Single chip serves as satellite front-end

Janine Love - November 07, 2005

Silicon Laboratories says...
SILICON LABORATORIES INTRODUCES INDUSTRY’S FIRST SINGLE-CHIP RF FRONT-END FOR DIRECT BROADCAST SATELLITE --Highly Integrated SiRX Family Delivers on Performance and Ease-of-Use--

AUSTIN, Texas—Silicon Laboratories Inc. announced the first product in its SiRX product family, the industry's first fully-integrated single-chip satellite RF front-end for direct broadcast satellite (DBS). Offering the highest performance, smallest size and easiest-to-use receiver solution for DBS, the Si21xx devices are ideal for all free-to-air (FTA) and pay-TV DBS equipment including satellite set-top boxes, PC cards for satellite TV, DBS receivers for automotive or avionic use, DVD recorders and digital TVs with integrated satellite receivers.

Leveraging Silicon Laboratories’ world-class RF expertise in CMOS and building upon the company’s unique intellectual property for minimizing digital-to-analog crosstalk, the SiRX satellite RF front-end 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 low-noise block converter (LNB) into a single 6 x 8 mm CMOS solution. The integration of the LNB supply controller is an industry-first and includes support for DiSEqC 2.x and legacy tone/voltage LNB signaling. The SiRX devices also support an on-chip hardware blindscan 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.

"With more than 65 million DBS receivers expected to ship in 2006, satellite television is a large and growing market where OEMs are facing pressure to integrate more value-added features," said Michelle Abraham, principal analyst of In-Stat. "The integration of the complete front-end satellite receiver onto a single-chip eliminates the difficulty of analog RF design for satellite set-top box designers. This integration has the potential to improve performance as well as reduce system cost and design time so that equipment manufacturers can focus their efforts on integrating higher-value features into their products." The SiRX family provides best-in-class performance, meeting or
exceeding 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 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.

"By leveraging Silicon Laboratories mixed-signal RF expertise, we are uniquely positioned to deliver a highly-integrated RF solution to address the needs of DBS equipment makers," said Dave Bresemann, vice president of Silicon Laboratories. "The satellite broadcast market is a large opportunity for the company with many difficult RF challenges where we can bring our expertise to bear to provide substantial improvements in system cost and performance." eeProduct Center's Janine Love says...

Satellite receivers typically feature complicated board layouts with many components, including a tuner, demodulator, and a power supply chip, and all of the associated routing of signals between these chips. These designs are challenged by having to avoid noise and interference on the printed circuit board (PCB) traces. The team at Silicon Laboratories decided to streamline these functions, and integrated the tuner, demodulator, and power supply chip into a single IC, known as the SiRX family of satellite front-ends.

"The end result is that we have cut the number of external components, provide better reliability and manufacturability, and enable better consistency across multiple PCBs," explained Mark Thompson, Silicon Laboratories' Director of Marketing. "In addition, we've solved a sourcing/inventory issue, because all three chips are typically not supplied by the same vendor."

This company likes to set the bar high for its designers, though, so integrating 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 low-noise block converter (LNB) into a single 6 x 8 mm CMOS solution was not going to be enough. They also wanted industry-leading sensitivity and linearity specs as well in order to pick up very weak signals under adverse conditions yet still maintain consistent performance even at high signal levels. As a result, input power ranges from –81 to –18 dBm, and the third-order intercept point (IP3) is typically +15 dBm.

So, what were the major design challenges with this product? "Achieving the high level of integration while maintaining best in class performance," reports Thompson. "We managed to do this by taking advantage of other Silicon Laboratories' designs and leveraging our core technologies and intellectual property into this product design."

What Thompson is referring to is the company's growing portfolio of integrated, mixed-signal designs in CMOS. (See recently released GSM/GPRS and EDGE products.) The company has focused specifically on developing four key competencies: digital low-IF technology, minimizing digital-to-analog cross talk, RF CMOS expertise, and power management expertise. When combined with the company's presence in the set top box (STB) market, the SiRX products seemed like the next obvious design to take on. It is targeted at all free-to-air (FTA) and pay-TV DBS equipment including satellite STBs, PC cards for satellite TV, DBS receivers for automotive or avionic use, DVD recorders, and digital TVs with integrated satellite receivers.

This product is especially noteworthy because of its effect on the BOM, and its ability to provide high
levels of performance across a range of satellite applications. The company is making an evaluation board available as well as a layout/schematic, access to application engineers, and field applications support.

Samples of the SiRX family are available now in a 6 x 8 mm, lead-free, RoHS compliant 44-pin QFN package with full production in the second quarter of 2006. Pricing for the Si21xx devices starts at $7.37 in quantities of 1K. Evaluation board kit $150. Click here for the data sheet.