Integrated CMOS chip is complete RF to digital front-end

By leveraging its mixed-signal RF expertise with advances in its 0.13-micron CMOS process, Silicon Laboratories has readied a highly integrated RF front-end solution to address the needs of direct broadcast satellite (DBS) equipment makers. Called the SiRX Si21xx product family, it is the first fully integrated single-chip satellite receiver for DBS applications, according to Silicon Labs.

The Si21xx products receive input from the low-noise block converter (LNB), which is part of the satellite dish housing, and outputs a digital bitstream that carries the digital audio and video satellite services for further video/audio decompression and display by the baseband processor. The SiRX family can be used in any equipment that receives DBS services, either free-to-air (FTA) or from pay-TV operators, including satellite set-top boxes, PC cards for satellite TV, DBS receivers for automotive or avionic use, DVD recorders with an integrated satellite receiver or integrated in a DTV set.

In essence, the satellite RF front-end chip integrates a high-performance satellite L-band RF tuner, a dual-mode DVB-S/DSS digital demodulator and a power-efficient, step-up supply controller for the LNB into a single 6 mm x 8 mm lead-free, RoHS-compliant 44-pin QFN package. The integration of the LNB supply controller is an industry first and includes support for DiSEqC 2.x and legacy tone/voltage LNB signaling, according to the manufacturer. Using a built-in dc-dc converter, the on-chip LNB supply offers up to 18 V with about 80% efficiency and current rating of 500 mA to 750 mA and provides short-circuit and overcurrent protection. The SiRX devices also support an on-chip hardware blind scan feature that improves channel scan time by a factor of 10 when compared to many existing solutions. This feature radically reduces set-top box installation time for FTA applications where channel locations are unknown.

The SiRX family is designed to meet or exceed key RF front-end requirements such as sensitivity, intermodulation distortion, receiver implementation loss and LNB peripheral support. The integration of the tuner, demodulator and LNB supply functions eliminates the need for external signaling among three separate ICs, which greatly simplifies the required software-programming overhead as well as the number of board signal traces typical of competing solutions. The device supports symbol rates of 1 MBaud to 45 MBaud over a 950 MHz to 2150 MHz range. It also supports features like automatic acquisition, fade recovery, blind scanning, performance monitoring, and DiSEqC level 2.2. The single-chip RF-to-digital architecture of the SiRX satellite RF front-end family reduces design time and allows an easy conversion from terrestrial or cable reception to satellite reception for existing designs.

Samples of the SiRX family are available with full production in the second quarter of 2006. Pricing for the Si21xx devices starts at $7.37 in quantities of 1K. The manufacturer also provides an evaluation board with all the hardware and software and recommended design and layout for $150.