



# TWR-WIFI-RS2101

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## User's Manual

Rev. 1.0

## Contents

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## Revision History

| Revision | Date      | Changes         |
|----------|-----------|-----------------|
| 1.0      | July 2010 | Initial Release |

## 1 Overview

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The Redpine Wi-Fi Tower Module (TWR-WIFI-RS2101) is a low-cost evaluation, demonstration and development board that features an 802.11n solution from Redpine Signals. The following list summarizes the features of the TWR-WIFI-RS2101:

- RS9110-N-11-21 Wi-Fi module
  - o Compliant to 802.11b/g and single stream 802.11n
  - o Supports all Wi-Fi client security protocols (WEP, WPA, and WPA2)
  - o Reference Design certified for FCC/IC/CE
  - o RoHS compliant
  - o Does not require any WLAN driver on the host processor
  - o Host interface through SPI
  - o Terminates SLIP connections and offers transparent serial modem functionality
  - o Integrated antenna, frequency reference, and low-frequency clock
  - o Ultra low power operation with power save modes
  - o Single supply 3.1 to 3.6V operation

A block diagram for the TWR-WIFI-RS2101 is shown in the figure below.

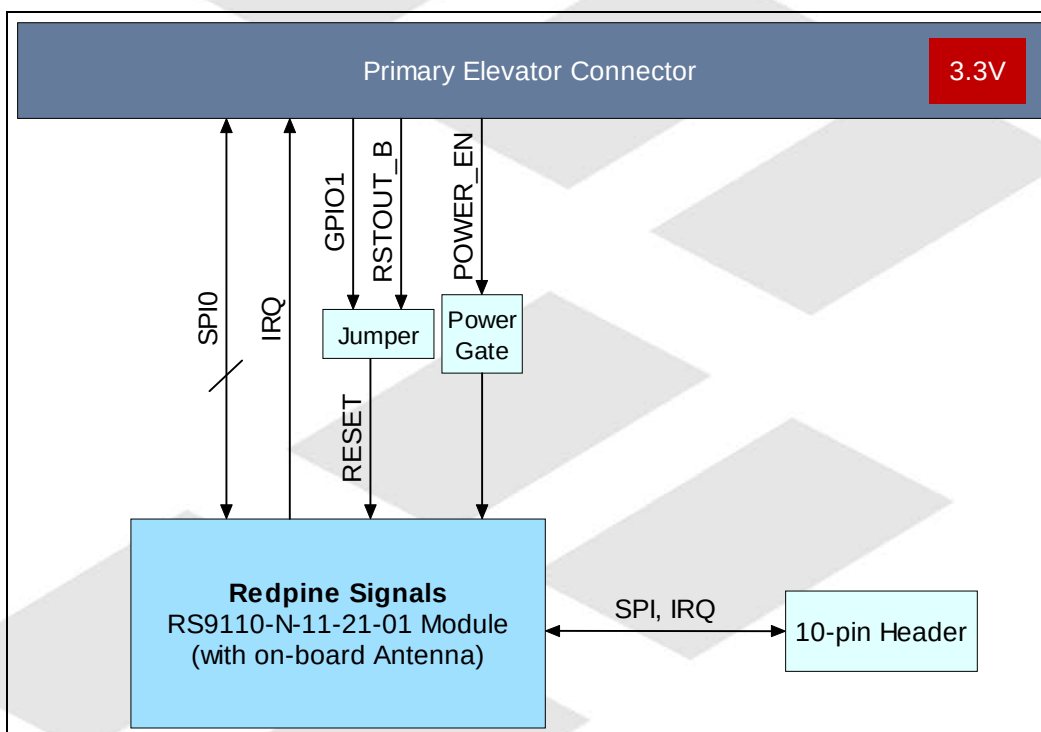


Figure 1. TWR-WIFI-RS2101 Block Diagram

## 2 Reference Documents

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The documents listed below should be referenced for more information on the Freescale Tower system and the TWR-WIFI-RS2101. Refer to <http://www.freescale.com/tower> for the latest revision of all Tower documentation.

- *TWR-WIFI-RS2101 User Manual*
- *TWR-WIFI-RS2101 Quick Start Guide*
- *TWR-WIFI-RS2101 Lab Tutorial*
- *RS9110-N-11-21 Product Brief*
- *RS9110-N-11-21 Wi-Fi Module Abridged Datasheet*

## 3 Hardware Features

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This section provides more details about the features and functionality of the TWR-WIFI-RS2101.

### 3.1 RS9110-N-11-21 Module

The RS9110-N-11-21 module from Redpine's Connect-io-n™ family of products is a complete IEEE 802.11bgn Wi-Fi client device with a standard serial or SPI interface to a host processor or data source. It integrates a MAC, Baseband processor, RF transceiver with power amplifier, a frequency reference, an antenna, and all WLAN protocol and configuration functionality in embedded firmware to provide a self-contained 802.11n WLAN solution for a variety of applications. No WLAN driver functionality is required on the host processor. Based on the Redpine Signals RS9110 SoC which includes an embedded processor, it is designed to provide standards compliant wireless connectivity to devices and systems that have a serial port and implement a TCP/IP stack. As a wireless serial modem, the RS9110-N-11-21 handles SLIP packets and accepts AT commands for configuration, enabling a variety of M2M applications at low cost and small footprint. It uniquely provides connectivity in the single stream 802.11n mode, preserving overall network throughput in the emerging enterprise environments.

For the TWR-WIFI-RS2101 Tower Peripheral Module, the RS9110-N-11-21 module communicates with the MCU through an SPI.

Figure 2 shows a functional block diagram of the RS9110-N-11-21 module. Refer to the RS9110-N-11-21 *Wi-Fi Module Abridged Datasheet* for more information.

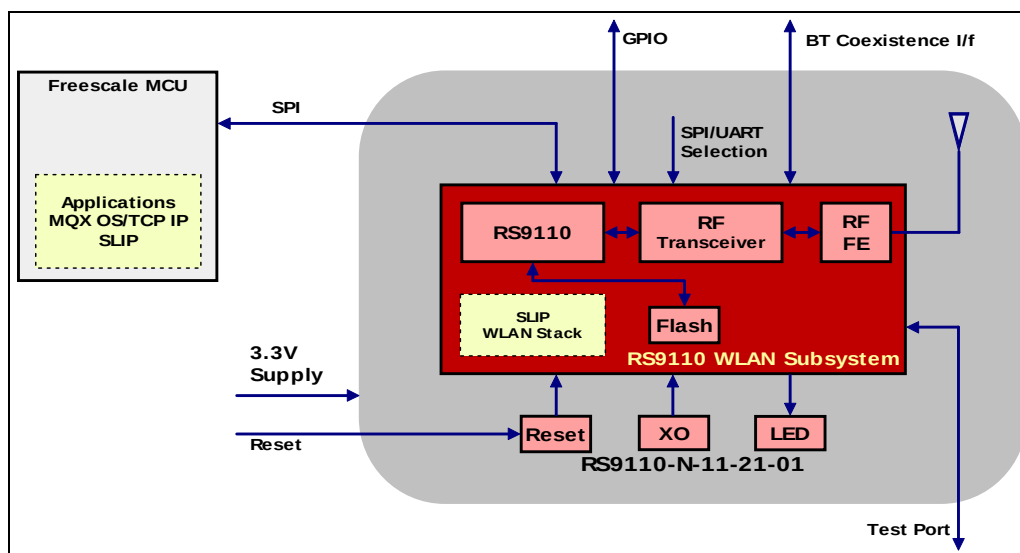


Figure 2. RS9110-N-11-21 Module: Functional Block Diagram

## 3.2 System Power

The RS9110-N-11-21 is powered from a source in an assembled Tower System via the 3.3V supply on the Primary Elevator Connector.

## 3.3 Access Header

The SPI and interrupt signals are routed to both the Primary Elevator connector and a 2x5 pin header. This Access Header can be used to access the RS9110-N-11-21 module signals for probing or for use outside of the Tower System. The pinout is shown in Table 1.

Table 1. Access Header Connections

| RS9110-N-11-21<br>Signal | Pin |    | RS9110-N-11-21<br>Signal |
|--------------------------|-----|----|--------------------------|
| 3.3V                     | 1   | 2  | GND                      |
| SPI_CLK                  | 3   | 4  | SPI_INTR                 |
| No Connect               | 5   | 6  | No Connect               |
| SPI_DATAOUT              | 7   | 8  | SPI_CS                   |
| SPI_DATAIN               | 9   | 10 | GND                      |

## 3.4 Elevator Connections

The TWR-WIFI-RS2101 features two expansion card-edge connectors that interface to Elevator boards in a Tower system: the Primary and Secondary Elevator connectors. The Primary Elevator connector, comprised of sides A and B, is utilized by the TWR-WIFI-RS2101, while the Secondary Elevator connector only makes connections to ground (GND). Table 2 provides the pinout for the Primary

Elevator Connector. An “X” in the “Used” column indicates that there is a connection from the TWR-WIFI-RS2101 to that pin on the Elevator connector. An “X” in the “Jmp” column indicates that a jumper is available that can configure or isolate the connection from the Elevator connector.

Table 2. TWR-WIFI-RS2101 Primary Elevator Connector Pinout

| TWR-WIFI-RS2101 Primary Connector |                       |            |      |     |        |                   |            |      |     |
|-----------------------------------|-----------------------|------------|------|-----|--------|-------------------|------------|------|-----|
| Side B                            |                       |            |      |     | Side A |                   |            |      |     |
| Pin #                             | Name                  | Usage      | Used | Jmp | Pin #  | Name              | Usage      | Used | Jmp |
| B1                                | 5V                    |            |      |     | A1     | 5V                |            |      |     |
| B2                                | GND                   | Ground     |      |     | A2     | GND               | Ground     |      |     |
| B3                                | 3.3V                  | 3.3V Power |      |     | A3     | 3.3V              | 3.3V Power |      |     |
| B4                                | ELE_PS_SENSE          |            |      |     | A4     | 3.3V              | 3.3V Power |      |     |
| B5                                | GND                   | Ground     |      |     | A5     | GND               | Ground     |      |     |
| B6                                | GND                   | Ground     |      |     | A6     | GND               | Ground     |      |     |
| B7                                | SPI1_CLK / SDHC1_CLK  |            |      |     | A7     | SCL0              |            |      |     |
| B8                                | SPI1_CS1 / SDHC1_CS1  |            |      |     | A8     | SDA0              |            |      |     |
| B9                                | SPI1_CS0 / SDHC1_CS0  |            |      |     | A9     | GPIO9 / CTS1      | POWER_EN   |      |     |
| B10                               | SPI1_MOSI / SDHC1_CMD |            |      |     | A10    | GPIO8 / SDHC_D2   |            |      |     |
| B11                               | SPI1_MISO / SDHC1_D0  |            |      |     | A11    | GPIO7 / SD_WP_DET |            |      |     |
| Mechanical Key                    |                       |            |      |     |        |                   |            |      |     |
| B12                               | ETH_COL               |            |      |     | A12    | ETH_CRS           |            |      |     |
| B13                               | ETH_RXER              |            |      |     | A13    | ETH_MDC           |            |      |     |
| B14                               | ETH_TXCLK             |            |      |     | A14    | ETH_MDIO          |            |      |     |
| B15                               | ETH_TXEN              |            |      |     | A15    | ETH_RXCLK         |            |      |     |
| B16                               | ETH_TXER              |            |      |     | A16    | ETH_RXDV          |            |      |     |
| B17                               | ETH_TXD3              |            |      |     | A17    | ETH_RXD3          |            |      |     |
| B18                               | ETH_TXD2              |            |      |     | A18    | ETH_RXD2          |            |      |     |
| B19                               | ETH_TXD1              |            |      |     | A19    | ETH_RXD1          |            |      |     |
| B20                               | ETH_TXD0              |            |      |     | A20    | ETH_RXD0          |            |      |     |
| B21                               | GPIO1                 | GPIO_RST   | X    |     | A21    | SSI_MCLK          |            |      |     |
| B22                               | GPIO2                 |            |      |     | A22    | SSI_BCLK          |            |      |     |
| B23                               | GPIO3                 |            |      |     | A23    | SSI_FS            |            |      |     |
| B24                               | CLKIN0                |            |      |     | A24    | SSI_RXD           |            |      |     |
| B25                               | CLKOUT1               |            |      |     | A25    | SSI_TXD           |            |      |     |
| B26                               | GND                   | Ground     |      |     | A26    | GND               | Ground     |      |     |
| B27                               | AN7                   |            |      |     | A27    | AN3               |            |      |     |
| B28                               | AN6                   |            |      |     | A28    | AN2               |            |      |     |
| B29                               | AN5                   |            |      |     | A29    | AN1               |            |      |     |
| B30                               | AN4                   |            |      |     | A30    | AN0               |            |      |     |
| B31                               | GND                   | Ground     |      |     | A31    | GND               | Ground     |      |     |
| B32                               | DAC1                  |            |      |     | A32    | DAC0              |            |      |     |
| B33                               | TMR3                  |            |      |     | A33    | TMR1              |            |      |     |
| B34                               | TMR2                  |            |      |     | A34    | TMR0              |            |      |     |
| B35                               | GPIO4                 |            |      |     | A35    | GPIO6             |            |      |     |
| B36                               | 3.3V                  | 3.3V Power |      |     | A36    | 3.3V              | 3.3V Power |      |     |

|     |                 |             |   |  |     |          |                      |  |  |
|-----|-----------------|-------------|---|--|-----|----------|----------------------|--|--|
| B37 | PWM7            |             |   |  | A37 | PWM3     |                      |  |  |
| B38 | PWM6            |             |   |  | A38 | PWM2     |                      |  |  |
| B39 | PWM5            |             |   |  | A39 | PWM1     |                      |  |  |
| B40 | PWM4            |             |   |  | A40 | PWM0     |                      |  |  |
| B41 | CANRX           |             |   |  | A41 | RXD0     | RS_UART_OUT          |  |  |
| B42 | CANTX           |             |   |  | A42 | TXD0     | RS_UART_IN           |  |  |
| B43 | 1WIRE           |             |   |  | A43 | RXD1     |                      |  |  |
| B44 | SPIO_MISO       | SPI_DATAOUT | X |  | A44 | TXD1     |                      |  |  |
| B45 | SPIO_MOSI       | SPI_DATAIN  | X |  | A45 | GPIO     |                      |  |  |
| B46 | SPIO_CS0        | SPI_CS      | X |  | A46 | GPIO     |                      |  |  |
| B47 | SPIO_CS1        |             |   |  | A47 | GPIO     |                      |  |  |
| B48 | SPIO_CLK        | SPI_CLK     | X |  | A48 | GPIO     |                      |  |  |
| B49 | GND             | Ground      |   |  | A49 | GND      | Ground               |  |  |
| B50 | SCL1            |             |   |  | A50 | GPIO     |                      |  |  |
| B51 | SDA1            |             |   |  | A51 | GPIO     |                      |  |  |
| B52 | GPIO5           |             |   |  | A52 | GPIO     |                      |  |  |
| B53 | USB_DP_PDOWN    |             |   |  | A53 | GPIO     |                      |  |  |
| B54 | USB_DM_PDOWN    |             |   |  | A54 | USB_DM   |                      |  |  |
| B55 | IRQ_H           |             |   |  | A55 | USB_DP   |                      |  |  |
| B56 | IRQ_G           |             |   |  | A56 | USB_ID   |                      |  |  |
| B57 | IRQ_F           |             |   |  | A57 | USB_VBUS |                      |  |  |
| B58 | IRQ_E           |             |   |  | A58 | TMR7     |                      |  |  |
| B59 | IRQ_D           |             |   |  | A59 | TMR6     |                      |  |  |
| B60 | IRQ_C           |             |   |  | A60 | TMR5     |                      |  |  |
| B61 | IRQ_B           |             |   |  | A61 | TMR4     |                      |  |  |
| B62 | IRQ_A           | SPI_INTR    |   |  | A62 | RSTIN_b  |                      |  |  |
| B63 | FB_ALE/FB_CS1_b |             |   |  | A63 | RSTOUT_b | RSTOUT_RST (RESET_n) |  |  |
| B64 | FB_CS0_b        |             |   |  | A64 | CLKOUT0  |                      |  |  |
| B65 | GND             | Ground      |   |  | A65 | GND      | Ground               |  |  |
| B66 | FB_AD15         |             |   |  | A66 | FB_AD14  |                      |  |  |
| B67 | FB_AD16         |             |   |  | A67 | FB_AD13  |                      |  |  |
| B68 | FB_AD17         |             |   |  | A68 | FB_AD12  |                      |  |  |
| B69 | FB_AD18         |             |   |  | A69 | FB_AD11  |                      |  |  |
| B70 | FB_AD19         |             |   |  | A70 | FB_AD10  |                      |  |  |
| B71 | FB_R/W_b        |             |   |  | A71 | FB_AD9   |                      |  |  |
| B72 | FB_OE_b         |             |   |  | A72 | FB_AD8   |                      |  |  |
| B73 | FB_D7           |             |   |  | A73 | FB_AD7   |                      |  |  |
| B74 | FB_D6           |             |   |  | A74 | FB_AD6   |                      |  |  |
| B75 | FB_D5           |             |   |  | A75 | FB_AD5   |                      |  |  |
| B76 | FB_D4           |             |   |  | A76 | FB_AD4   |                      |  |  |
| B77 | FB_D3           |             |   |  | A77 | FB_AD3   |                      |  |  |
| B78 | FB_D2           |             |   |  | A78 | FB_AD2   |                      |  |  |
| B79 | FB_D1           |             |   |  | A79 | FB_AD1   |                      |  |  |
| B80 | FB_D0           |             |   |  | A80 | FB_AD0   |                      |  |  |
| B81 | GND             | Ground      |   |  | A81 | GND      | Ground               |  |  |
| B82 | 3.3V            | 3.3V Power  |   |  | A82 | 3.3V     | 3.3V Power           |  |  |

## 4 Jumper Table

There are several jumpers provided for isolation, configuration, and feature selection. Refer to the following table for details. The default installed jumper settings are shown in **bold**.

Table 3. TWR-WIFI-RS2101 Jumper Table

| Jumper | Option                    | Setting    | Description                                                                                                                                 |
|--------|---------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| J3     | Reset Selection           | <b>1-2</b> | Connect Tower RSTOUT_B (A63) to RS9110-N-11-21/RESET_n                                                                                      |
|        |                           | <b>2-3</b> | Connect Tower GPIO1 (B21) to RS9110-N-11-21/RESET_n                                                                                         |
| J5     | Connect POWER_EN          | <b>ON</b>  | Power to RS9110-N-11-21 module controlled by POWER_EN signal                                                                                |
|        |                           | OFF        | Power to RS9110-N-11-21 is switched off                                                                                                     |
| J15    | SPI/UART Interface Select | <b>ON</b>  | RS9110-N-11-21/SPI Interface Selected for communication with Host MCU                                                                       |
|        |                           | OFF        | RS9110-N-11-21/UART Interface Selected for communication with Host MCU – this is not available as a standard feature of the TWR-WIFI-RS2101 |
| J10    | Connect Power Gate output | <b>ON</b>  | Connect the output of the Power Gate to the 3.3V supply for RS9110-N-11-21 module                                                           |
|        |                           | OFF        | Disconnect the output of the Power Gate to the 3.3V supply for RS9110-N-11-21 module                                                        |





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