



Bluetooth™ System Solution

CX81400/CX72303

The Conexant Bluetooth™ System Solution is an ultra-low-power, complete, version 1.1-compliant semiconductor solution that is ideally suited for portable devices requiring extended battery life, maximum data rates, small form factors and low system costs. The Bluetooth System Solution supports the design of both generic Host Controller Interface (HCI) modules as well as embedded designs where the application is implemented using the processor and memory on the Conexant baseband device. The Bluetooth System Solution can be used in conjunction with the company's global system for mobile communications (GSM) cellular, PC home networking, standard modem and broadband modem products portfolios to create personal-networked communication systems.

Using this two-component solution, electronics manufacturers worldwide can incorporate Bluetooth wireless technology into their designs as a cost-effective, convenient replacement for cables between cellular handsets, laptop and desk PCs, Internet appliances and more — enabling end users to create a wireless personal area network and access the power of the Internet in the home or on the go.

One Solution, Two Optimized Components

The Bluetooth System Solution from Conexant is a two-chip solution optimized for low power consumption and high performance. The CX81400 Baseband Controller is manufactured using 0.18µm CMOS for maximum throughput. Alternatively, the CX72303 RF Transceiver used SiGe to achieve the lowest power consumption. Partitioning the solution allows the most appropriate process technologies to be used to separately address the conflicting design requirements of the radio and baseband sections.



Distinguishing Features

- Fully qualified Bluetooth version 1.1 system solution
- Lowest system power consumption in industry
- 720Kbps data throughput
- Kernel interface and HCI abstraction layer for embedded application design
- Integrated RAM and ROM
- Point-to-point and point-to-multipoint (7 slaves) support

Bluetooth System Solution

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The Bluetooth System Solution Functional Description

The major blocks of the system are the RF Transceiver, baseband controller, Central Processing Unit (CPU), Serial Interface Control (SIC), General Purpose Input/Output (GPIO) control and system support. The CX72303 RF Transceiver transmits and receives data in accordance with the Bluetooth specification, while the CX81400 baseband controller performs all baseband control and link management functions necessary to establish a Bluetooth communication link.

CX81400 Bluetooth Baseband Controller

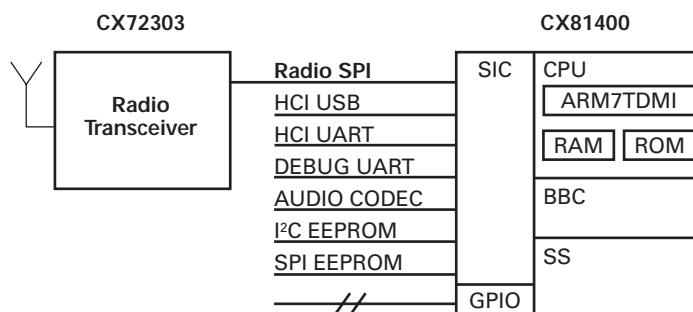
The CX81400 is a highly-integrated, version 1.1-compliant Bluetooth baseband device that includes both link manager and baseband control functions. This device, together with the CX72303 Bluetooth RF Transceiver, provides the system designer with the flexibility to design a complete system solution using either a standard UART or USB Bluetooth HCI, or to port an upper stack to embed a full application onto the ARM4TDMI processor. The CX81400 integrates an industry-standard RISC processor, the ARM7TDMI with a baseband controller link, memory and peripherals that include a universal serial bus (USB)

controller into a single package. It includes a lower protocol stack, hardware drivers, link manager and HCI. The CX81400 Baseband Controller is a key component of a system-level solution that reduces development time, risk and cost. For system architecture flexibility, the CX81400 is available in a 160-pin fine pitch ball grid array (FPBGA) that includes address and data pins for external memory-based designs, or a 100-pin FPBGA, which implements the lower layer HCI stack on internal read-only memory (ROM) and without the need for external parallel Flash memory. A 176-pin low quad flat pack (LQFP) is also available for development purposes.

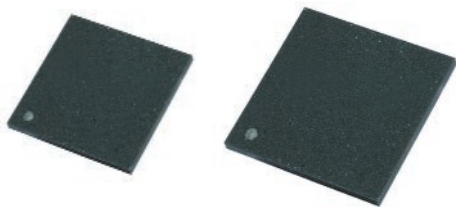
CX72303 Bluetooth RF Transceiver

The CX72303 integrated single-chip Bluetooth RF transceiver is specifically designed for Bluetooth system solutions and is version 1.1 certified.

Using silicon germanium (SiGe) technology, the chip design has been optimized for ultra-low power applications that require extended battery life, small form factors and low system costs. This transceiver is designed to exceed the Bluetooth Class 2 and Class 3 specifications and guarantee an operating range greater than 10 meters. A range of 100m can be



System Block Diagram



achieved using a Conexant Bluetooth Class 1 power amplifier (RF110). The GFSK modulation index is 0.3, the channel bandwidth is 1 MHz and the frequency deviation is 140 to 175 KHz. Correlator and data clock extraction functions (i.e., timing, recovery) are implemented in the baseband, optimizing cost and power consumption as well as performance. The interface is completely digital.

Designed using state-of-the-art circuit implementation, the CX72303 has the following integrated on-chip features:

- A low-power receiver architecture based on cascaded complex automatic gain control (AGC)/filtering stages and a complex phase lock loop (PLL) demodulator, eliminating the need for external filter components
- High-sensitivity low noise amplifier (LNA)
- A transmitter power amplifier (PA) featuring programmable output levels from -10 to +2 dBm
- A Delta-Sigma synthesizer incorporating two-point angle modulation
- Low power voltage control oscillator (VCO)
- Received signal strength indicator (RSSI)
- A fast dynamic-threshold multiple frequency shift keying (MFSK) bit slicer

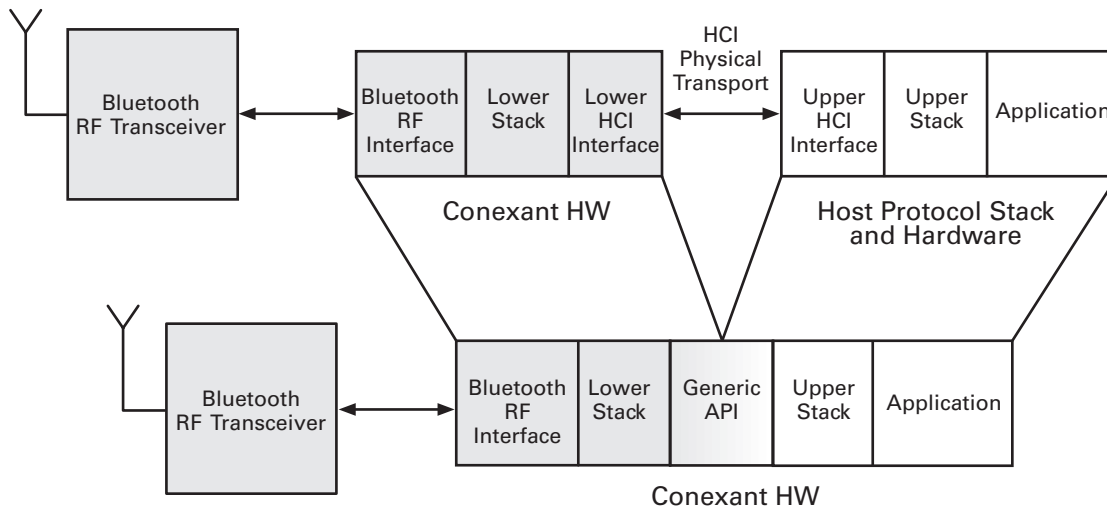
Central Processing Unit (CPU)

In addition to the ARM7TDMI RISC core, the CPU contains ROM, RAM, direct memory access (DMA), advanced peripheral bus (APB) bridge, watchdog timer and interrupt control. The blocks within the CPU subsystem are connected using an advanced microcontroller bus architecture (AMBA). The ARM core communicates using memory mapped registers and shared RAM. The use of Conexant's leading-edge sub-micron process cost-effectively allows the integration of large amounts of memory required to implement the Bluetooth stack. The CPU subsystem has 192 KB ROM and 192 KB RAM (152 KB is allocated for program download and 40 KB is allocated for data storage).

Serial Interface Control (SIC)

The SIC subsystem provides interfaces to communicate with peripheral devices. The SIC interfaces to serial memory, codec, debug port and the HCI. Both the debug port and the HCI use UARTs. The SIC also supports the following peripheral devices:

- Debug and HCI UART
- HCI USB
- Radio SPI
- Audio codec
- I²C and SPI-compatible EEPROMs



Embedded protocol stack

General Purpose Inputs/Outputs (GPIO)

GPIO pins are used for digital interfaces, and its software specifies the function of each GPIO. For functions that use the same GPIO, only one function can be selected and used for the system. The desired function is selected using the system configuration registers in serial EEPROM. The synchronous serial port (SSP) interface type is selected using external pull-up or pull-down resistors to various logic level specifications.

System Support Module (SSM)

The SSM block provides the interfaces for power control, test support and clock generation. It also provides the clock interface for the 48 MHz crystal oscillator, the 13 MHz system master clock and the 3.2 KHz slow clock. The 48 MHz crystal oscillator clock is used to generate the clocks for the USB circuitry. The 13 MHz clock is used as the master clock for the CPU and is generated by the CX72303. The 3.2 KHz slow clock, also generated by the CX72303, is used to maintain the system in sleep mode.

Product Features

- Lowest system power consumption in industry
- Full-speed UART and USB support for embedded applications
- 1- to 30-meter Class 2 operating range
- Standard Bluetooth RF interface between CX81400 and CX72303
- Hardware support for all packet types (ACL and SCO)
- Full-point to multi-point support
- Class 2 and Class 3 operation
- Integrated ARM7TDMI RISC
- 100-pin FPBGA
- 160-pin fine pitch ball grid array (FPBGA)
- 176-pin low quad flat pack (LQFP)
- 0.18 micron CMOS Process (CX81400)
- 0.5 micron SiGe Process (CX72303)

Bluetooth Technology Applications

- Personal wireless communications, headsets and cellular
- Personal computers and peripherals
- Personal digital assistants, mobile computers and peripherals

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www.conexant.com
 General Information:
 U.S. and Canada: (800) 854-8099
 International: (949) 483-6996
 Headquarters – Newport Beach
 4311 Jamboree Rd, P.O. Box C
 Newport Beach, CA 92660-3095
 Order# 101685B
 01-1087

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