BGW200 Low-power WLAN SiP

Complete, single-package 802.11b solution for mobile handheld devices

Optimized for low-power mobile applications, this complete, single-package 802.11b solution combines a baseband/MAC, RF transceiver, and power amplifier into an ultra-small (150 mm²) package. It delivers the industry's lowest power consumption in standby mode and supports coexistence with Bluetooth® solutions.

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The BGW200 is a complete, low-power 802.11b Wireless LAN (WLAN) System-in-a-Package (SiP) solution optimized for battery-powered hand-held devices. It enables consumers to connect to the growing number of WLAN networks in offices, homes, and public places. It also allows service providers to increase their network reach and customer base, enabling complementary data and voice services across cellular/PCS and WLAN networks. Coexistence support for Bluetooth 1.1 and 1.2 enables seamless integration with Philips Bluetooth solutions.

The SiP format, with its complete system functionality, delivers quicker design cycles, lower risk, simplified manufacturing, and a reduced bill of materials. The single-package format also simplifies assembly and testing, and reduces yield losses. The SiP delivers a complete, fully tested implementation of 802.11b functionality, so development teams can focus their energy on innovative product design instead of solving complex issues related to RF layout.

Key features

- Advanced, single-package WLAN SiP optimized for mobile handheld devices
  - No RF-critical design required
  - Low total cost of ownership
- Lowest power consumption in standby mode: < 2 mW (typ)
- Ultra-small form factor
  - Low-profile 68-pin HVQFN-like SiP package (10 x 15 x 1.3 mm)
  - Only three external components for entire solution
- "No Host Load" design delivers easy integration and longer battery life
  - Host processor sleeps while BGW200 processes beacons
  - BGW200 wakes the host processor only upon data packet arrival
- Co-exists with Bluetooth 1.1 and 1.2
- Complete software drivers, utility, and diagnostic tools

Applications

- Smartphones, cellular phones, VoIP wireless phones
- PDAs, handheld computing devices, WLAN adapter cards (Secure Digital)
- Portable audio/video devices, MP3 players
- Other handhelds and electronic devices for wireless digital, audio, multimedia, and telephony

Ultra-small footprint, ultra-low power consumption

The BGW200 uses a single, 68-pin HVQFN-like package that measures only 10 x 15 x 1.3 mm. The entire 802.11b solution requires only three external components and uses less than 180 mm² of circuit board area.

The BGW200 incorporates several features that decreases power consumption. There is an integrated ARM7 processor, 1.25 Mbytes of SRAM, 256 Kbytes of ROM, optimized host interfaces (SDIO/SPI), and integrated power management hardware/software algorithms. The result is the lowest standby power consumption in the industry (less than 2 mW).

Superior "No Host Load" Architecture

The BGW200 is designed to place no load on the host processor, so mobile devices can integrate WLAN functionality without compromising application performance or battery life. The BGW200 only interfaces

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Low-power 802.11b SiP with baseband/MAC and RF transceiver for mobile handhelds

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with the host processor when a valid data packet is received. So the host processor is allowed to sleep while the BGW200 independently processes 802.11 beacons.

The MAC protocol runs on an embedded ARM7 processor, for zero overhead on the host processor. An instruction prefetch unit enhances the performance of the ARM7. To support new MAC protocol features, the BGW200 is also designed to support firmware upgrades.

Bluetooth coexistence

The BGW200 is designed to support collaborative coexistence between 802.11 and Bluetooth 1.1 and 1.2. A dedicated software and hardware interface implements Packet Traffic Arbitration (PTA) with voice priority between the BGW200 and the Bluetooth system. An auto shutdown feature ensures that Bluetooth voice takes priority over other signals and there is special support for burst and fragmented frames. Bluetooth 1.2 enhances coexistence further, by adding independent Adaptive Frequency Hopping (AFH) capability. The Philips BGB20x family of Bluetooth SiPs is designed to interface and coexist seamlessly with the BGW200.

Supports latest QoS and security standards

Advanced hardware and software algorithms, along with Wi-Fi Multimedia Extensions (WME), provide advanced Quality of Service (QoS) functions. This lets the BGW200 support real-time applications like VoIP and non-real-time applications like email and web surfing. The BGW200 is also designed to support the upcoming 802.11e standard.

The BGW200 has advanced security features, including 40- and 128-bit WEP, WPA, CCX (Cisco Security), TKIP, and AES. The SiP is also designed to support the upcoming 802.11i extension.

Advanced RF subsystem

The integrated RF transceiver supports transmit output power control from +8 to +18 dBm at the antenna port – enabling optimal range, throughput, and power consumption. The integrated RF transceiver uses a direct conversion radio architecture that minimizes external components and eliminates the IF filter. For additional component reduction, the integrated PA is internally matched to the ZIF radio. In addition to the radio transceiver and power amplifier, the BGW200 also integrates an Rx/Tx diversity switch, bandpass filter, balun, power supply decoupling, and other passive components.
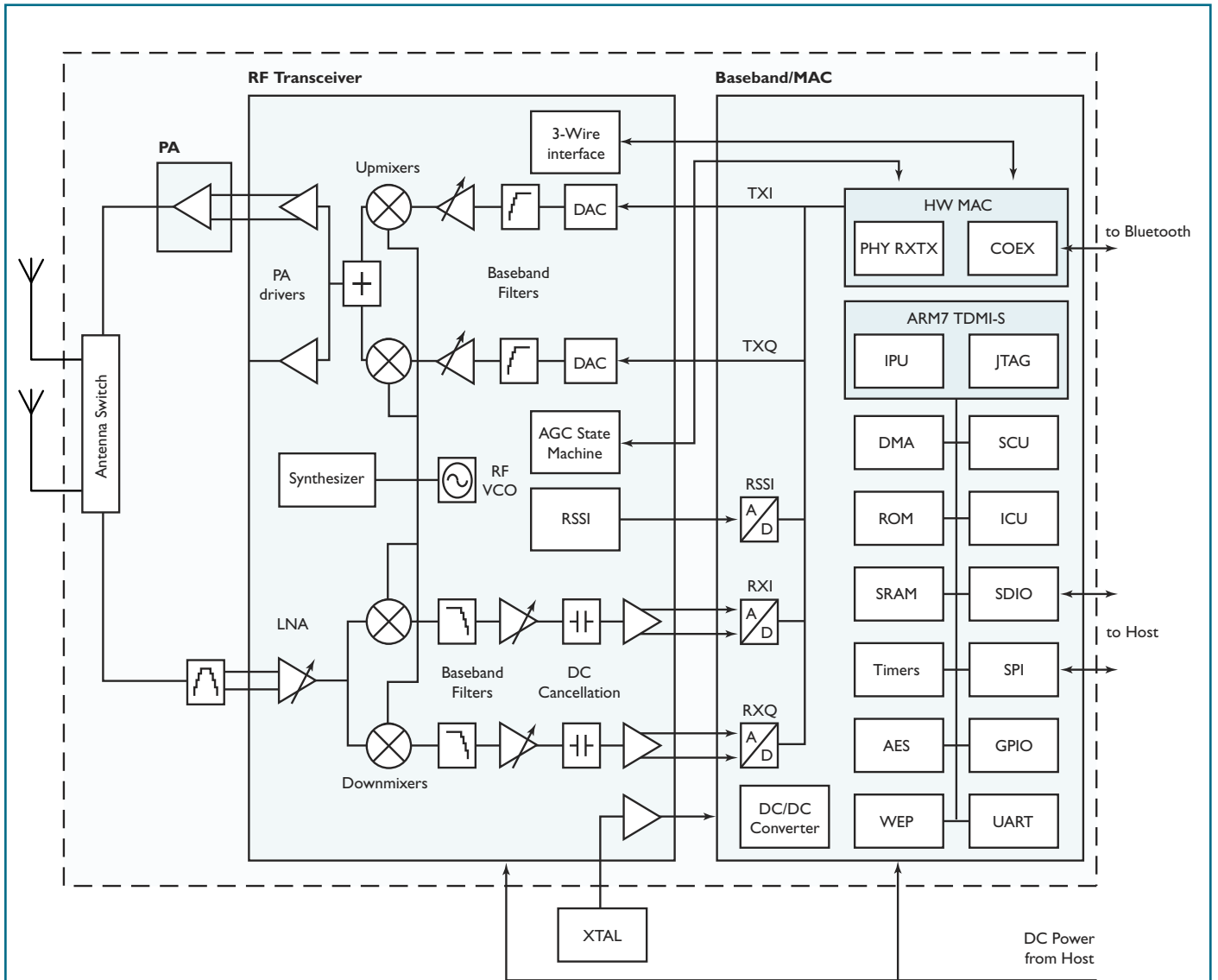
Reference designs and eval kits

Reference design software drivers support PocketPC™ and Linux™ operating systems. Drivers for Palm™ and Symbian™ are in development. The BGW200 is backed by a complete set of software utility and diagnostic tools, and is available in evaluation kits.

Table 1

Frequency Bands	2.4 to 2.5 GHz
Modulations	DBPSK, DQPSK, CCK (DSSS)
Data Rates	1, 2, 5.5, 11 Mbps
SiP Power Consumption (typical)	Tx: 731 mW @ 15 dBm Rx: 415 mW Standby: < 2 mW Sleep Mode: 0.2 mW

Table 2

Description	Size	Part Number
Low-power 802.11b SiP	10 x 15 x 1.3 mm	BGW200

BGW200 functional block diagram

RF Transceiver

PA

Upmixers

3-Wire interface

PA drivers

Baseband Filters

DAC

TXI

DAC

TXQ

AGC State Machine

Synthesizer

RF VCO

RSSI

RSSI

LNA

Baseband Filters

DC Cancellation

RXI

RXQ

Downmixers

DC/DC Converter

Antenna Switch

XTAL

Baseband/MAC

HW MAC

PHY RXTX

COEX

to Bluetooth

ARM7 TDMI-S

IPU

JTAG

DMA

SCU

ROM

ICU

SRAM

SDIO

to Host

Timers

SPI

AES

GPIO

WEP

UART

DC Power from Host

List of abbreviations

AES	Advanced Encryption Standard	PHY	Physical Layer
COEX	Coexistence	RSSI	Receive Signal Strength Indicator
ICU	Interrupt Control Unit	SCU	System Control Unit
IPU	Instruction Pre-fetch Unit	SDIO	Secure Digital Input Output
JTAG	Joint Test Action Group	SPI	Serial Peripheral Interface
MAC	Medium Access Control	WEP	Wired Equivalent Privacy

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