

# **RS9110-N-11-03 Evaluation Board User Guide**

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## Table of Contents

<b>1: Introduction.....</b>	<b>5</b>
<b>  : Wi-Fi Data Transfer Tests.....</b>	<b>6</b>
<b>.1: Test Setup.....</b>	<b>6</b>
<b>.2: Evaluation Software – Windows XP.....</b>	<b>7</b>
<b>.3: Evaluation Process on Windows XP.....</b>	<b>8</b>
<b>.4: Evaluation Software – Linux.....</b>	<b>8</b>
<b>.5: Evaluation Process on Linux.....</b>	<b>9</b>
<b>.6: Evaluation Software – Windows CE.....</b>	<b>9</b>
<b>.7: Evaluation Process on Windows CE.....</b>	<b>10</b>
<b>3: Connector Details.....</b>	<b>11</b>
<b>3.1: SPI/SDIO connector.....</b>	<b>11</b>
<b>3.2: GPIO Interface Header Details.....</b>	<b>11</b>
<b>3.3: SD Memory Interface.....</b>	<b>12</b>
<b>4: Compliance Statements.....</b>	<b>12</b>

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Table of Figures

**Figure 1: RS9110-N-11-03 Evaluation Board and Connectors.....5**  
**Figure 2: RF Cable Connected to the RS9110-N-11-03 Evaluation Board.....6**  
**Figure 3: Test Setup for Throughput Measurement.....7**

## 1: Introduction

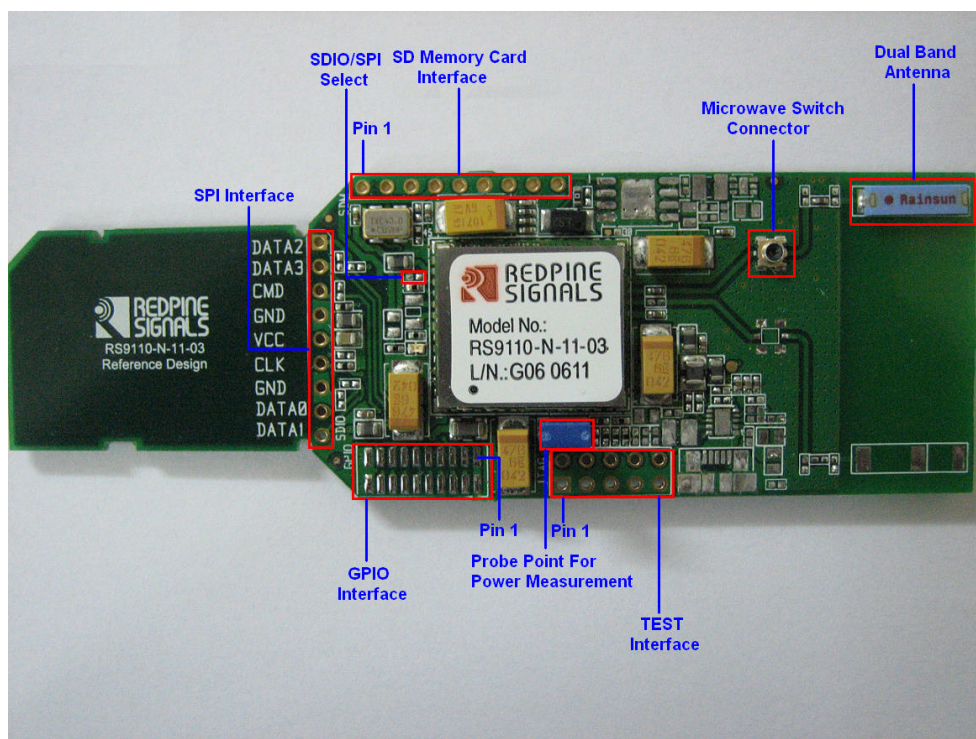
The RS9110-N-11-03 evaluation board provides a complete IEEE 802.11abgn Wireless LAN evaluation platform. This basically has the RS9110-N-11-03 IEEE 802.11abgn WLAN module mounted on it along with few other supporting components such as 40 MHz reference oscillator and other passives. The RS9110-N-11-03 is a high-performance, low-power WLAN module.

The board connects to a host processor through SDIO or SPI interfaces. It also provides the connectivity for the WLAN module to the Vector Signal Generator (VSG) and Vector Signal Analyzer (VSA) through a microwave coaxial connector switch.

The RS9110-N-11-03 evaluation board facilitates you in carrying out following tests.

- Evaluation of the Transmit and Receive performance of the radio
- Evaluation of the end-to-end throughput performance

The following picture illustrates various connectors on the RS9110-N-11-03 evaluation board



**Figure 1: RS9110-N-11-03 Evaluation Board and Connectors**

A probe point (Jumper PB9) is provided in order to measure the total power consumed by the RS9110-N-11-03 module during transmit, receive, and standby modes.

On board resistors are provided for the Mode Select, which helps the user to switch from the SDIO host interface to SPI host interface. A JTAG Connector is also provided to debug process flow control of the evaluation board. A SMD-based Microwave switch connector is provided to detach the onboard antenna, and attach external RF input/output of any signal generator/signal analyzer through a Microwave Cable Adapter (Murata Part Number – MXHS83QH3000).

The following diagram illustrates how the user can connect an adapter with Microwave coaxial cable to the switch connector.



**Figure 2: RF Cable Connected to the RS9110-N-11-03 Evaluation Board**

## **: Wi-Fi Data Transfer Tests**

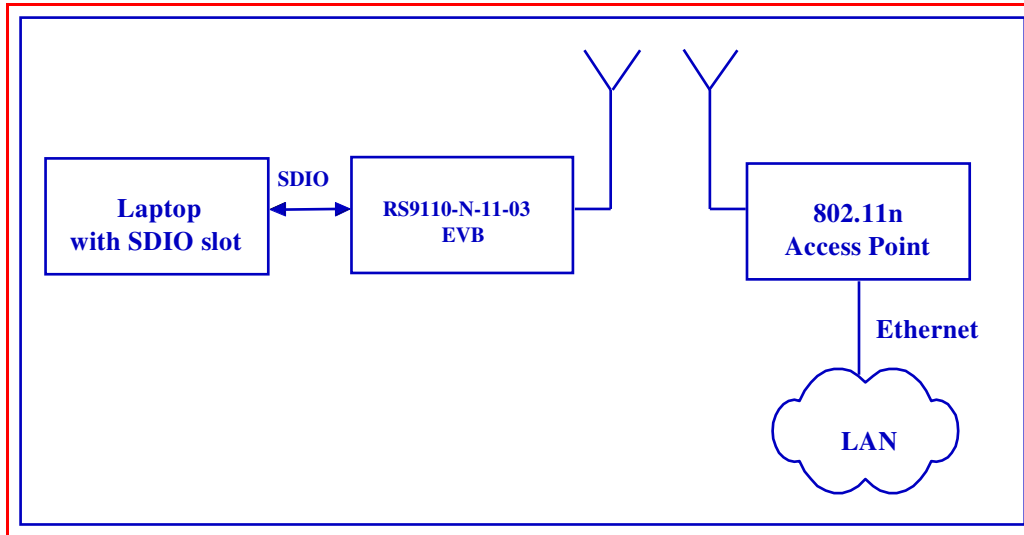
The evaluation kit allows you to carry out WLAN data transfer tests, where in RS9110-N-11-03 EVB can be connected to any 802.11abgn Access Points and user can run any network applications to verify the WLAN connection. You can also evaluate the application level throughputs using this EVB.

In order to perform these tests, a Windows XP, or Linux, or Window CE based WLAN driver is provided along with the evaluation kit.

### **.1: Test Setup**

If you want to evaluate the system, you need to have the following test setup. The EVB is inserted into the Laptop that has SDIO slot, and it is wirelessly connected to an 802.11n Access Point. Data transfer tests can be performed using any other systems in the LAN, which is connected to AP. The test setup is shown in the figure below. The sub-net mask of the wireless interface on the Laptop and AP should be same as that of the LAN, for which AP is connected via Ethernet.

Please note that, in order to evaluate the Lite-Fi™ on a Windows CE or a Windows Mobile platform, you need to replace the Laptop in the following setup, with any of the Windows CE or Windows Mobile based SDIO platform.



**Figure 3: Test Setup for Throughput Measurement**

The following is the list of the test setup requirements:

Laptop with SDIO slot and Windows XP or Linux operating system, or a Windows CE or Windows Mobile based SDIO platform.

RS9110-N-11-03 EVB

802.11n Access Point

## **.2: Evaluation Software – Windows XP**

The following table provides the description of the software package and installation guides to be used for carrying out the WLAN data transfer tests using an Access Point, on a Windows XP platform.

<b>Deliverable</b>	<b>Description</b>
LiteFi_X_Y_Z.exe	This is an installation setup file based on Windows XP, which will install the Wi-Fi driver files into "C:\Program Files\Lite-Fi". <X_Y_Z> indicates the driver version. For example, LiteFi_2_1_3.exe, means 2.1.3 version of the Windows XP driver.
<i>LiteFi_Driver_Installation_Guide_WindowsXP.pdf</i>	This is a user guide which provides instructions on following topics:

	<p>Installation of the setup file</p> <p>Host requirements to install the Wi-Fi driver</p> <p>Installation of the Wi-Fi driver</p>
<i>RS9110_N_11_03_WLAN_Test_Procedure_WindowsXP_V1_0.pdf</i>	<p>This is a user guide on the usage of the driver and wireless configuration utility to do data transfer tests under following categories:</p> <ul style="list-style-type: none"> <li>11g connection with WPA/WPA2</li> <li>11n connection with WPA2</li> <li>11n connection with Aggregation</li> </ul>

### **.3: Evaluation Process on Windows XP**

You can start the evaluation process as follows:

Step 1: - Follow the instructions mentioned in the *LiteFi\_Driver\_Installation\_Guide\_WindowsXP.pdf*.

Step 2: - Follow the instructions mentioned in the *RS9110\_N\_11\_03\_WLAN\_Test\_Procedure\_WindowsXP.pdf*.

### **.4: Evaluation Software – Linux**

The following table provides the description of the software package and installation guides to be used for carrying out the WLAN data transfer tests using an Access Point, on a Linux platform.

<b>Deliverable</b>	<b>Description</b>
<i>LiteFi_WLAN_X_Y_Z.tgz</i>	This is an installation setup file based on Linux platform, which will install the Wi-Fi driver files into appropriate user directory. <X_Y_Z> indicates the driver version. For example, <i>LiteFi_WLAN_2_1_3.tgz</i> , means 2.1.3 version of the Linux driver.
<i>LiteFi_Driver_Installation_Guide_Linux.pdf</i>	This is a user guide which provides instructions on following topics: <ul style="list-style-type: none"> <li>Installation of the setup file</li> <li>Host requirements to install the Wi-Fi driver</li> <li>Installation and un-installation of the Wi-Fi driver</li> </ul>
<i>RS9110_N_11_03_WLAN_Test_Procedure_Linux.pdf</i>	This is a user guide on the usage of the driver and wireless configuration utility to do data transfer tests under following categories in



Deliverable	Description
	Linux platform: 11g connection with WPA/WPA2 11n connection with WPA2 11n connection with Aggregation

### **.5: Evaluation Process on Linux**

You can start the evaluation process as follows:

Step 1: - Follow the instructions mentioned in the *LiteFi\_Driver\_Installation\_Guide\_Linux.pdf*.

Step 2: - Follow the instructions mentioned in the *RS9110\_N\_11\_03\_WLAN\_Test\_Procedure\_Linux.pdf*.

### **.6: Evaluation Software – Windows CE**

The following table provides the description of the software package and installation guides to be used for carrying out the WLAN data transfer tests using an Access Point, on a Linux platform.

Deliverable	Description
RWLPSDIO_arm_X_Y_Z.cab	This is an installation setup file for a Windows CE or Windows Mobile based ARM platform. <X_Y_Z> indicates the driver version. For example, RWLPSDIO_arm_2_1_3.cab, means 2.1.3 version of the Windows CE driver.
<i>LiteFi_Driver_Installation_Guide_WindowsCE.pdf</i>	This is a user guide which provides instructions on following topics: Copying the setup file Host requirements to install the Wi-Fi driver Installation of the Wi-Fi driver
<i>RS9110_N_11_03_WLAN_Test_Procedure_WindowsCE.pdf</i>	This is a user guide on the usage of the driver and wireless configuration utility to do data transfer tests under following categories in Windows CE platform such as HP-iPAQ PDA: 11g connection – Open System 11g connection with WPA 11n connection with WPA

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## **.7: Evaluation Process on Windows CE**

You can start the evaluation process as follows:

Step 1: - Follow the instructions mentioned in the  
*LiteFi\_Driver\_Installation\_Guide\_WindowsCE.pdf*

Step 2: - Follow the instructions mentioned in the  
*RS9110\_N\_11\_03\_WLAN\_Test\_Procedure\_WindowsCE.pdf*

### 3: Connector Details

This section covers the connector details of various headers.

#### 3.1: SPI/SDIO connector

The following table provides the interface details for SPI/SDIO connector. You should not install R12, for operating the evaluation board in SDIO Mode. Conversely, you need to install R12 to put the board into SPI mode.

S. NO	SDIO Signal Names	SPI Signal Names	Connector Pin No.
1)	Sdio_data2	Spi_Intrerrupt	J2.1
2)	Sdio_data3	--	J2.2
3)	Sdio_cmd	Spi_cs	J2.3
4)	Gnd	Gnd	J2.4 & 7
5)	Supply	Supply	J2.5
6)	Sdio_clk	Spi_clk	J2.6
7)	Sdio_data0	Spi_data in	J2.8
)	Sdio_data1	Spi_data out	J2.9

#### 3.2: GPIO Interface Header Details

S. No	Signal Names	Connector Pin No.
1)8	Supply	J8.1&2
2)8	GPIO 1	J8.3
3)8	GPIO 0	J8.4
4)	HOST WAKEUP INT	J8.5
5)8	XTAL IP EN	J8.6
6)8	I2C SCL	J8.7
7)8	I2C SDA	J8.8
)	UART1 OUT	J8.9
9)8	UART1 IN	J8.10
10)	WLAN ACTIVE	J8.11
11)	BT PRIORITY	J8.12
12)	UART1 RST	J8.13
13)	UART2 OUT	J8.14
14)	UART1 CTS	J8.15

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S. No	Signal Names	Connector Pin No.
15)	BT ACTIVE	J8.16
16)	VRF28 (DO NOT USE)	J8.17
17)	Gnd	J8.18,19&20

### 3.3: SD Memory Interface

S. No.	Signal Names	Connector Pin No.
1)8	CS	J9.1
2)8	DI	J9.2
3)8	Supply	J9.3
4)	SCLK	J9.4
5)8	GND	J9.5
6)8	DO	J9.6
7)8	CD	J9.6

## 4: Compliance Statements:

### 4.1 FCC Compliance Statements

This device complies with Part 15 of the FCC rules. Operation is subject to following Two conditions: 1. this device may not cause harmful interference and 2. This device Must accept any interference received including interference that may cause undesired Operation of this device.

The changes or modifications not expressly approved by the party responsible for Compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna Must not be co-located or operating to conjunction with any other antenna or transmitter, Except if installed in compliance with FCC Multi Transmitter procedures.

To inherit the modular approval, the antennas for this transmitter must be installed to provide A separation distance of 20cm from all persons and must not be co-located or operating in Conjunction with any other antenna or transmitter.

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Note: This equipment has been tested and found to comply with the limits for a Class B digital device, Pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable Protection against harmful interference in a residential installation. This equipment generates Uses and can radiate radio frequency energy and, if not installed and used in accordance With the instructions, may cause harmful interference to radio communications. However, There is no guarantee that interference, Will not occur in a particular installation. If this equipment Does cause harmful interference to radio or television reception, which can be determined by turning The equipment off and on, the user is encouraged to try to correct the interference by one or More of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an Outlet on a circuit different from that to which the receiver is connected.

CAUTION: The operation of this radio in the 5.15-5.25 GHz frequency band is restricted to indoor use only.

**To OEM Installer:**

1. FCC and IC ID on the final system must be labeled with “Contains FCC ID: XF6-RS9110N1103” and IC ID: 8407A - RS9110N1103 or “Contains transmitter Module FCC ID: XF6-RS9110N1103 “and “Contains transmitter Module IC ID: 8407A - RS9110N1103
2. In the user manual, final system integrator must ensure that there is no instruction provided in the user Manual to install or remove the transmitter module.
3. Transmitter module must be installed used in strict accordance with the Manufacturer’s instructions as described in the user documentation that comes with the product.

The user manual of the final host system must contain the following statements:  
This device complies with Part 15 of the FCC rules. Operation is subject to following Two conditions: 1. this device may not cause harmful interference and 2. This device Must accept any interference received including interference that may cause undesired operation of this device.

The changes or modifications not expressly approved by the party responsible for Compliance could void the user’s authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not Be co-located or operating to conjunction with any other antenna or transmitter, except if installed In compliance with FCC Multi Transmitter procedures.

To inherit the modular approval, the antennas for this transmitter must be installed to provide a Separation distance of at least 20cm from all persons and must not be co-located or operating in Conjunction with any other antenna or transmitter.

**Note:**

The buyer of the module who will incorporate this module into his host must submit the final product to the Manufacturer of the module and the MANUFACTURER OF THE MODULE WILL VERIFY that the product Is incorporated in host equipment in a way that is represented by the testing as shown in the test report.

## 4.2 IC Compliance Statements:

This Class B digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For local area network devices shall contain instructions related to the restriction mentioned in the below, namely that:

- (i) The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

This equipment complies with radio frequency exposure limits set forth by Industry Canada for an uncontrolled Environment. This equipment should be installed and operated with minimum distance 20 cm between the device and the user or bystanders.

Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par Industrie Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre le dispositif et l'utilisateur ou des tiers.

énoncé de la FCC (états-Unis seulement) Cet équipement a été testé et jugé conforme aux limites de Classe B pour un appareil numérique, en vertu de l'article 15 de la réglementation de la FCC. Ces limites ont été instaurées pour fournir une protection raisonnable contre toute interférence nuisible dans une installation résidentielle. Cet équipement génère, utilise et peut émettre de l'énergie radiofréquence. S'il n'est pas installé et utilisé conformément aux instructions, il peut provoquer des interférences sur les communications radio. Cependant, il n'est pas garanti que des interférences ne se produiront pas dans certaines installations. Si cet équipement cause des interférences à la réception radio ou télévisée (ce qui peut être vérifié en éteignant l'appareil puis en le remettant sous tension), l'utilisateur peut tenter de résoudre en suivant une ou plusieurs des mesures ci-après : Réorienter ou déplacer l'antenne réceptrice. Augmenter l'espace entre l'appareil et le récepteur. Brancher l'appareil à une prise de courant différente de celle sur laquelle le récepteur est branché. Pour obtenir de l'aide, contacter le vendeur ou un technicien radio/television expérimenté.

REMARQUE: Toute modification non autorisée expressément par le fabricant responsable de la conformité peut annuler le droit de l'utilisateur à faire fonctionner le produit.