UltraCMOS® Technology - The Ultimate SOI

Ultra-Thin-Silicon (UTSi®) on sapphire substrates enables monolithic RF integration

The need for RF products and components that are smaller, higher performance, more efficient and less expensive is greater than ever before. Monolithic RF integration is no longer a luxury – it is a requirement for the future. CMOS devices have enabled these efficiencies in the baseband and IF sections of the signal chain, however at the front-end, prevailing III-V compound semiconductors have run out of steam. More recently, high-resistivity (HR) silicon-on-insulator (SOI) materials advanced, offering the highest practical resistivity that could be obtained with silicon, though state-of-the-art had not been achieved. Yet.

Today, Peregrine Semiconductor’s UltraCMOS® technology delivers the ultimate SOI by mastering its technique of processing Ultra-Thin Silicon (UTSi®) circuitry on an insulating dielectric sapphire substrate. This patented Silicon-on-Sapphire (SOS) technology has for years been recognized as a technically superior semiconductor vehicle reserved for highly specialized military and space projects. SOS was thought to be impossible to manufacture in commercial volumes at a reasonable cost. Overcoming these challenges without sacrificing the inherent benefits of the technology took several years of research and development, all now protected by over one hundred patents. With this technology, Peregrine is producing monolithic integrated circuits (ICs) that are expanding customer options by providing major advances in speed and power at a lower cost, enabling the combination of high-performance RF, mixed-signal, passive elements, nonvolatile memory and digital functions on a single device.

Monolithic integration also provides significant performance advantages over competing mixed-signal processes such as GaAs, SiGe, BiCMOS and bulk silicon CMOS in applications where RF performance, low power and integration are paramount. Additionally, because UltraCMOS® devices are fabricated in standard high-volume CMOS facilities, products benefit from the fundamental reliability, cost effectiveness, high yields, scalability and integration of CMOS, while achieving the peak performance levels historically expected from SiGe and GaAs.

FOUNDRY SERVICES

Our comprehensive portfolio of Process Design Kits, standard cell libraries, IP offerings and design services delivers leading-edge solutions for today’s competitive RF wireless and broadband application challenges. For quick-turn prototyping service, we offer Multi-Project Runs (MPR) on a scheduled basis. This approach enables rapid, low-cost device evolution from design to limited or full production volumes.
UltraCMOS® TECHNOLOGY PROCESS OPTIONS

0.5 µm UltraCMOS® 'FA Process' (Standard Flow)
This is the core process for the ‘F’ series 0.5 µm UltraCMOS® processes. A wide variety of digital, analog and optoelectronic products have been realized in this process. The basic feature set consists of:
• Three NMOS and three PMOS threshold voltages available
• Single polysilicon - silicided
• Three metal layers

0.5 µm UltraCMOS® 'FC Process' (Thick Metal - Capacitors)
In this process variant, the final metal layer is thickened to improve inductor performance over the standard metal layer available in the FA process. This process also defines high quality metal to metal capacitors between the two topmost metal layers, enabling very high performance RF tuned circuits to be fully integrated on-chip.
• Three NMOS and three PMOS threshold voltages available
• Single polysilicon - silicided
• Three metal layers
• Improved inductor performance
• Metal to metal capacitors

0.25 µm UltraCMOS® 'GA/GC Process'
This 0.25 µm gate process is intended to extend the already highly capable FA and FC process RF performance into the deep GHz regime. Process features are similar to those of the 0.5 µm UltraCMOS® series:
• Three NMOS and three PMOS threshold voltages available
• Silicided diffusions & polysilicon
• Three metal layers

UltraCMOS technology combines the fundamental benefits of standard CMOS, the most widely used semiconductor process technology, with a synthetic sapphire substrate that enables significant improvements in performance for RF applications. We have engineered design advancements, including our patented HaRP™ technology which significantly improves harmonic and linearity performance, and our patent-pending DuNE™ technology, a circuit design technique that we have used to develop our advanced digitally tunable capacitor (DTC) products.

About Peregrine Semiconductor
Peregrine Semiconductor is a fabless provider of high-performance RFICs. Our solutions leverage our proprietary UltraCMOS® technology, which enables the design, manufacture, and integration of multiple RF, mixed-signal, and digital functions on a single chip. Our products deliver what we believe is an industry-leading combination of performance and monolithic integration, and target a broad range of applications in the aerospace and defense, broadband, industrial, mobile wireless device, test and measurement equipment, and wireless infrastructure markets.

UltraCMOS technology combines the fundamental benefits of standard CMOS, the most widely used semiconductor process technology, with a synthetic sapphire substrate that enables significant improvements in performance for RF applications. We have engineered design advancements, including our patented HaRP™ technology which significantly improves harmonic and linearity performance, and our patent-pending DuNE™ technology, a circuit design technique that we have used to develop our advanced digitally tunable capacitor (DTC) products.

We leverage our RF design expertise and systems knowledge to develop RFIC solutions that address the stringent performance, integration, and reliability requirements of the rapidly evolving wireless markets. We offer a broad portfolio of high performance RFICs including switches, digital attenuators, mixers/upconverters, prescalers, frequency synthesizers, digitally tunable capacitors (DTCs), and DC-DC converter products, and we are currently developing power amplifiers (PAs).

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