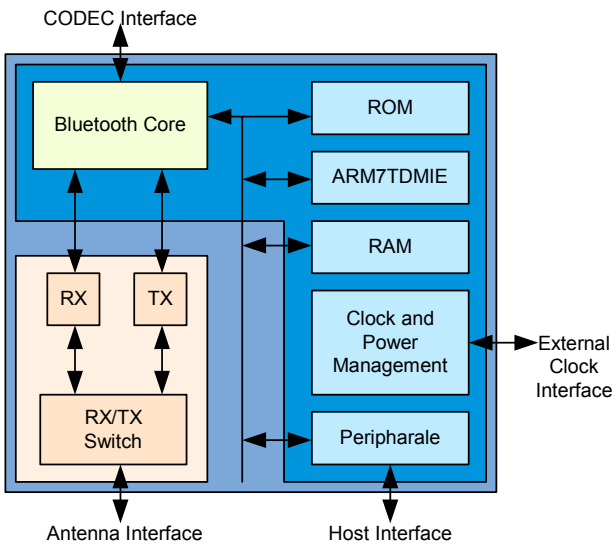
Product Brief

Bluetooth™ Transceiver Complete in CMOS

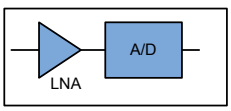
Texas Instruments BRF6100 Fully Integrated Bluetooth Transceiver

The BRF6100, a fully integrated Bluetooth transceiver features full support of Bluetooth Specification 1.1, -83 dBm sensitivity, 25 mA transmit and 37 mA receive current consumption (at 1.8V supply), less than $4.00 U.S. pricing in volume, and total system board area of 90 mm2. This capability is attained through aggressive integration of the complete Bluetooth radio transceiver and advanced digital system architecture. The device is presently in the late development stage and commercial samples are planned for the fourth quarter.



CMOS Radio Integration

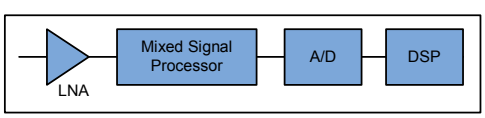
Advanced radio receiver research in the industry has included extensive investigation of software-defined radios (SDR).



The concept of an SDR is actually rather simple and involves encoding the RF receiver input with a very high-speed A/D converter and provides filtering and demodulation of the signal in the digital domain. Using the SDR technique, numerous problems associated with analog radio designs, such as linearity limitations, coupling, temperature variations, and process variations, can be avoided. Digital techniques are also advantageous with regard to elimination of passive components and rapid migration to different wafer process technologies. However, the extreme demands placed on the A/D converter lead to very high-power consumption and make SDR impractical for use in portable, battery-operated devices.

The BRF6100 employs a revolutionary Digital Radio Processor concept that overcomes the limitations of conventional SDR, retaining the benefits associated with a digital implementation, while providing very low power consumption.

The RF input passes through the low-noise amplifier (LNA) and then flows though a special mixed-signal preprocessor followed by a digital processor. The resulting radio design is fully integrated with the digital baseband processing unit. Almost all passive elements such as varactors, external SAW filters, VCOs, and resonators are either eliminated or integrated. The complete design requires only four external components and some decoupling capacitors.



The BRF6100 is implemented in a 0.13 um CMOS process featuring copper interconnect. Good RF device performance in the 2.4 GHz band is achieved along with low-cost passive element integration. Digital logic, ROM, SRAM, RF, analog, and power management functions are all fully integrated.

Advanced Digital Architecture

Consisting of the industry standard ARM7™ processor with additional peripherals, Bluetooth HW accelerator and advanced power management block, the digital baseband section represents the result of 3 years of optimization. The BRF6100 digital baseband is the 4th-generation baseband developed by Texas Instruments. Since Bluetooth technology development started, TI has introduced several digital baseband products, two of which are ROM-based, allowing the ultimate in cost reduction. The BRF6100 digital baseband has been optimized for size, to support aggressive pricing, and for low power, as demanded by users of portable devices, such as cellular phones, mice and headsets. BRF6100 employs internal ROM for all system program storage. This is a bold technical statement that represents state-of-the-art verification techniques for both HW and embedded SW, a must for winning products for mass consumer markets. External program memory, while giving a sense of security to the end customer, implies larger PCB footprint, higher power consumption, noise issues, and higher solution cost. Embedded flash, eliminates the large foot-print, but possesses all the other issues mentioned. In addition to system cost reduction, embedded ROM consumes inherently less power than external commodity flash memory or embedded flash. Access times are faster, allowing zero-wait-state execution; allowing the user to squeeze more effective MIPS from the platform; and allowing the CPU and peripherals to be shut down for longer times, yielding even less power consumption.

The HW/SW partition of the BRF6100 includes a Bluetooth HW accelerator that relieves the ARM7 processor from all time critical tasks. The resulting flexibility makes the BRF6100 an excellent platform to support both spec changes and product enhancements. On chip resources, such as data and program memory, I/O signals and available MIPS, make the BRF6100 an excellent device for a wide range of embedded applications, especially where a “single chip product” is required. The BRF6100 has full Bluetooth specification 1.1 feature support, with point-to-multipoint, low power modes (sniff, park, hold), and with a UART that is supporting HCI at all common baud rates and more. One SCO voice channel is supported.

Advances in wafer process capability, radio architecture, digital system design, modern design methodology and tools have been combined in the BRF6100 to create a fully integrated Bluetooth system. The radio receiver is based on a revolutionary Digital Radio Processor concept that provides full integration of the radio function at very low power consumption. Only four external passive components and decoupling capacitors are needed to complete a fully compliant Bluetooth design. The device is realized in a 0.13 um CMOS process featuring copper interconnect, good RF performance capability, low cost, and low power consumption.