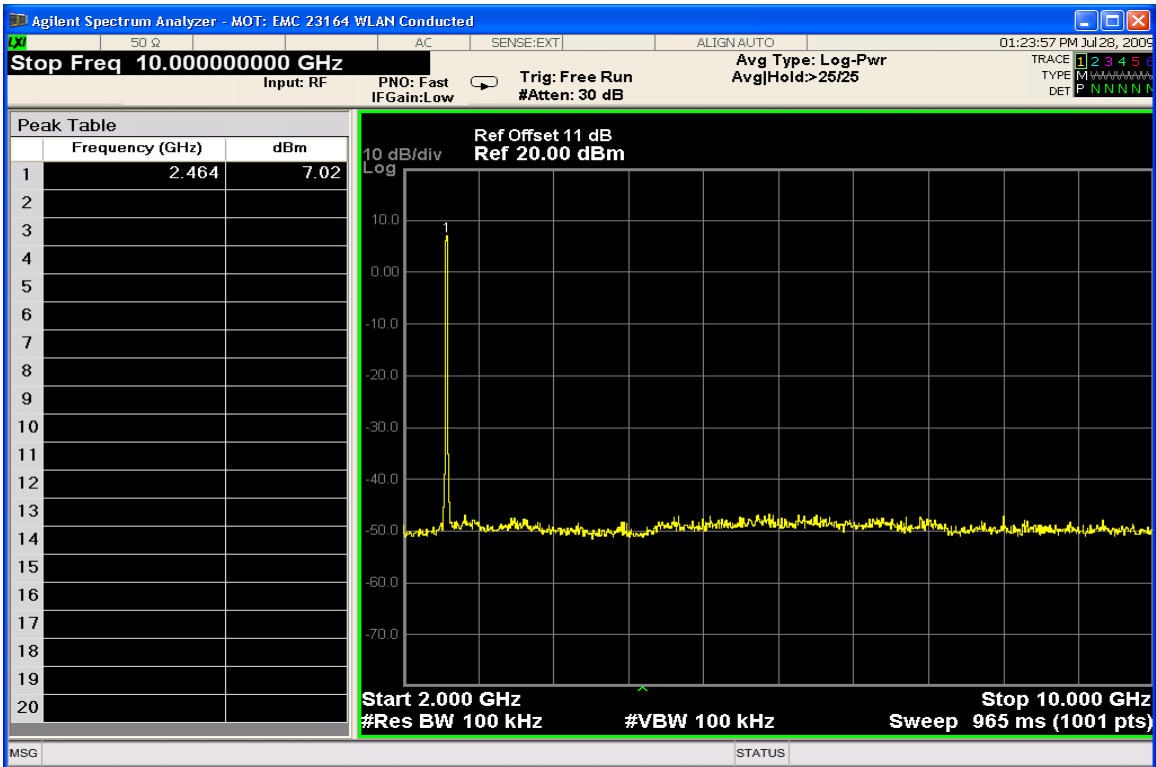
Conducted Spurious Emissions 10-20GHz (Mid Channel)



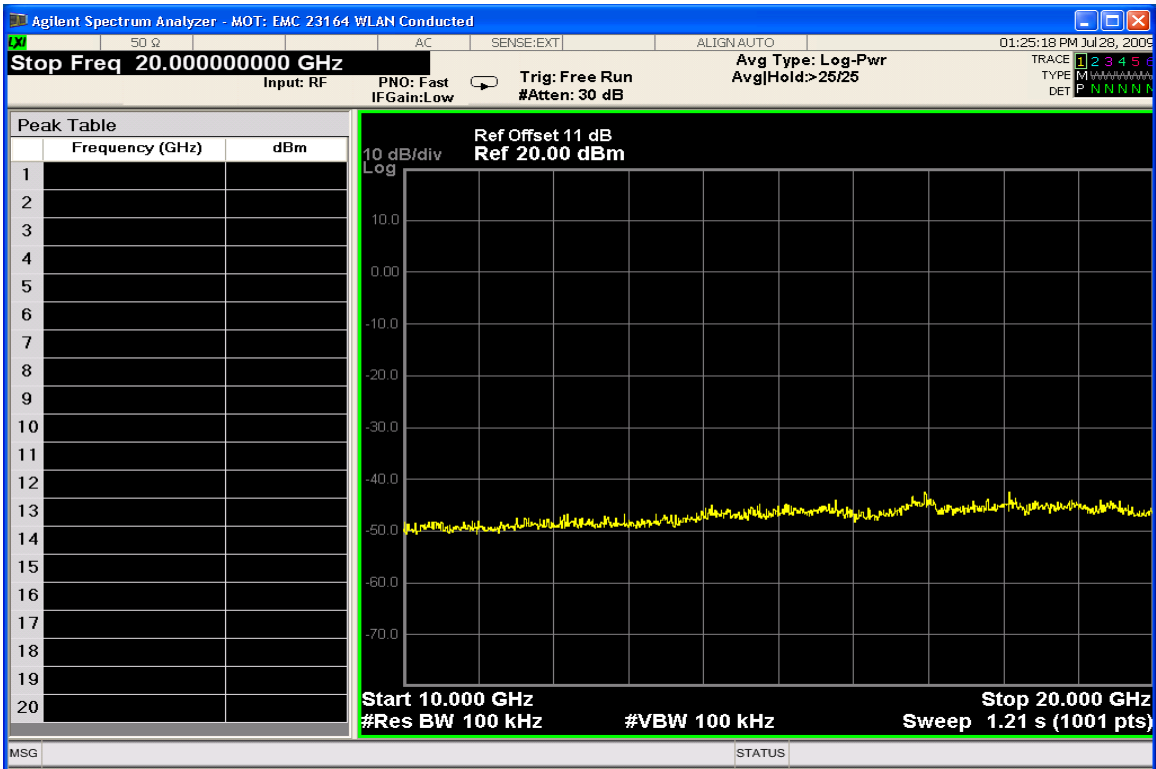
Conducted Spurious Emissions 20-26.5GHz (Mid Channel)



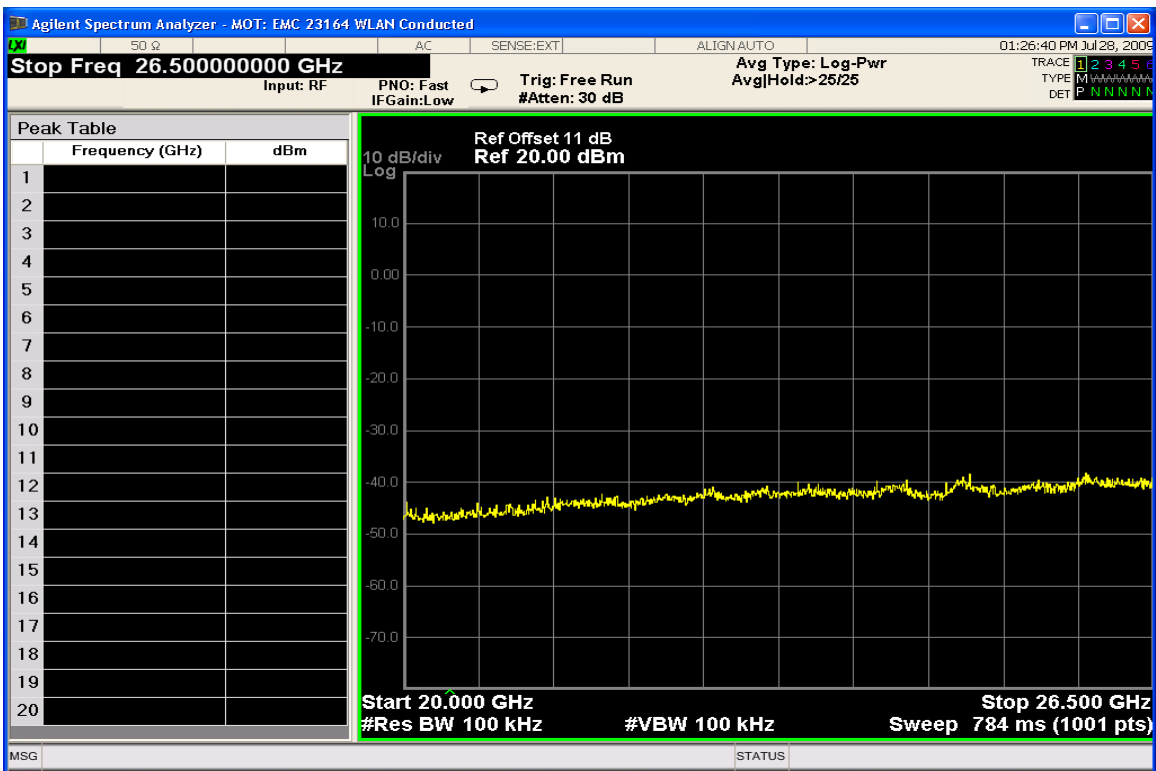
Conducted Spurious Emissions 30-3000MHz (High Channel)



Conducted Spurious Emissions 2-10GHz (High Channel)

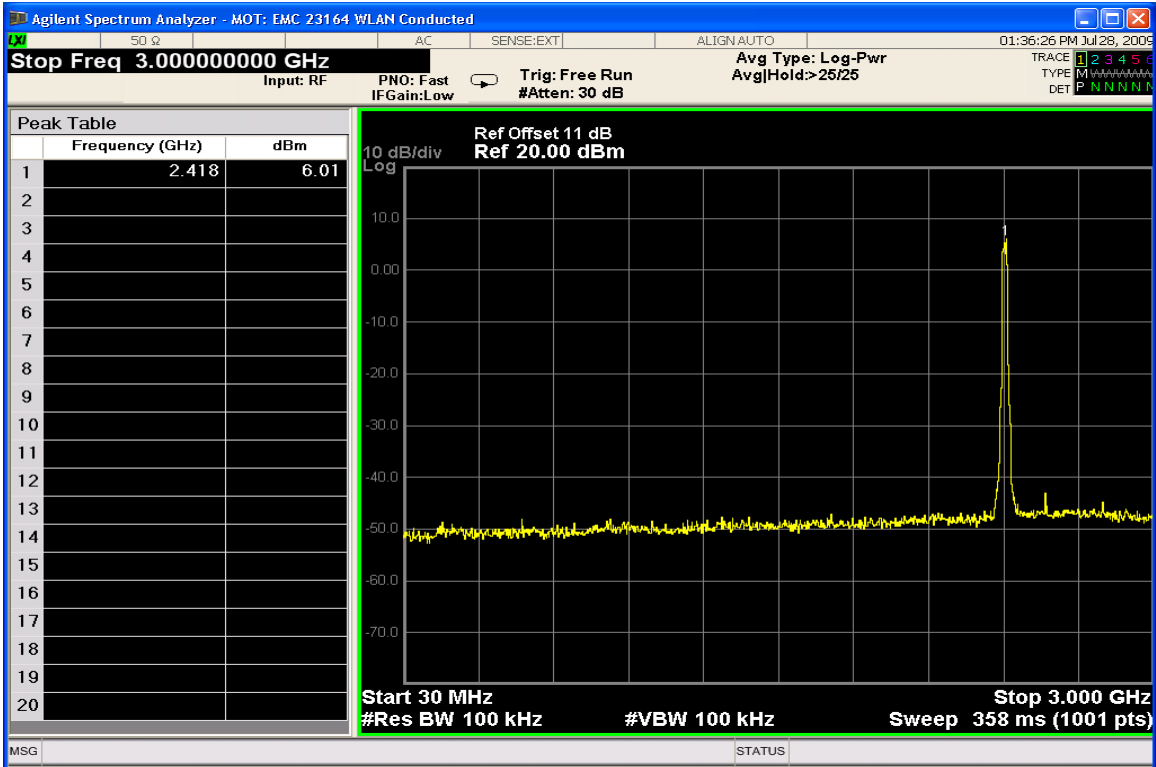


Conducted Spurious Emissions 10-20GHz (High Channel)

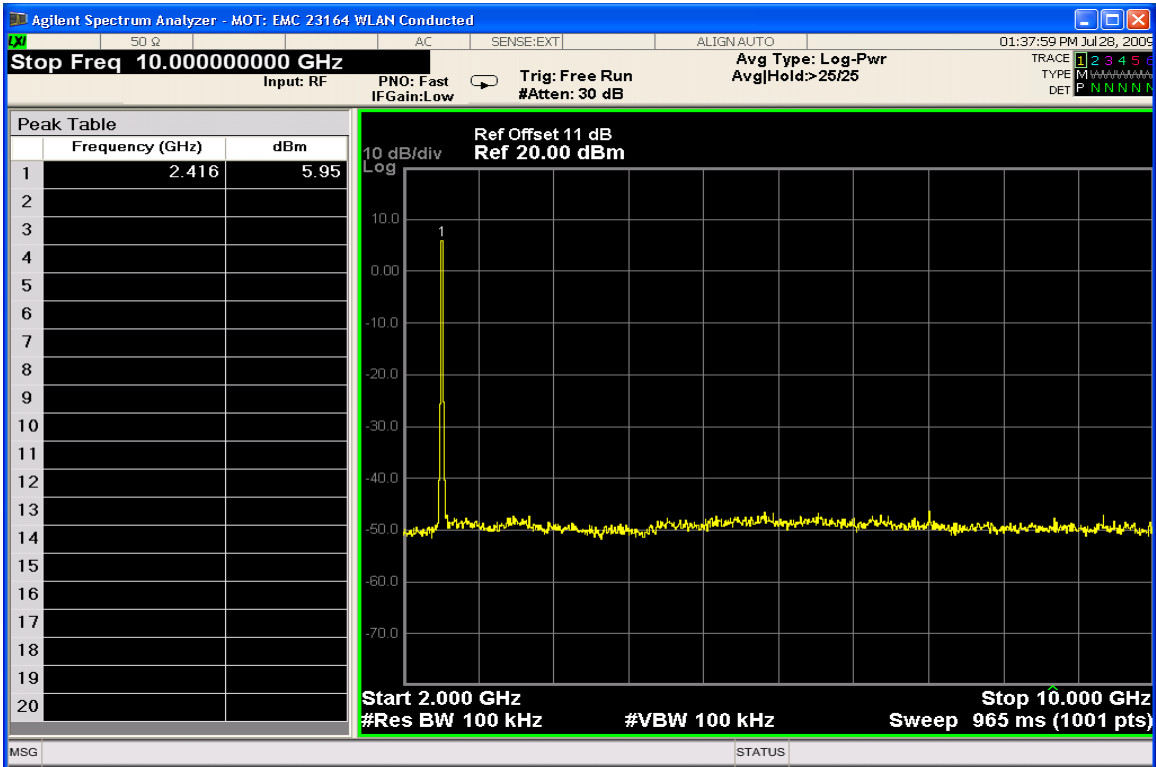


Conducted Spurious Emissions 20-26.5GHz (High Channel)

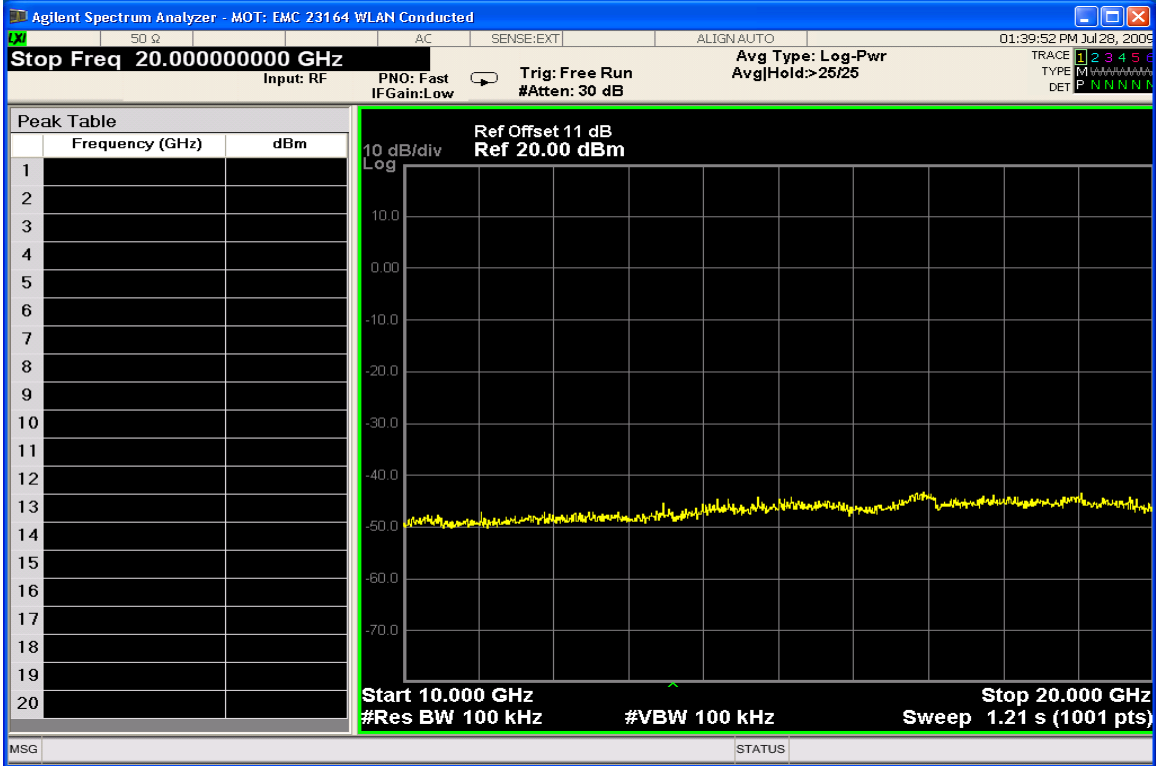
**802.11 g @ 9Mbps**



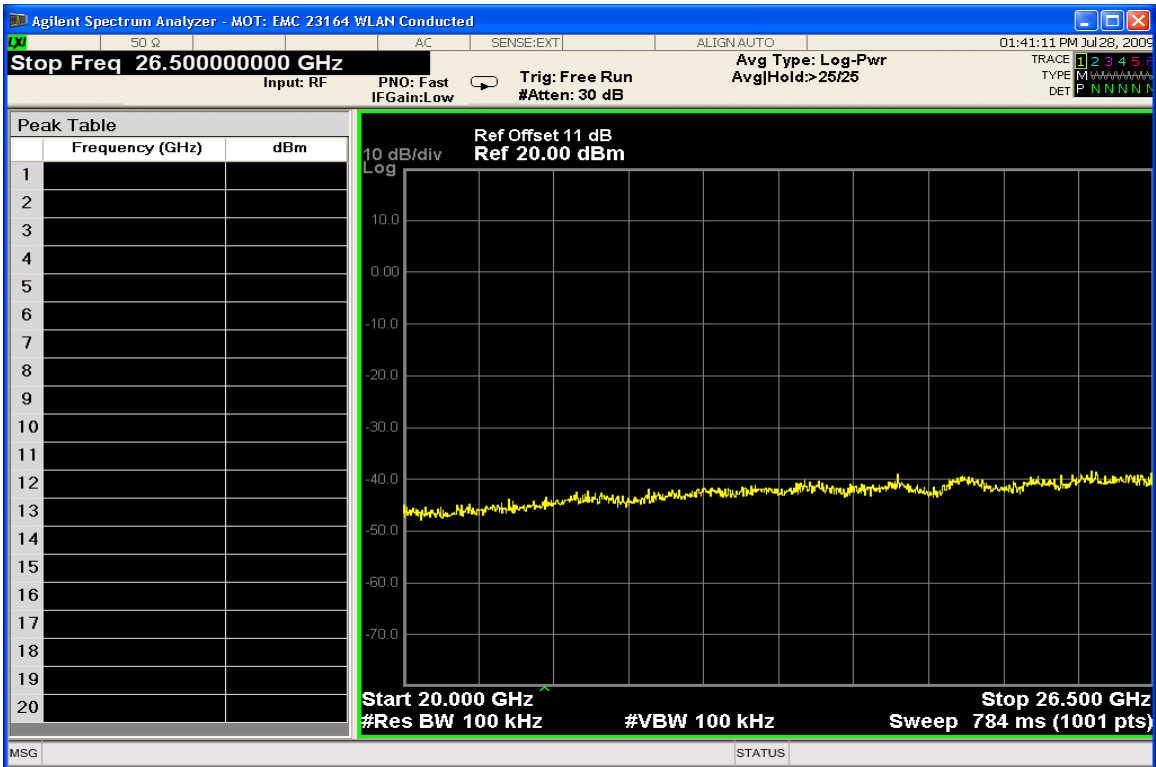
**Conducted Spurious Emissions 30-3000MHz (Low Channel)**



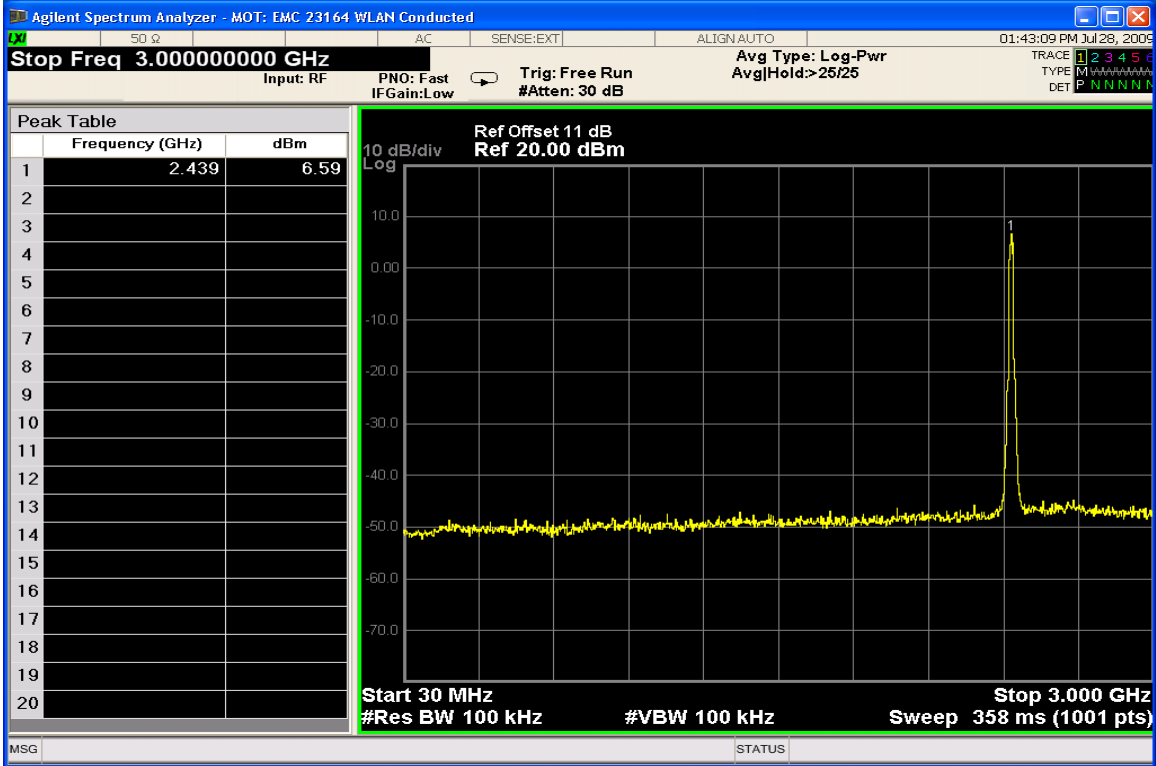
**Conducted Spurious Emissions 2-10GHz (Low Channel)**



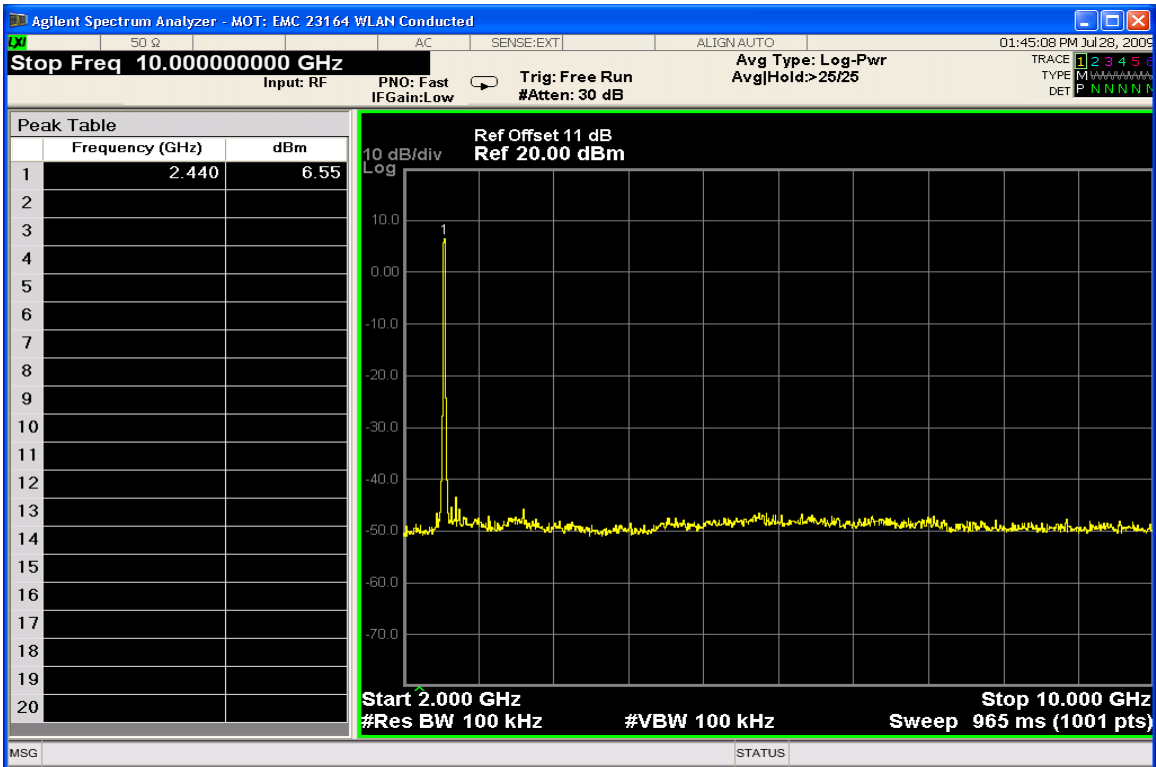
Conducted Spurious Emissions 10-20GHz (Low Channel)



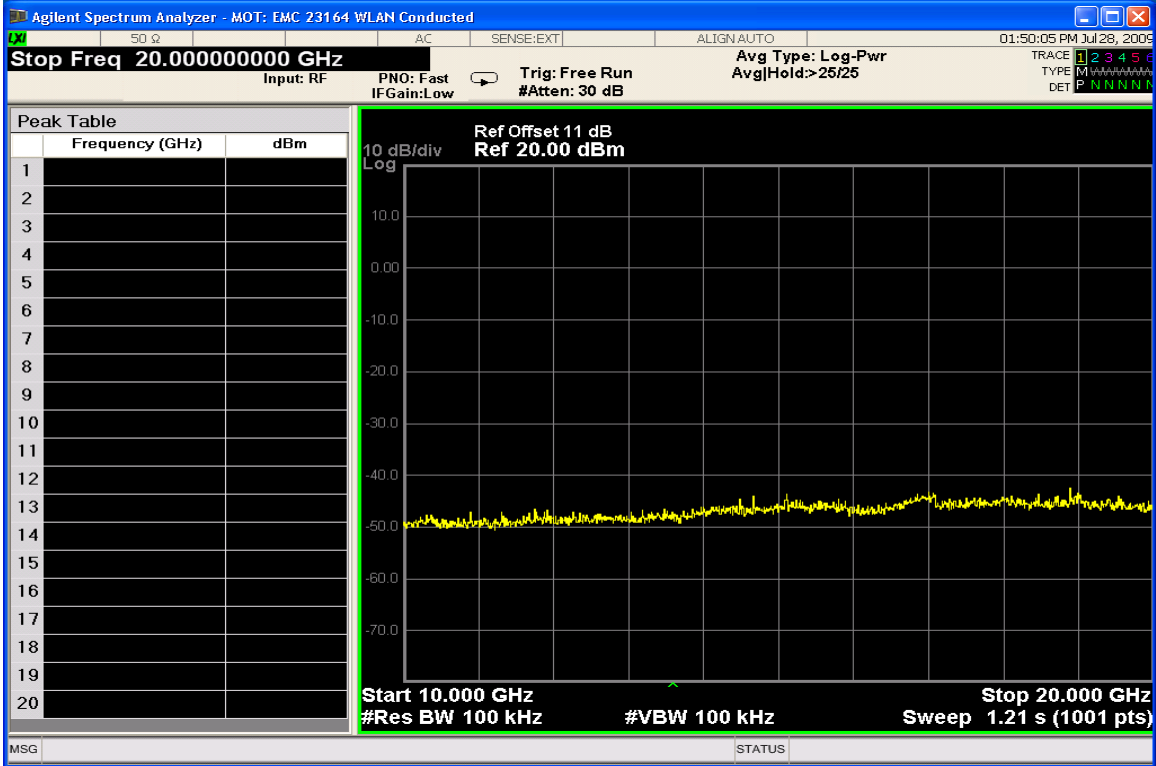
Conducted Spurious Emissions 20-26.5GHz (Low Channel)



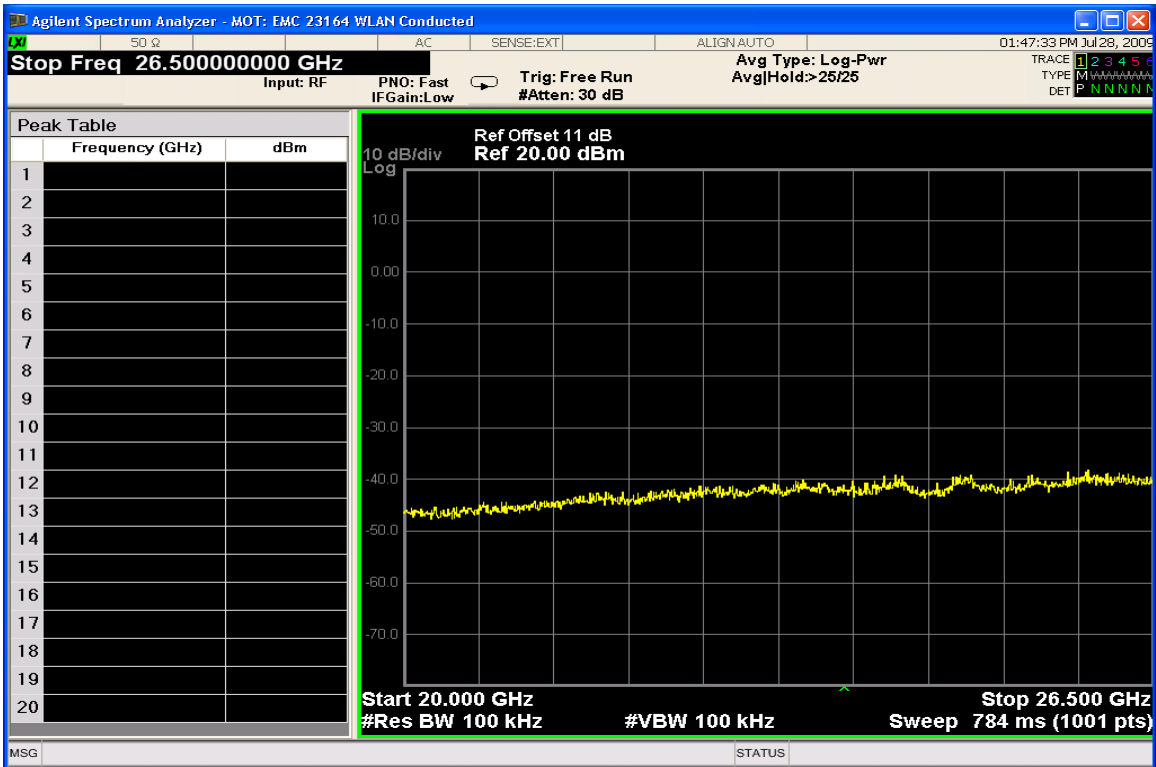
Conducted Spurious Emissions 30-3000MHz (Mid Channel)



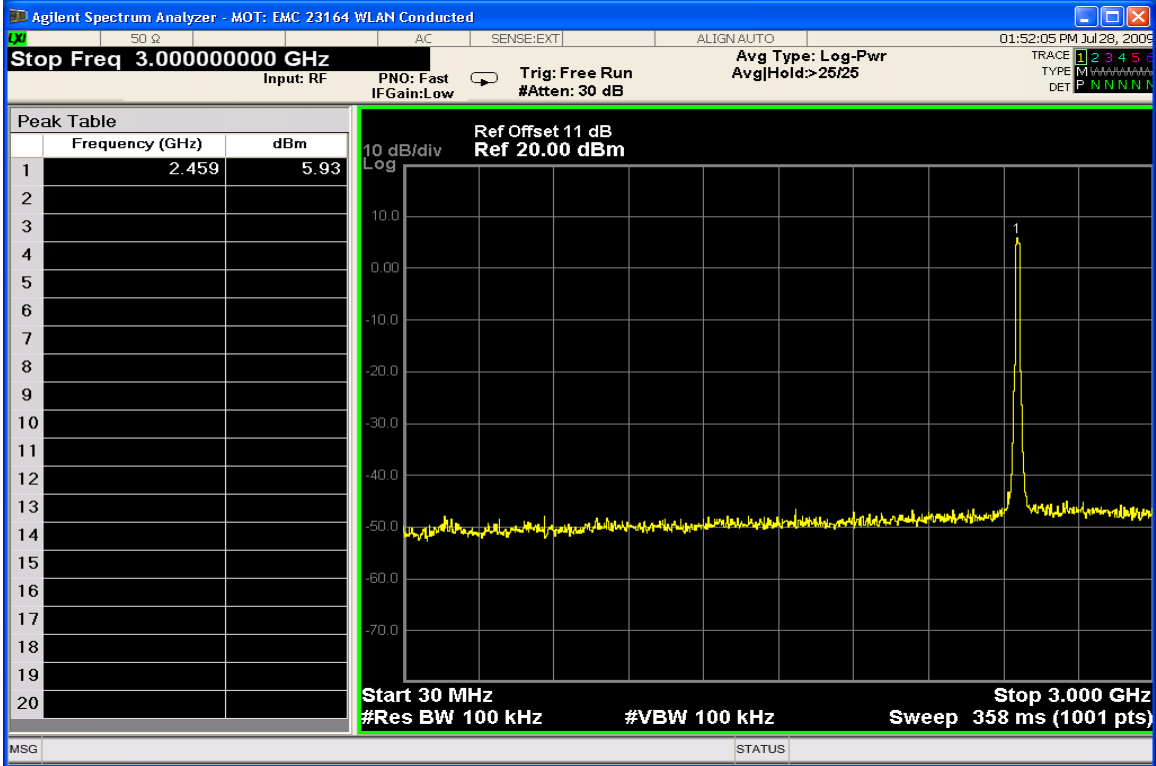
Conducted Spurious Emissions 2-10GHz (Mid Channel)



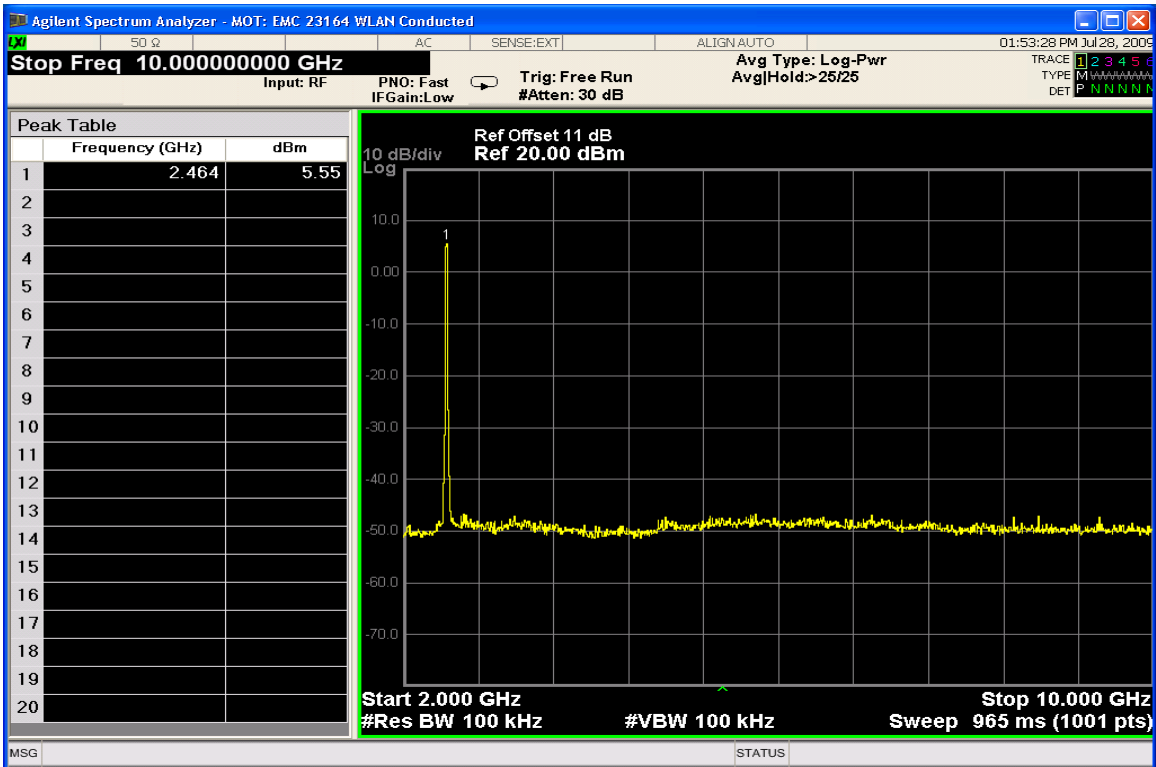
Conducted Spurious Emissions 10-20GHz (Mid Channel)



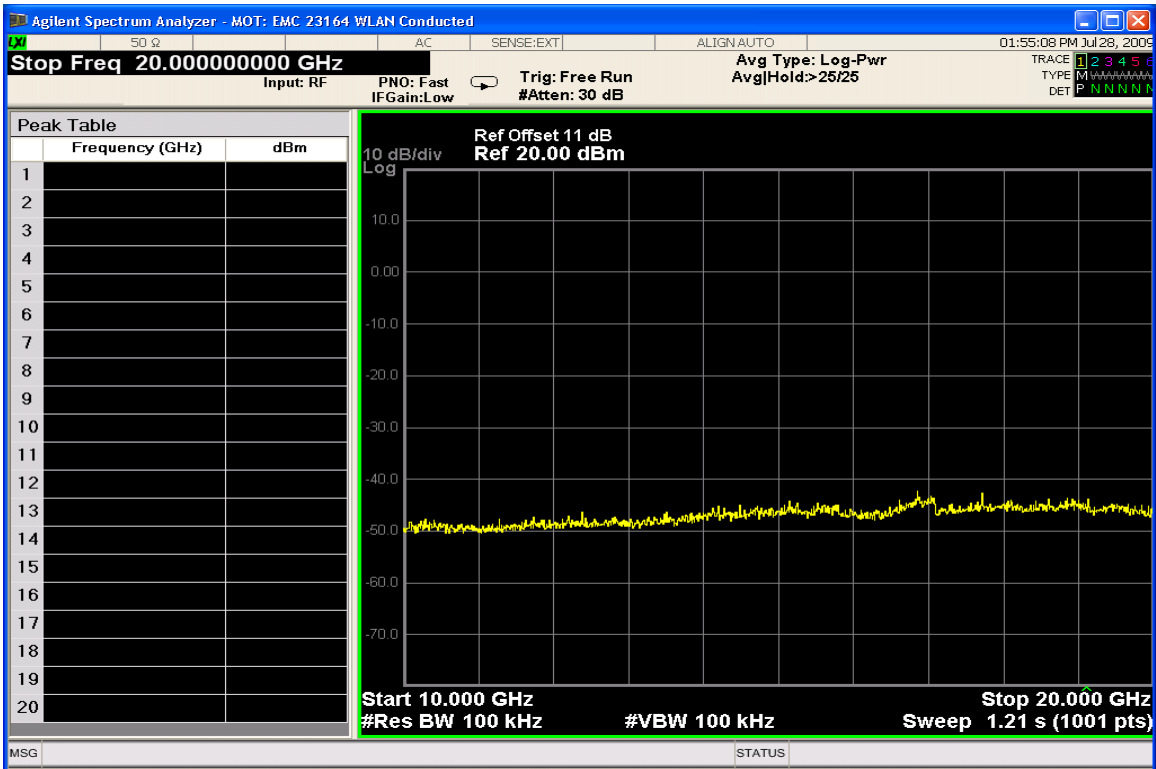
Conducted Spurious Emissions 20-26.5GHz (Mid Channel)



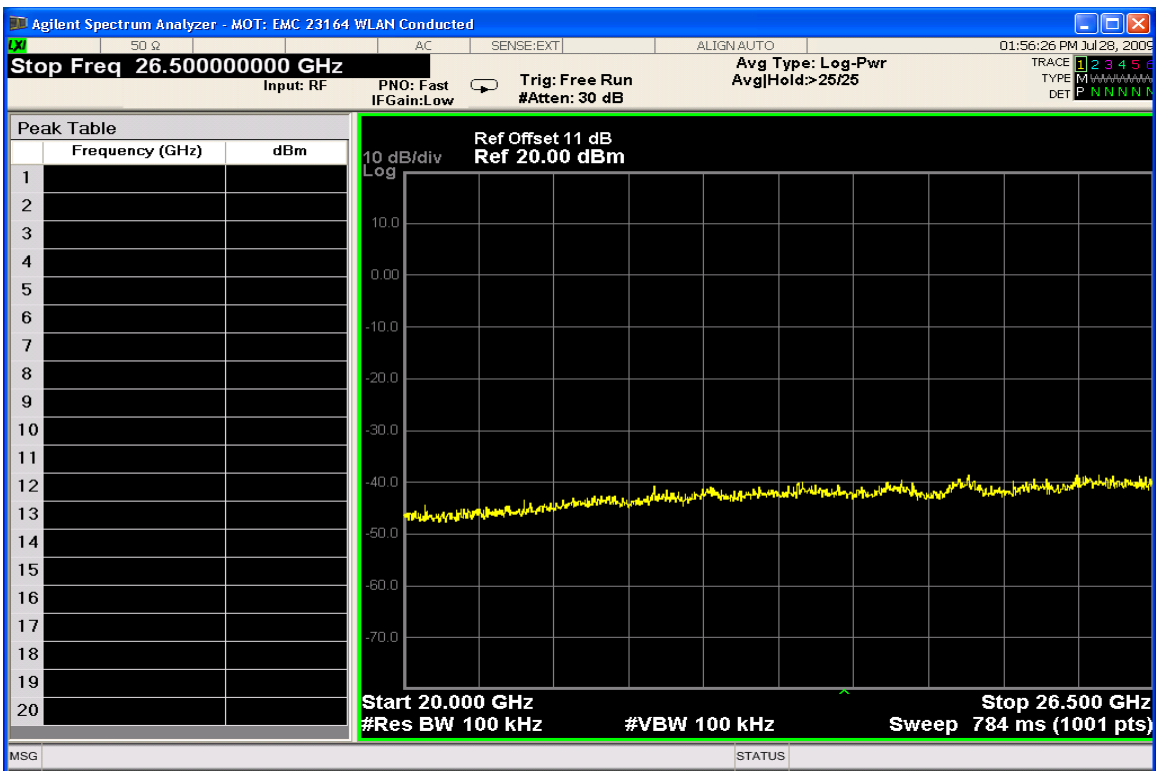
Conducted Spurious Emissions 30-3000MHz (High Channel)



Conducted Spurious Emissions 2-10GHz (High Channel)



Conducted Spurious Emissions 10-20GHz (High Channel)



Conducted Spurious Emissions 20-26.5GHz (High Channel)

**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.

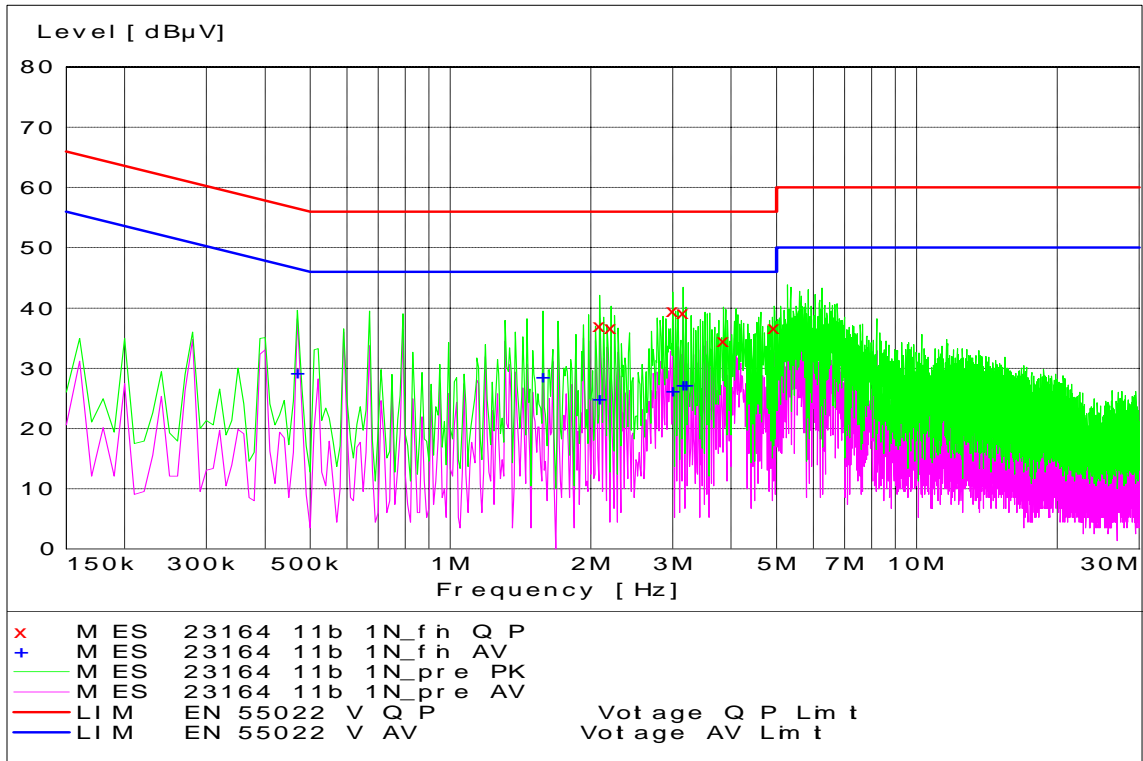
All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using 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 – Quasi Peak and Average Detector.

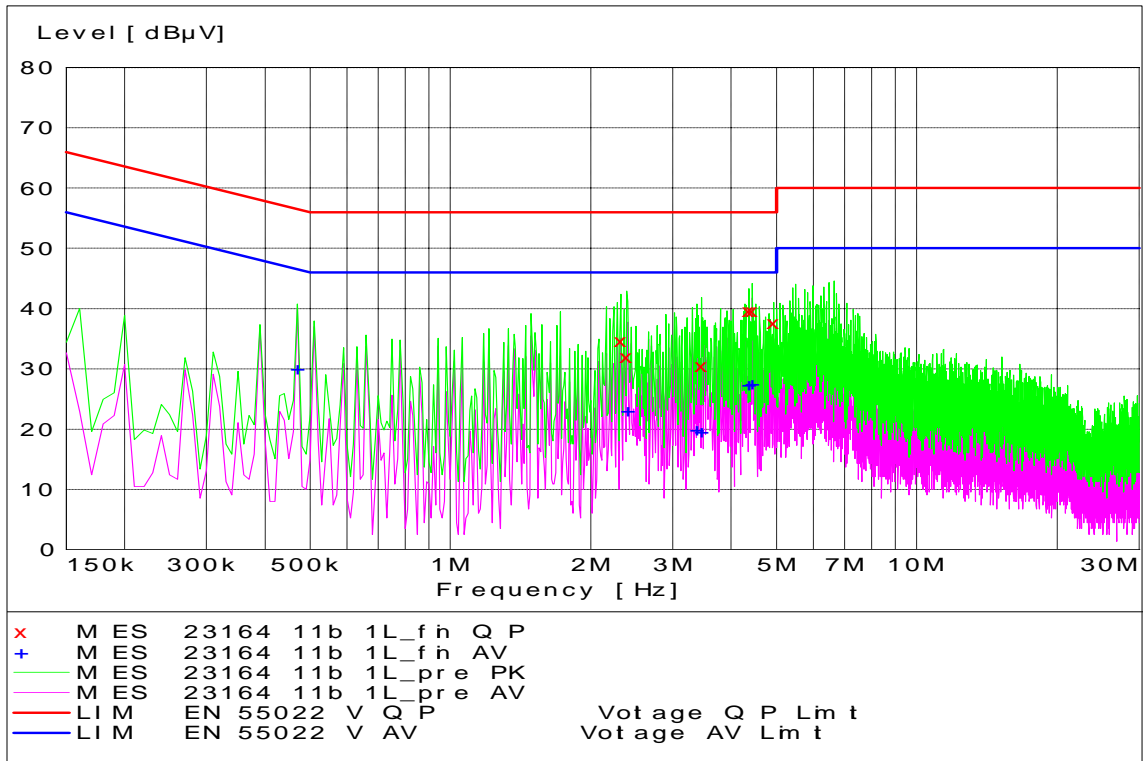
**Measurement Results**

See attached:

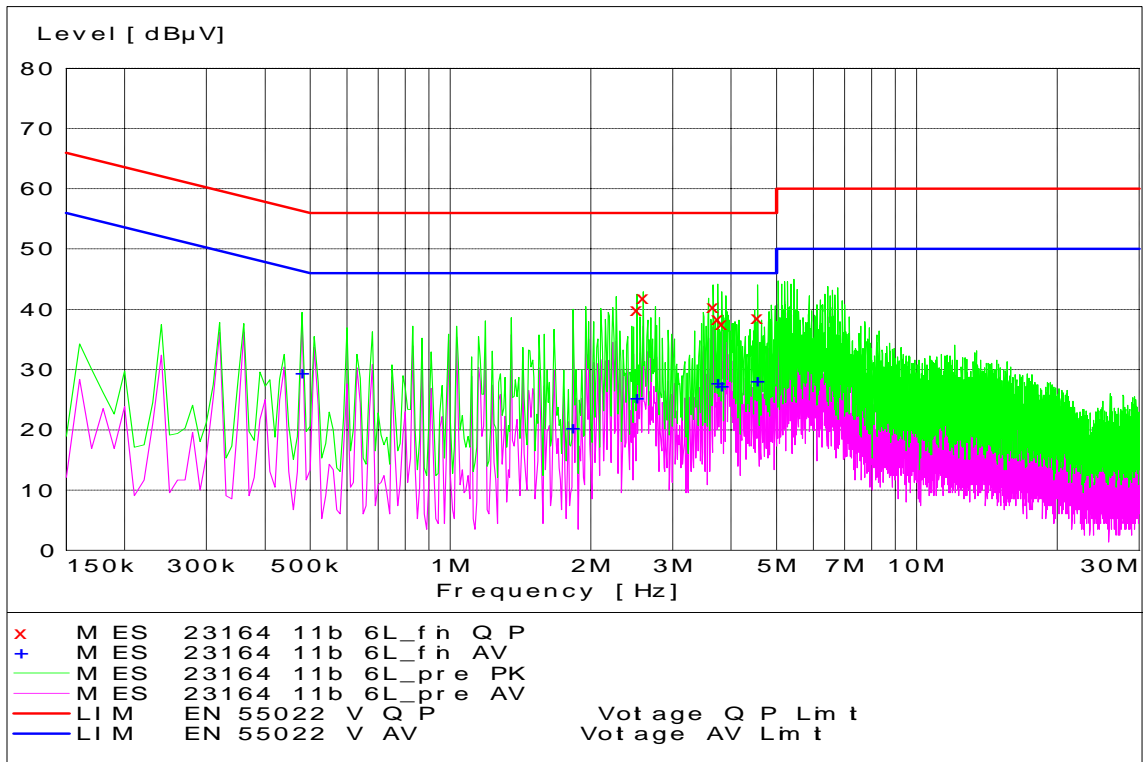
**802.11b @ 11Mbps**



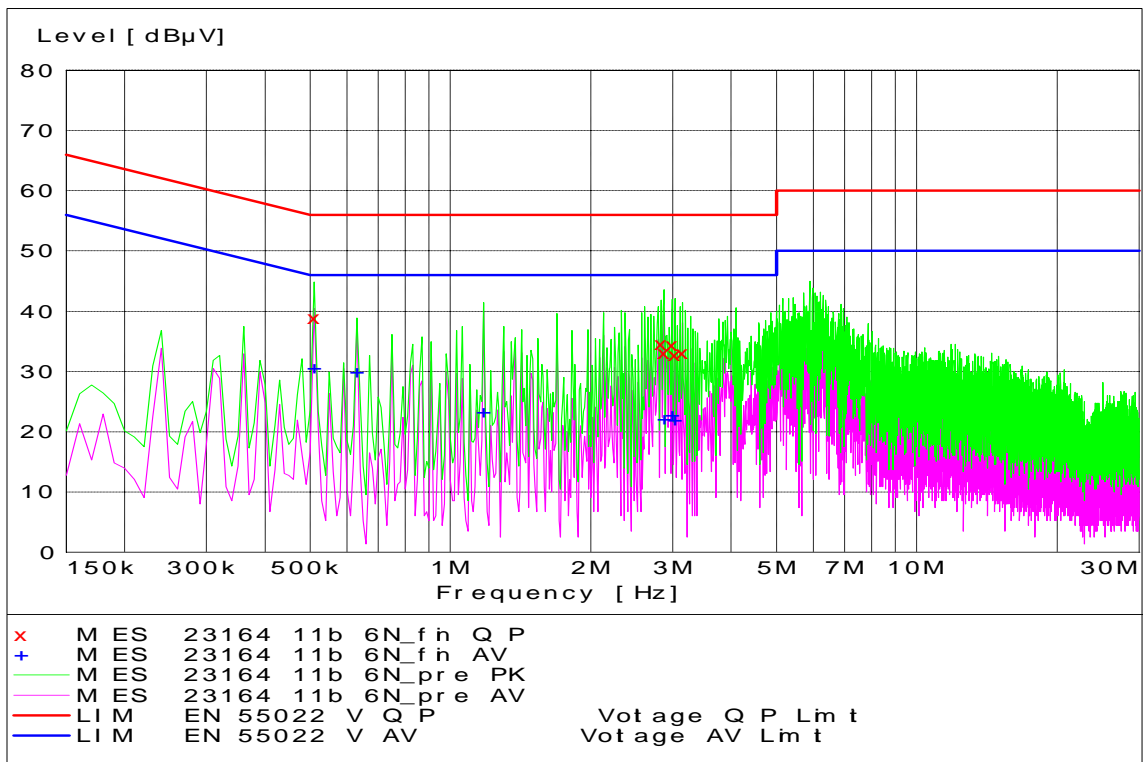
**WLAN Channel 1 - Tx Mode - Neutral Coupling**



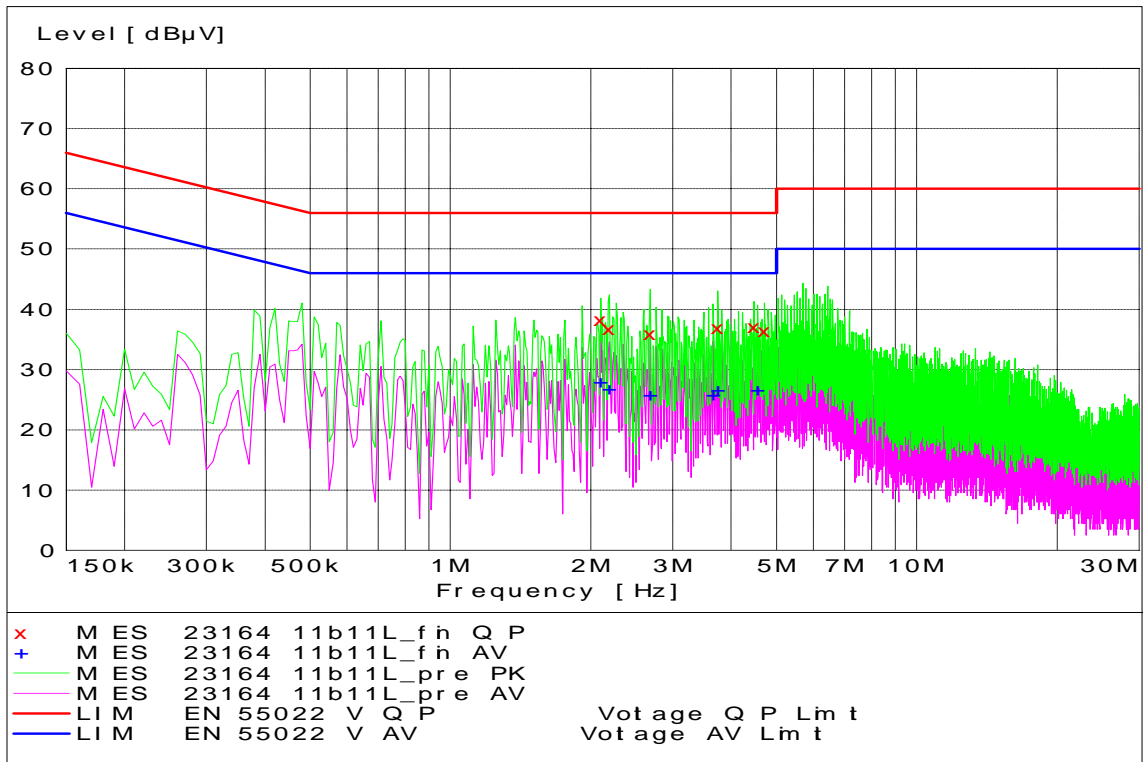
**WLAN Channel 1 - Tx Mode - Line Coupling**



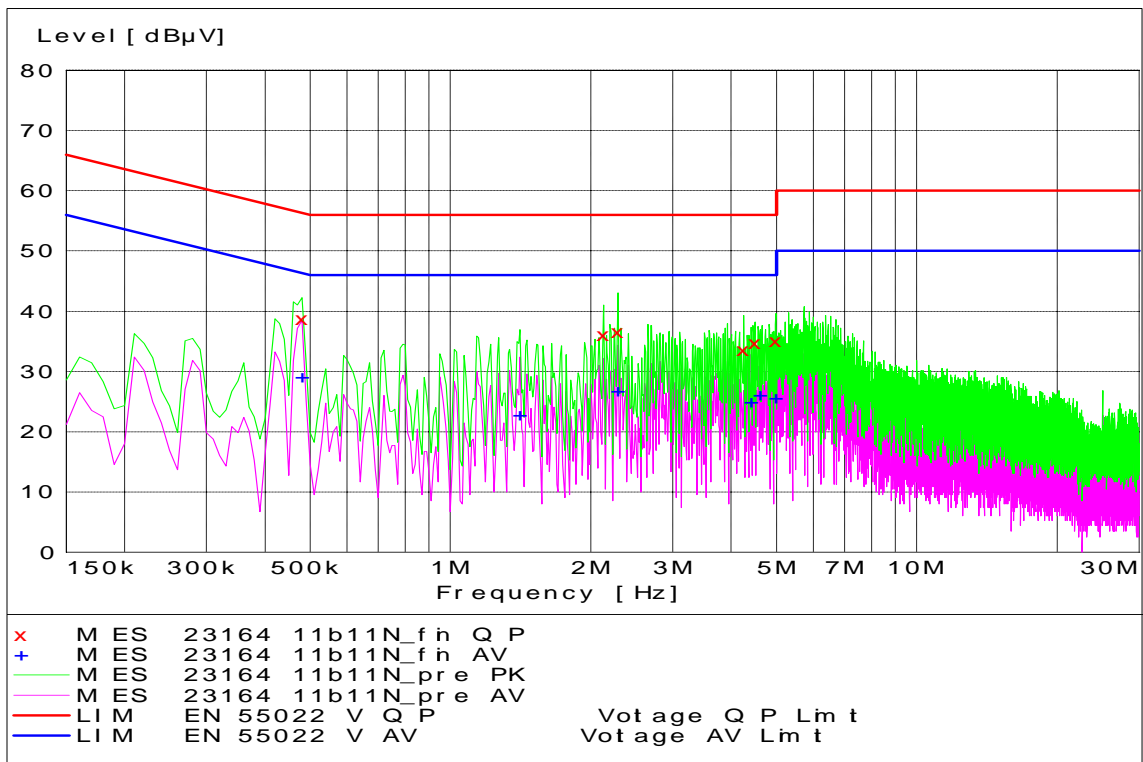
**WLAN Channel 6 - Tx Mode - Line Coupling**



**WLAN Channel 6 - Tx Mode - Neutral Coupling**

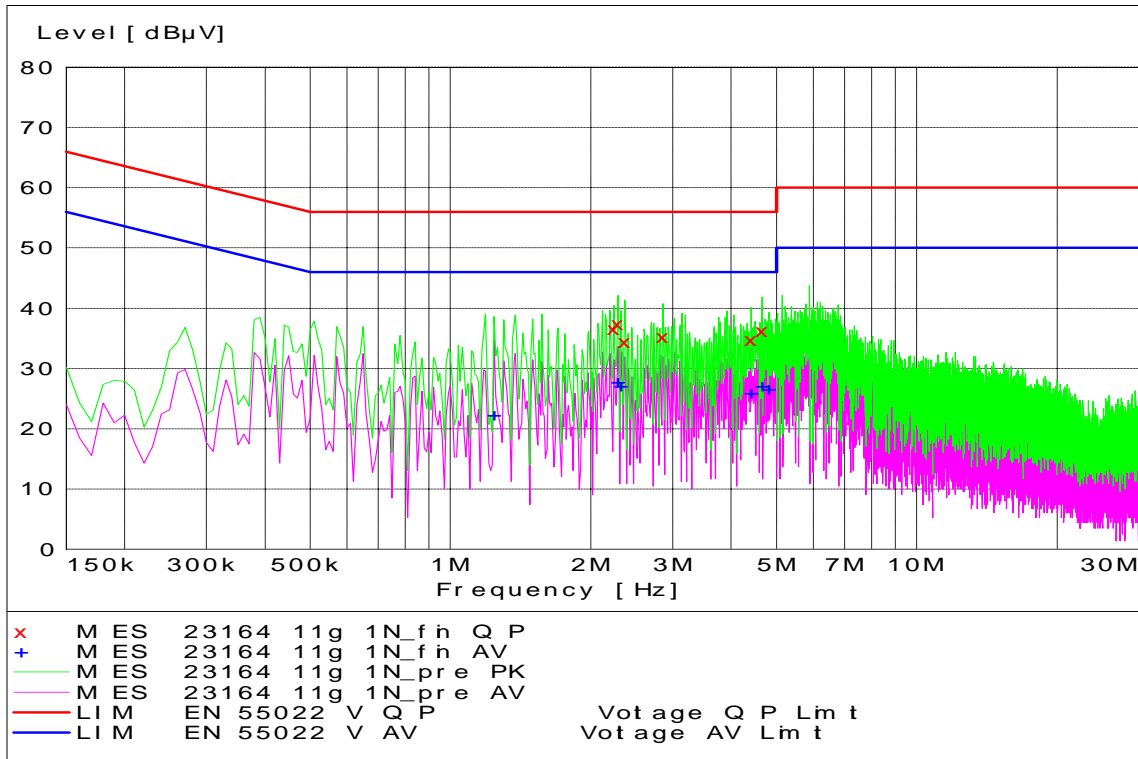


**WLAN Channel 11 - Tx Mode - Line Coupling**

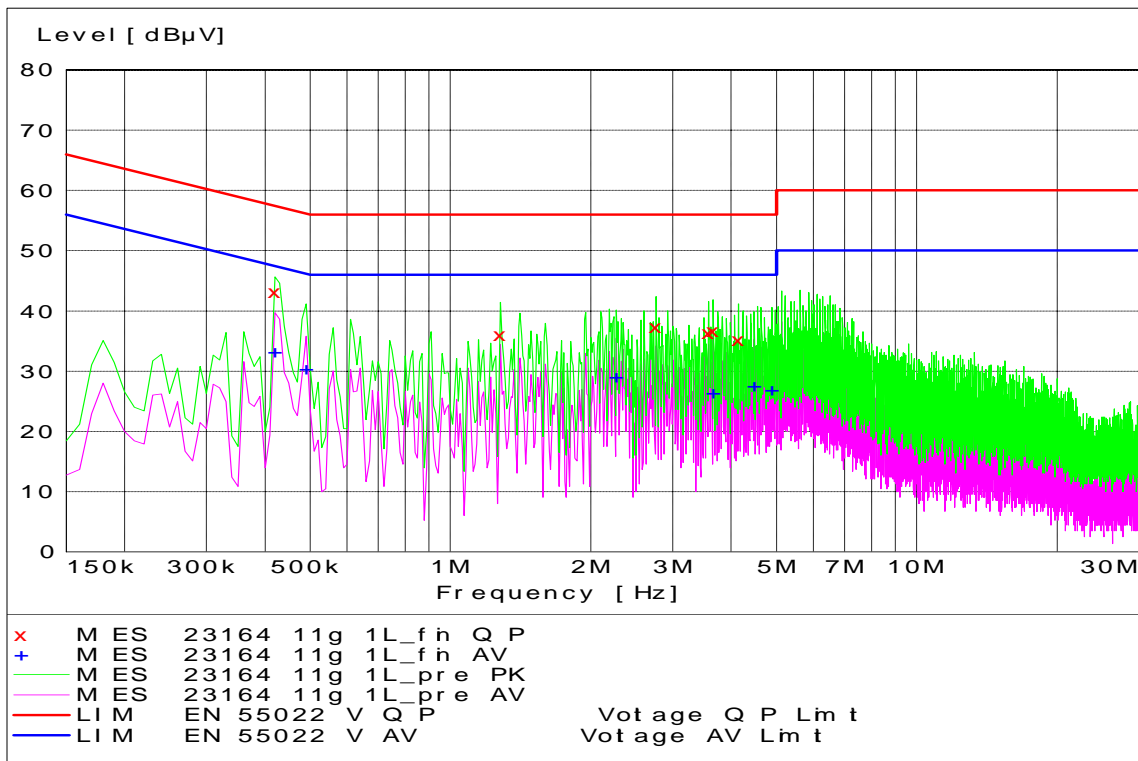


**WLAN Channel 11 - Tx Mode - Neutral Coupling**

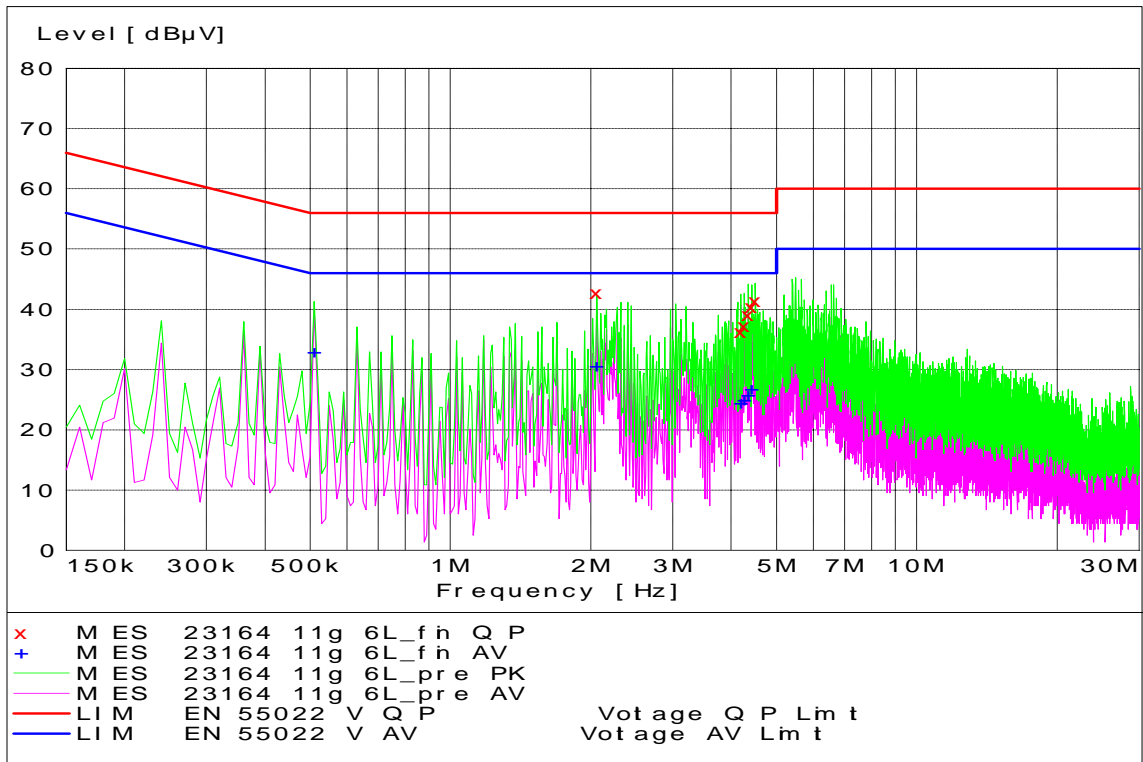
**802.11g @ 9Mbps**



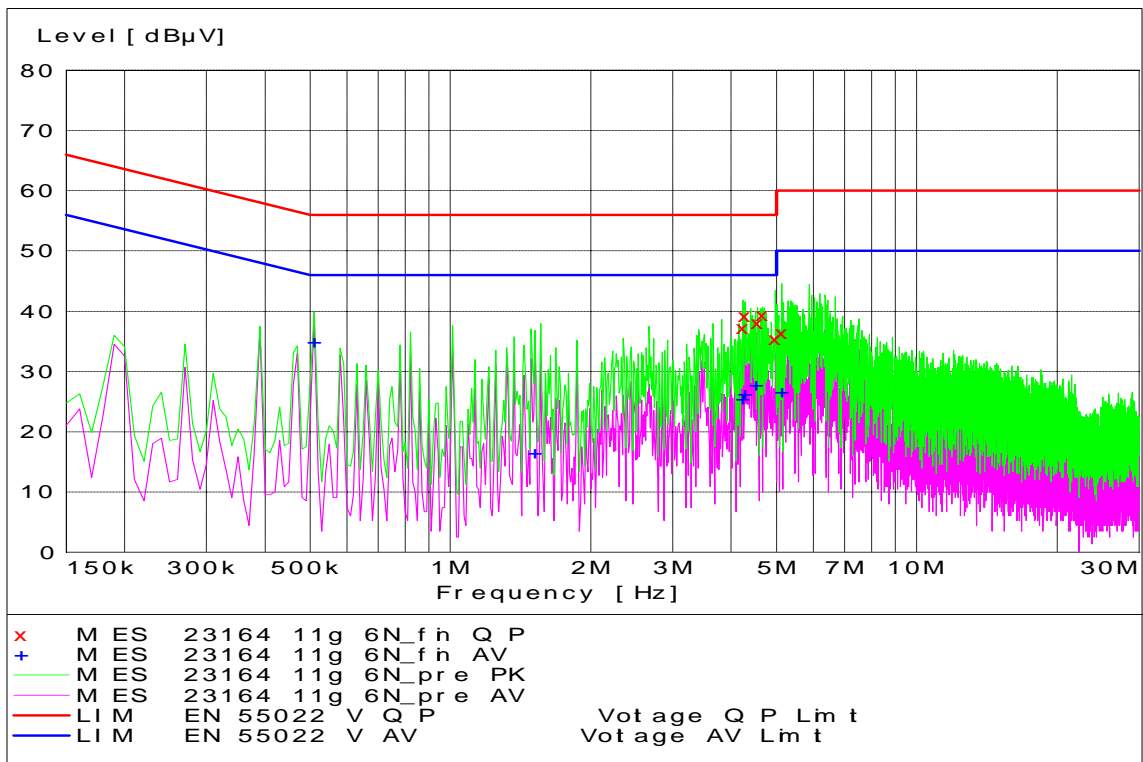
**WLAN Channel 1 - Tx Mode - Neutral Coupling**



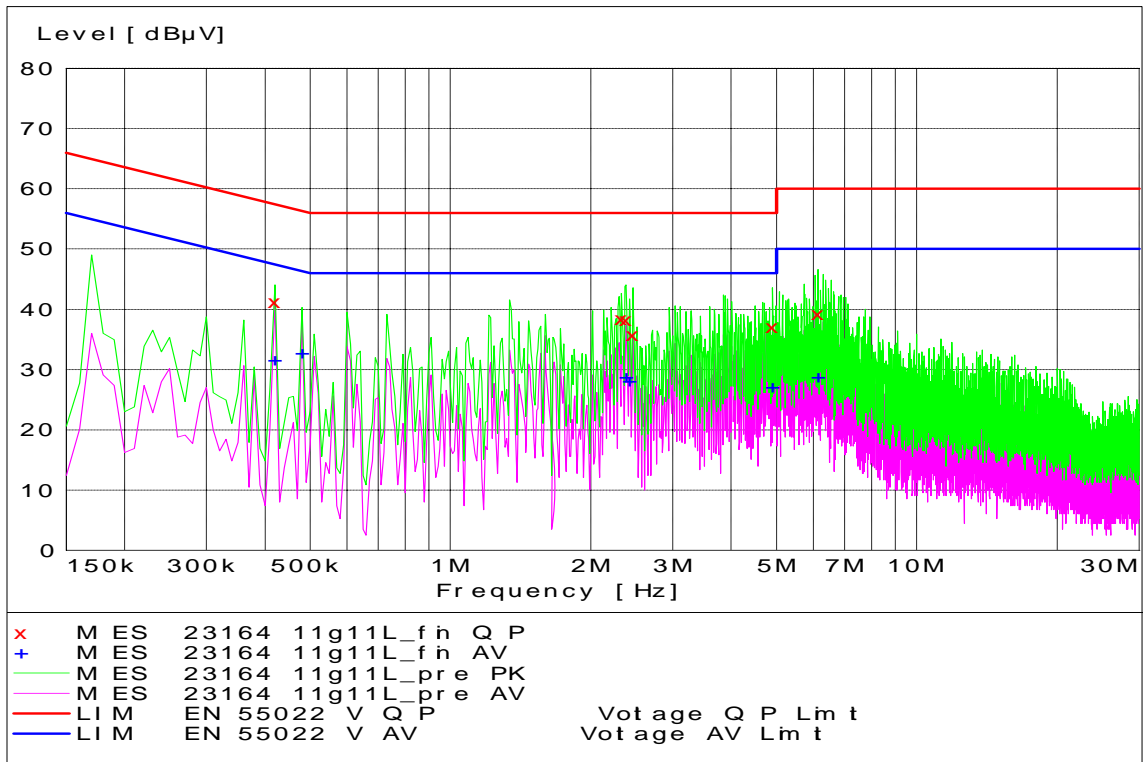
**WLAN Channel 1 - Tx Mode - Line Coupling**



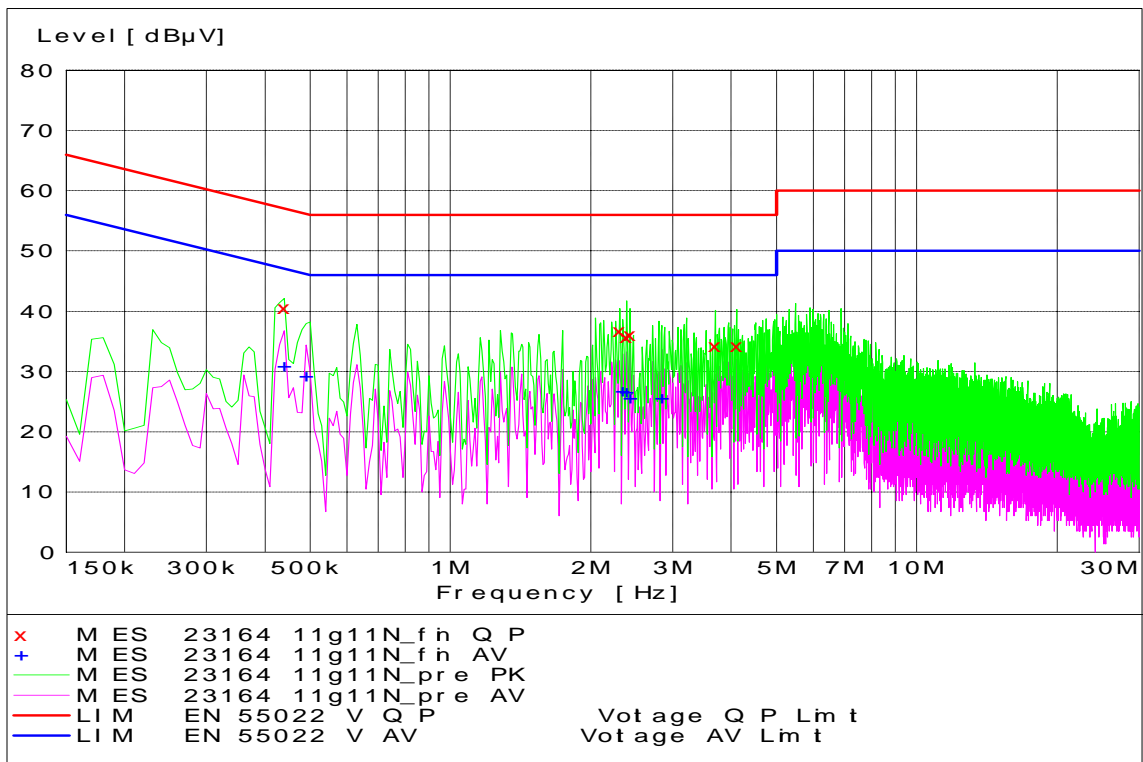
**WLAN Channel 6 - Tx Mode - Line Coupling**



**WLAN Channel 6 - Tx Mode - Neutral Coupling**



**WLAN Channel 11 - Tx Mode - Line Coupling**



**WLAN Channel 11 - Tx Mode - Neutral Coupling**

**End of Test Report**