

## Summary



This Technical Brief presents a practical step-by-step method of measuring the sensitivity of an Intersil PRISM® PCMCIA Wireless LAN assembly.

## Equipment Required

1. Reference PRISM PCMCIA WLAN transmitter (used as a DSSS source)
2. Shielded Boxes with Beryllium Copper Finger Stock on lid, - 2 required: One to enclose TX Controller and Transmitter and one to enclose RX Controller and Receiver.
3. Laptop Computers - 2 required.
4. RF Wattmeter with sensitive sensor head, H-P 438A with 8484A sensor or equivalent (-70 to +20dBm power range)
5. Variable Attenuator, 50Ω, 6dB - 60dB, Weinschel 940-60-11 or equivalent.
6. 2-Way Precision 6dB, 50Ω Power Splitter, H-P 11667B or equivalent - one required, one optional (see Test Setup).
7. 6dB, 50Ω, Precision Attenuator, DC-6GHz, with SMA connectors.

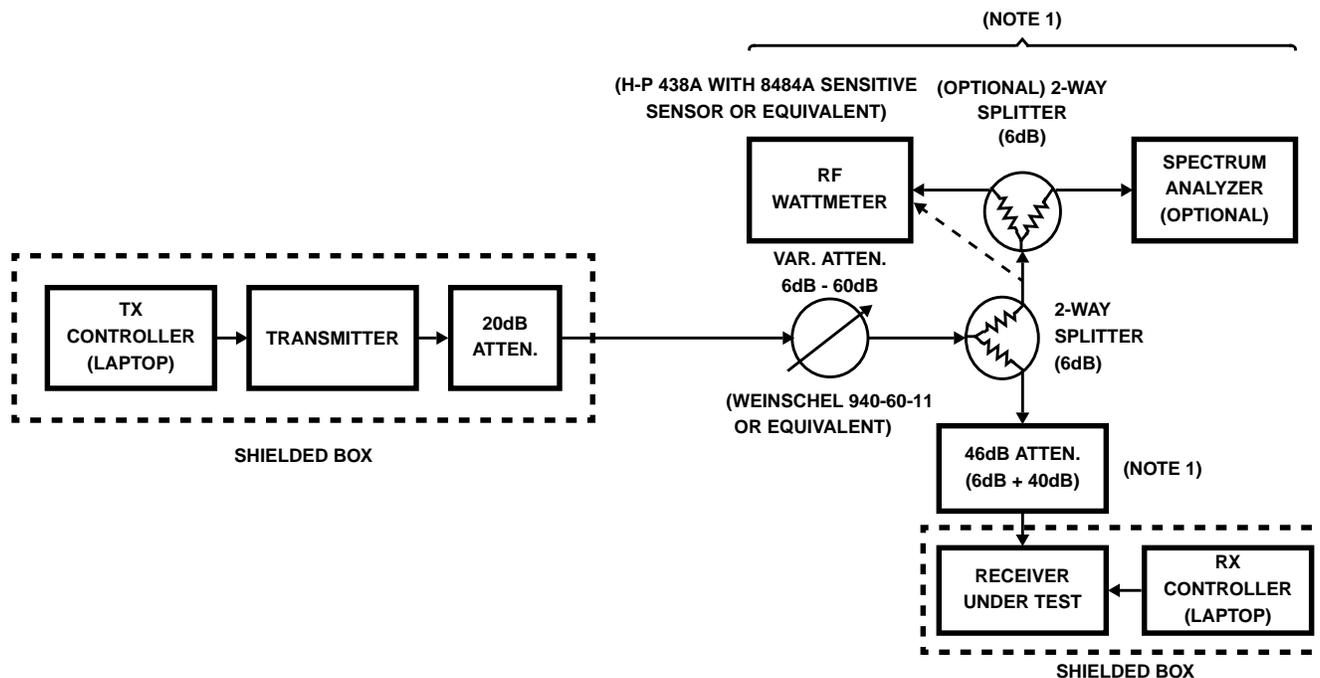
8. 40dB, 50Ω, Precision Attenuator, DC-6GHz, with SMA connectors.
9. 20dB, 50Ω, Precision Attenuator, DC-6GHz.
10. (optional) Spectrum Analyzer, H-P 8593E or equivalent.
11. Torque Wrench for SMA connectors, 5 lb-in., H-P 1582 or equivalent.
12. Various lengths of low loss 50Ω coax cable terminated in male SMA connectors.
13. LANEVAL software (proprietary Intersil Windows-based software which generates transmitter packets and displays the receiver Packet Error Rate).
14. Prism Test Utility (PTU) software (proprietary Intersil Windows-based software which provides a convenient Continuous Transmit mode enabling accurate power measurement).

## Test Procedure

NOTE: In the procedure below, it is assumed that the proper Windows Driver, LANEVAL and PTU software are correctly installed and operational. The proprietary software is normally supplied with the purchase of an EVAL kit.

If possible, this test should be performed in a shielded RF Screen Room in order to exclude any interfering signals from degrading the measurement.

## Test Setup - Receiver Sensitivity



NOTE:

1. If the Spectrum Analyzer is not used, delete the optional 2-Way Splitter, connect the RF Wattmeter directly to the previous Splitter and change the 46dB Attenuator to 40dB.

1. Connect the equipment as shown in the Test Setup below using low loss coax cables. Use the Torque Wrench to ensure that all coaxial cable connections are adequately torqued to provide good shielding. Do not over torque as damage to the SMA connectors may occur.
  2. Ensure that the Wattmeter has recently been zeroed and that the correct Calibration Constants have been entered.
  3. On the Transmitter Controller Laptop, note that the NDIS driver icon appears in the System Tray on the desktop (looks like a computer with an antenna sticking out of the top). Double click on this icon and note that the Wireless LAN Configuration Utility opens. Left click on the Configuration tab and select either the **AdHoc** or **Pseudo IBSS** mode (depending on driver version). Select the Channel and Data Rate. Click on **Apply** and note that the NDIS icon color is green.
  4. Using the LANEVAL software on the Transmit Controller laptop, turn on the transmitter by left-clicking the mouse on the **Start Tx** button. Note that the Transmit Data window opens. Click on the **Start Tx** button. in this window. The transmitter will start and data transmission will begin. Allow the transmitter to warm up for 3 minutes to stabilize its power output.
  5. Place a cover over the transmitter shielded box such that the unit is completely covered on all six sides. Add a weight to the center of the cover to ensure adequate pressure sealing the cover to the Finger Stock.
  6. Set the Variable Attenuator to minimum attenuation [i.e., fully clockwise (CW)].
  7. On the Receiver Controller laptop, repeat step 3.
  8. On the Receiver Controller laptop, start the LANEVAL software. In the opening menu, left click on **Start Rx**. Note that the Receive Data window opens. In this menu, left click on **Start Rx**. Note that the displays in the **Current** column are indicating data. The Percent Packet Error Rate (PER%) should indicate at or very close to 0% (i.e., perfect packet transfers).
- NOTE: If no data is received, check in the Network area of the Control Panel in both the Transmitter and Receiver to ensure that an IP address and Subnet Mask have been assigned in the associated TCP/IP component. The IP Address must be different in the Transmitter and Receiver. The Subnet Mask must be the same. 255 255 255 0 is the recommended Subnet. To access this area, on the Desktop select **Start -> Settings -> Control Panel**. Then double click on **Network**.
9. Place the cover on the Receiver. Close as much of the top opening as possible, leaving only just enough of the Laptop exposed to enable reading its screen. Alternately, for convenience, you may connect a remote monitor and a remote keyboard to the Laptop thereby permitting the Receiver box to be completely shielded. In this case, it is prudent to place Ferrite Decoupling Sleeves around each of the connecting cables on these devices to prevent RF signals from propagating through this path. Locate these sleeves inside the box near where the cables exit the box.
  10. Slowly increase the attenuation by rotating the Variable Attenuator counterclockwise (CCW) until the PER increases to approximately 8%.  
*NOTE:* Because of the sophisticated correlator used in PRISM, PER normally degrades extremely rapidly, once the sensitivity threshold is reached. It is therefore not usually possible to achieve exactly an 8% PER. Rather, try to average the PER around this 8% value.
  11. Turn the Transmitter off by clicking on the **Stop Tx** button.
  12. Start the PTU software by double clicking on its icon on the Desktop.
  13. Select the proper associated driver from the list appearing on the screen. After a short delay, the MAC Address and Baseband Processor type should appear. If you are not sure of the correct driver, click on the PCMCIA icon in the System Tray on the Desktop and note the name displayed.
  14. Note that the button for the operating channel is colored green. Click on this channel and note that a border appears around the button.
  15. Click on the **Continuous Tx** button and note that its color turns to red. The Transmitter is now operating with no packet gaps, enabling accurate reading of the power.  
*Note:* You will not receive packets while in Continuous Transmit mode.
  16. Note the Wattmeter reading. The Receiver Sensitivity may be easily calculated by subtracting 40dB from this power reading.  
Example: If the Wattmeter indicates -43dBm, the Receiver Sensitivity is -83dBm.
  17. Turn off the Transmitter by clicking on the **Continuous Tx** button. The color should revert back to grey.

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