REDPINE SIGNALS®
DRIVING WIRELESS CONVERGENCE®

RS9116 Connectivity Product Family

n-Link™ and WiSeConnect™

Redpine Signals' RS9116 family of SoCs and modules provides a comprehensive multi-protocol wireless connectivity solution including 802.11 a/b/g/n (2.4 GHz and 5 GHz), 802.11j, dual-mode Bluetooth® 5.

Solution Highlights

- Co-existence of multiple wireless protocols managed by an internal protocol arbitration manager
- Ultra-low power consumption with multiple power modes to reduce the system energy consumption
- Multiple levels of security including FIPS 140-2 and PUF (Physically Unclonable Function) to create a highly secure system
- Fully integrated and wireless certified modules with multiple sizes as small as 4.63 mm x 7.90 mm
- Multiple software architectures (hosted and embedded) and host interfaces (SDIO, USB, SPI, UART) for easy integration with different processor families and operating systems
- Footprint compatible single band and dual band modules as well as hosted and embedded modules for easy migration within the product family
- Leading edge RF performance providing long range and higher throughputs

Features

Wi-Fi®

- Compliant to 1x1 IEEE 802.11 a/b/g/n, 802.11j (hosted mode) with single band and dual band support
- Support for 20 MHz and 40 MHz channel bandwidths
- Transmit power up to +20dBm[1] with integrated PA
- Receive sensitivity as low as -97 dBm[1]
- Application data throughput up to 100 Mbps[1] (Hosted Mode) in 802.11n with 40 MHz bandwidth and up to 50 Mbps[1] with 20 MHz bandwidth
- Application data throughput up to 90 Mbps[1] (Embedded Mode) with 40 MHz bandwidth and up to 40 Mbps[1] with 20 MHz bandwidth
- Data Rates:- 802.11b: Upto 11 Mbps ; 802.11g/a:Upto54 Mbps ; 802.11n: MCS0 to MCS7

Bluetooth

- Compliant to dual-mode Bluetooth 5
- Transmit power up to +20 dBm[1] with integrated PA
- Receive sensitivity:- LE: -96 dBm, LR 125 Kbps: -102 dBm[1]
- <5 mA[1] transmit current in BT 5 mode, 2 Mbps data rate
- Data rates: 125 kbps, 500 kbps, 1 Mbps, 2Mbps, 3 Mbps
- Operating Frequency Range:- 2.402 GHz - 2.480 GHz
- EDR+2.1, 4.0, 4.1, 4.2 and 5.0
- BT LE 1 Mbps, 2 Mbps and Long Range modes
- Piconet and scatternet
- BT profile support[2] for SPP, A2DP, AVRCP, HFP, PBAP, IAP, GAP, SDP, L2CAP, RFCOMM, GATT, IAP1, IAP2

RF Features

- Integrated baseband processor with calibration memory, RF transceiver, high-power amplifier, balun, T/R switch and flash memory
- Dual external antenna (diversity supported)

Operating Modes

- Hosted mode (n-Link™): Wi-Fi stack, Bluetooth stack and profiles and all network stacks reside on the host processor
- Embedded mode (WiSeConnect™): Wi-Fi stack, TCP/IP stack, IP modules, Bluetooth stack reside in RS9116W; Some of Bluetooth profiles reside in host processor

Hosted Mode (n-Link™)

- Host interfaces: SDIO 2.0 and USB HS
- Host drivers for Linux, Android™, and Windows®
- Support for Client mode, Access point mode, Wi-Fi Direct, Concurrent client and access point mode, Enterprise Security
- Support for concurrent Wi-Fi, dual-mode Bluetooth 5
- Support for multiple Virtual Access Points

Embedded Mode (WiSeConnect™)

- Host interface: UART, SPI, USB HS, and USB HS CDC
- Support for Embedded Client mode, Access Point mode, Wi-Fi Direct and Enterprise Security
- Supports advanced security features: WPA/WPA2-Personal and Enterprise (EAP-TLS, EAP-FAST, EAP-TTLS, EAP-PEAP, EAP-LEAP, PEAP-MSCHAP-V2)
- Integrated TCP/IP stack (IPV4/IPV6), HTTP/HTTPS, DHCP, ICMP, SSL 3.0/TLS1.2, WebSockets, IGMP, DNS, DNS-SD, SNMP, FTP Client
- BT profile support[2] for SPP, A2DP, AVRCP, HFP, PBAP, IAP, GAP, SDP, L2CAP, RFCOMM, GATT, IAP1, IAP2
- Wireless firmware upgrade and provisioning
- Support for concurrent Wi-Fi, dual-mode Bluetooth 5

Wireless Co-Existence Modes

- Wi-Fi Access Point with support for upto 8 clients + Wi-Fi Client
- Wi-Fi Access Point + BLE
- Wi-Fi Client + Bluetooth Classic (EDR v 2.1) , Wi-Fi Client + BLE

Security

- HW device identity and key storage with PUF
- Accelerators: AES128/256, SHA256/384/512, RSA, ECC, ECDH, RNG, CRC
- WPA/WPA2-Personal, WPA/WPA2 Enterprise for Client, EAP-TLS, EAP-FAST, EAP-TTLS, PEAP-MSCHAP-v2

Power Consumption

- Wi-Fi standby associated current of <90 uA[1] for DTIM 3 (2.4 GHz)
- Wi-Fi TX current = 260 mA[1] (6 Mbps, 20 dBm, 2.4 GHz), RX current = 30 mA[1] (6 Mbps, 2.4 GHz)
- <7 mA[1] transmit current in BT 5 mode, 0 dBm output power, 1 Mbps data rate

Software and Regulatory Certifications

- Wi-Fi Alliance[2]
- Bluetooth Qualification[2]
- FIPS 140-2 Certification[2]
- Regulatory certifications (FCC, IC, ETSI/CE, TELEC)[2]

Operating Conditions

- Single supply: 3.3V or 1.85V
- Operating temperature: -40°C to +85°C (Industrial grade)

Packages

- Module packages with and without antenna
- SoC packages: WLCSP and QFN

Evaluation Kit:

- Single band P/N: RS9116X-SB-EVK1
- Dual band P/N: RS9116X-DB-EVK1

Package Options

Module Packages

Package Code	Package Type	Dimensions (mm)	Frequency Band	Integrated Antenna	Note
AA0	LGA, 101	14 x 15 x 2.1	Single Band (2.4 GHz)	No	RS9113 compatible
AA1	LGA, 79	16 x 27 x 3.1	Single Band (2.4 GHz)	Antenna and u.FL Connector	RS9113 compatible
CA0	LGA, 173	9.1 x 9.8 x 1.2	Single Band (2.4 GHz)	No	
CC0	LGA, 173	9.1 x 9.8 x 1.2	Dual Band (2.4 / 5 GHz)		
CA1	LGA, 107	15.0 x 15.70 x 2.2	Single Band (2.4 GHz)	Antenna and u.FL Connector	
CC1	LGA, 107	15.0 x 15.70 x 2.2	Dual Band (2.4 / 5 GHz)		
B00	LGA, 126	4.63 x 7.90 x 0.9	Single Band (2.4 GHz)	No	
MB0	M.2, 75	23 x 30	Dual Band (2.4 / 5 GHz)	Two u.FL Connectors	
HB0	Half Mini PCIe Card, 52	26.8 x 30	Dual Band (2.4 / 5 GHz)	Two u.FL Connectors	USB interface

SoC Packages

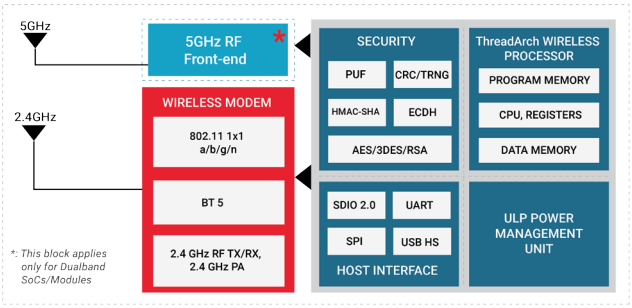
Package Code	Type of Package	Dimensions, Pitch (mm)	Frequency Band
WMS	WLCSP, 96	3.51 x 3.60 x 0.5, 0.4	Single Band (2.4 GHz)
QMS	QFN, 84	7 x 7 x 0.85, 0.5	Single Band (2.4 GHz)

Part Ordering Options

Part Number	Wireless	SoC Packages (ppg)	Module Packages (ppg)
Hosted Connectivity (n-Link™)			
RS9116N-SB00-ppg	SBW+BT 5	QMS, WMS	AA0, AA1, CA0, CA1, B00
RS9116N-DB00-ppg	DBW+BT 5	None	CC0, CC1, MB0, HB0
Embedded Connectivity (WiSeConnect™)			
RS9116W-SB00-ppg	SBW+BT 5	QMS, WMS	AA0, AA1, CA0, CA1, B00
RS9116W-DB00-ppg	DBW+BT 5	None	CC0, CC1

Note: Replace 'ppg' with desired SoC / Module Packages code;
***SBW**: Single Band Wi-Fi (2.4 GHz); **DBW**: Dual Band Wi-Fi (2.4/5 GHz)*

Block diagram



***Note:** The BTSIG certified production parts for this product family will be available in early 2019.*

[1]: Subject to change. Contact Redpine Signals for final numbers. [2]:Contact Redpine for availability.

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