## REDPINE® SIGNALS
Driving Wireless Convergence

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, dual-band 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-F™ 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 collocated 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
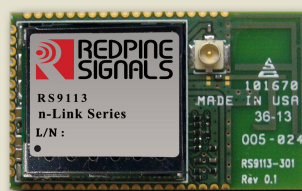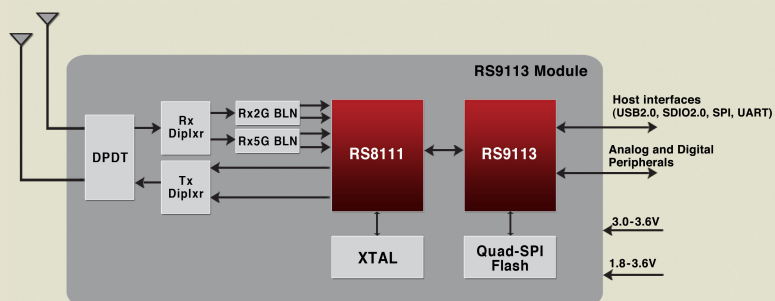

Module with integrated antenna

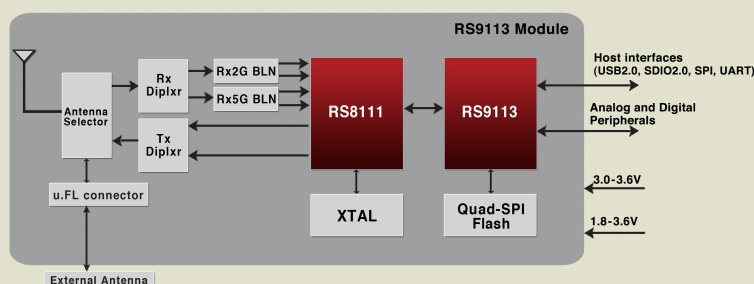**Module without integrated antenna**

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.

RS9113 Module Block Diagram without integrated antenna

RS9113 Module Block Diagram with integrated antenna

Specifications

Network Standard Support	IEEE 802.11a/b/g/j, 802.11n, 802.11d/e/i/w, 802.1X, 802.11k/r/v/h Bluetooth v2.1 + EDR, v3.0 + HS, 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 Bluetooth: 1, 2, 3Mbps 802.15.4-2009: 250Kbps
Modulation Techniques	OFDM with BPSK, QPSK, 16-QAM and 64-QAM 802.11b with CCK and DSSS Bluetooth: GFSK, DQPSK, 8DPSK 802.15.4-2009: DSSS
QoS	WMM and WMM Power Save Support
802.11n Advanced Features	1-SS, 40MHz bandwidth, Greenfield Preamble, Short-GI, 1 spatial stream STBC, RIFS, A-MSDU, A-MPDU, Aggregation with Block-ack, A-MSDU inside A-MPDU, PSMP, MTBA, Fragmentation and Virtual AP support (up to 8 BSSIDs)
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, mesh routing
Wi-Fi modes	Wi-Fi client, Access point, Wi-Fi Direct
Bluetooth modes	Master, slave, scatternet
Zigbee modes	Zigbee Coordinator, Router, End device
Host Interfaces	SDIO, USB 2.0, SPI, UART
Other Peripherals/Interface	I^2C, I^2S, SPI, QSPI, UART, GPIO, JTAG, Analog 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	WiFi Alliance (802.11abgn, WPA, WPA2 Personal and Enterprise, WMM, WMM-PS, WPS, Wi-Fi Direct™, Voice-Personal, Protected management frames), Cisco CCX v5, Zigbee Certification Bluetooth QualificationFIPS 140-2 World-WideRegulatory Compliance (FCC, IC, CE, ETSI, TELEC)

Typical Transmit Power(+/- 2 dBm)	Wi-Fi: 18 dBm for 802.11b DSSS
	       17 dBm for 802.11g/n OFDM
	       15 dBm for 802.11a/g/n OFDM
	Bluetooth: 19 dBm
	ZigBee: 19 dBm

Rx sensitivity (+/- 1 dBm)	Wi-Fi: 1 Mbps -97 dBm (< 8% PER)
	        54 Mbps -76.5 dBm (< 10% PER)
	        MCS7 (20MHz) -72 dBm (< 10% PER)
	        MCS7 (40MHz) -69 dBm (< 10% PER)
	Bluetooth: 1 Mbps -93 dBm
	        2 Mbps -93 dBm
	        3 Mbps -84 dBm
	        BTLE (1Mbps) -91 dBm
	ZigBee: 250 Kbps -101 dBm (< 8% PER)

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

Device Listing

Device Number	Description	Packaging	Qualification
RS9113-N00-S0N	Single band n-Link module with no antenna and integrated Wi-Fi.	Tray	Industrial
RS9113-N00-D0N	Dual band n-Link module with no antenna and integrated Wi-Fi.	Tray	Industrial
RS9113-N00-S1N	Single band n-Link module with embedded single antenna and integrated Wi-Fi.	Tray	Industrial
RS9113-N00-D1N	Dual band n-Link module with embedded single antenna and integrated Wi-Fi.	Tray	Industrial
RS9113-NB0-S0N	Single band n-Link module with no antenna and integrated Wi-Fi and Bluetooth	Tray	Industrial
RS9113-NB0-D0N	Dual band n-Link module with no antenna and integrated Wi-Fi and Bluetooth	Tray	Industrial
RS9113-NB0-S1N	Single band n-Link module with embedded single antenna and integrated Wi-Fi and Bluetooth	Tray	Industrial
RS9113-NB0-D1N	Dual band n-Link module with embedded single antenna and integrated Wi-Fi and Bluetooth	Tray	Industrial
RS9113-N0Z-S0N	Single band n-Link module with no antenna and integrated Wi-Fi and ZigBee.	Tray	Industrial
RS9113-N0Z-D0N	Dual band n-Link module with no antenna and integrated Wi-Fi and ZigBee.	Tray	Industrial
RS9113-N0Z-S1N	Single band n-Link module with embedded single antenna and integrated Wi-Fi and ZigBee	Tray	Industrial
RS9113-N0Z-D1N	Dual band n-Link module with embedded single antenna and integrated Wi-Fi and ZigBee	Tray	Industrial
RS9113-NBZ-S0N	Single band n-Link module with no antenna and integrated Wi-Fi ,Bluetooth and ZigBee	Tray	Industrial
RS9113-NBZ-D0N	Dual band n-Link module with no antenna and integrated Wi-Fi, Bluetooth and ZigBee.	Tray	Industrial
RS9113-NBZ-S1N	Single band n-Link module with embedded single antenna and integrated Wi-Fi, Bluetooth and ZigBee.	Tray	Industrial
RS9113-NBZ-D1N	Dual band n-Link module with embedded single antenna and integrated Wi-Fi, Bluetooth and ZigBee.	Tray	Industrial

Device Ordering Information

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

RS9113 - X Y Z - A B C

A = "S" for Single band (2.4 GHz), "D" for Dual band (2.4 GHz/5 GHz)
B = "0" for no antenna package, "1" for single antenna package
C = "N" for n-Link product family,
= "C" for Connect-io-n product family,
= "W" for WiSeConnect product family

X = "N" with Wi-Fi , "0" without Wi-Fi
Y = "B" with BT , "0" without BT
Z = "Z" with ZigBee, "0" without ZigBee
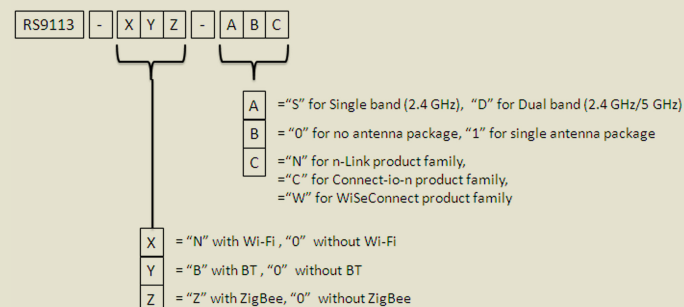
Examples:

- RS9113-NBZ-S0N will refer to single band n-Link module with no antenna and integrated Wi-Fi, Bluetooth and Zigbee.
- RS9113-N00-D1C will refer to a dual band Connect-io-n module with embedded single antenna and integrated Wi-Fi.
- RS9113-NB0-S0W will refer to a single band WiSeConnect module with no antenna and integrated Wi-Fi and Bluetooth.

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DRIVING WIRELESS CONVERGENCE®

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