RS9113 n-Link® Module Family

1x1 802.11abgn + BT4.0 + ZigBee

The RS9113 n-Link® module family is based on Redpine Signals RS9113 ultra-low-power, single spatial stream, dual-band 802.11n + BT4.0 + ZigBee Convergence SoC. The RS9113 module integrates a multi-threaded MAC processor with integrated analog peripherals and support for digital peripherals, baseband digital signal processor, analog front-end, crystal oscillator, calibration OTP memory, dualband RF transceiver, dual-band high-power amplifiers, baluns, diplexers, diversity switch and Quad-SPI Flash thus providing a fully-integrated solution for embedded wireless applications. The RS9113 based chips and modules leverage and improve upon Redpine’s proven low power innovations from Lite-Fi™ products (RS9110) and provide WLAN 802.11n, BT4.0 and ZigBee convergence solution for integration into mobile and M2M communication devices. It can connect to a host processor through SDIO, USB, SPI or UART interfaces.

Features and Benefits

- Ultra-low-power, low-cost and high-throughput 1 Tx – 1 Rx Dual-band 802.11n + BT4.0 (dual-mode) + Zigbee (802.15.4-2009)
- Supports 20MHz and 40MHz bandwidth
- Data rates up to 150 Mbps using 1-Spatial Stream 802.11n
- WLAN Tx output power up to +18dBm
- WLAN Receiver with -97dBm Rx sensitivity
- High performance Bluetooth receiver with -94dBm Rx sensitivity
- Support for Bluetooth Transmit power class-1 with integrated PA
- High performance ZigBee receiver with -100dBm Rx sensitivity
- Support for multiple ZigBee output powers up to +19dBm with integrated PA
- Innovative coexistence algorithms for optimum throughput of Wi-Fi and colocated Bluetooth and ZigBee modems
- Integrated Ultra-low-power subsystem with <3uA watch-dog mode and <30uA standby mode.
- Hardware Assisted Radar-detection for compliance to FCC and ETSI norms, enabling usage of more channels in the 5GHz band.
- Complete software along with host driver for various operating systems such as Windows, Linux, Windows CE, and Android.
- Single supply 3.0 to 3.6 V operation.
- Support for multiple host interfaces to allow maximum flexibility for the system integrator. Host interfaces supported are USB 2.0, SDIO, SPI and UART

Applications

- Smart phones, Tablets and e-Readers
- VoWi-Fi phones
- Smart Meters and in-home displays
- Industrial automation and telemetry
- MP3 music and MP4 video players
- Medical Devices
- Industrial monitoring and control
- Home and building automation

Evaluation Package

The evaluation package comprises RS9113 n-Link module based evaluation board. This is accompanied by firmware, reference drivers for Linux, Windows and Android operating systems with documentation.
### Wireless Specifications

**Network Standard Support**

IEEE 802.11 a/b/g/n, 802.11n™, 802.11d/e/i, 802.11w™, 802.1X, 802.11k™, 802.11v™, 802.11t™, Bluetooth v2.1 EDR, v4.0
802.15.4-2009 (2.4GHz)

**Data Rates**

- 802.11n: from 6.5 Mbps to 150 Mbps (MCS 0-7)
- 802.11a/g: from 6 Mbps to 54 Mbps
- 802.11b: from 1 Mbps to 11 Mbps

**Modulation Techniques**

OFDM with BPSK, QPSK, 16-QAM, 64-QAM
802.11b with CCX and DSSS
Bluetooth: GFSK, DQPSK, 2DPSK
802.15.4-2009: 2.5Kbps

**802.11n Advanced Features**

- 1-SS, 40MHz bandwidth, Greenfield Preamble, Short-GI, 1 spatial stream

**Bluetooth Advanced Features**

Scatternet, Adaptive Frequency Hopping, Interlaced scanning, 15 active slaves in proprietary mode, hold, sniff and park modes

**ZigBee Advanced Features**

CCM™ security, orphan scanning, coordinator realignment

**Wi-Fi modes**

Wi-Fi client, Access point, Wi-Fi Direct

**Bluetooth Modes**

Master, slave, scatternet

**ZigBee Modes**

ZigBee Coordinator®, Router®, End device

**QoS**

WMM and WMM Power Save Support

**Host Interfaces**

USB 2.0, SPI, UART

**Other Peripherals/Interfaces**

I2C, I2S, SPI, QSPI, USB ART, GPIO, JTAG, Analog(ADC/DAC) and Ultra-low-power peripherals.

**Supply Voltage**

3.0-3.6V, 1.8-3.6V

**Operating Temperature**

Industrial Grade -40ºC to +85ºC

**Software and Regulatory Certification**

Wi-Fi Alliance Compliance (802.11bg, WPA, WPA2 Personal and Enterprise, WMM, WMM-PS, WPS, Wi-Fi Direct™, Voice-Personal®, Protected management frames®), Cisco CCX v5®, Bluetooth-SIG Qualification®, Worldwide Regulatory Compliance:

- FCC (IDs are X8F-RS9113SB, X8F-RS9113DB)
- IC (IDs are 8407A-RS9113SB, 8407A-RS9113DB)
- CE/ETSI, TEC/ETL, SRRC

**Typical Transmit Power (+/-2 dBm)**

Wi-Fi:
- 17.5 dBm for 802.11b DSSS
- 17.5 dBm for 802.11g/n OFDM
- 12 dBm for 802.11a/n OFDM

Bluetooth:
- 15 dBm

**Rx sensitivity (+/- 1 dBm)**

Wi-Fi:
- 1Mbps: -97 dBm (< 8% PER)
- 54 Mbps: -76 dBm (< 10% PER)
- 27 Mbps: -60 dBm (< 10% PER)
- 14.5 Mbps: -42 dBm (< 10% PER)

Bluetooth:
- 1 Mbps: -94 dBm
- 2 Mbps: -92 dBm
- 3 Mbps: -84 dBm
- BTLE (Mbps): -91 dBm

ZigBee:
- 250 Kbps: -102 dBm (< 8% PER)

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### Device Listing

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Description</th>
<th>Packaging</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS9113-N00-50N</td>
<td>Single band n-Link module with no antenna and integrated Wi-Fi.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-5DN</td>
<td>Dual band n-Link module with no antenna and integrated Wi-Fi.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-51N</td>
<td>Single band n-Link module with embedded single antenna and integrated Wi-Fi.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-51D</td>
<td>Dual band n-Link module with embedded single antenna and integrated Wi-Fi.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-51N</td>
<td>Single band n-Link module with no antenna and integrated Wi-Fi and Bluetooth.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-51N</td>
<td>Single band n-Link module with embedded single antenna integrated Wi-Fi and Bluetooth.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-50N</td>
<td>Single band n-Link module with no antenna and integrated Wi-Fi and ZigBee.</td>
<td>Tray</td>
<td>Industrial</td>
</tr>
<tr>
<td>RS9113-N00-50N</td>
<td>Single band n-Link module with embedded single antenna and integrated Wi-Fi and ZigBee.</td>
<td>Tray</td>
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<td>RS9113-N00-50N</td>
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</tbody>
</table>

### Device Ordering Information

The device numbering is based on the following naming convention. All the devices are labeled as RS9113-XYZ-ABC, Where:

- **A** = S for single band (2.4 GHz), D for dual band (2.4 GHz/5GHz)
- **B** = 0 for no antenna package, 1 for single antenna package
- **C** = N for n-Link product family, C for Connect-i-o-n product family, W for WiSeConnect product family
- **N** = Wi-Fi
- **Y** = “B” with BT, “O” without BT
- **Z** = “Z” with ZigBee, “O” without ZigBee

### Examples:

- RS9113-NB0-50N will refer to a single band n-Link module with no antenna and integrated Wi-Fi, Bluetooth and Zigbee.
- RS9113-N00-51C will refer to a dual band Connect-i-o-n module with embedded single antenna and integrated Wi-Fi.
- RS9113-NB0-50W will refer to a single band WiSeConnect module with no antenna and integrated Wi-Fi.

### Module Reference Design

Redpine offers form-factor SPI, USB2.0, UART and SDIO reference designs along with software for manufacture testing and diagnostics. For details on availability please contact sales.

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These features are not supported by current software releases. Contact Redpine Signals Sales (sales@redpinesignals.com) for details.

These certifications are in progress at this time. Contact Redpine Signals Sales (sales@redpinesignals.com) for more details and for certifications not listed here.

Applicable to n-Link® modules only.

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For additional information, please contact Sales at Redpine Signals, Inc.: Redpine Signals, Inc. • 2107 North First Street • Suite 540 • San Jose, CA 95131 Phone: +1-408 748 3385 • Email: sales@redpinesignals.com • Website: www.redpinesignals.com

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