Peregrine Semiconductor Unveils Digitally Tunable Capacitors

Peregrine Semiconductor announced availability of the RoHScompliant PE64904 and PE64905 DuNE Digitally Tunable Capacitors. The new 5-bit, 32-state digitally controlled variable capacitors provide a monolithically integrated impedance tuning solution for demanding RF applications. These UltraCMOS-based devices enable wide-band tunable networks, minimizing mismatch losses, improving system efficiency and reducing radio complexity for a cost-effective tuning solution. Design applications for the new DTC devices range from tunable filters and matching networks to RFID, antenna tuning and other wireless communications where tunability and optimal system performance is critical.

“The need for a monolithically integrated, easy-to-use impedance tuning device has never been greater, and we are pleased to commercially release these new devices,” said Mark Schrepferman, marketing director for Peregrine’s HPS business unit. “Our initial DuNE technology launch enabled prototype DTCs for cellular handset and mobile TV applications. In identifying the performance requirements of the broader market, Peregrine engineers designed the latest DTCs to address a wide variety of complex tunable architectures,” he added.

The versatile solid-state devices can be used in Series or Shunt configurations to support a wide variety of tuning circuit topologies. Capacitance range is 0.7-4.6 pF in discrete 126 fF steps (6.6:1 tuning ratio) in Series configuration, and 1.1-5.1 pF in discrete 131 fF steps (4.6:1 tuning ratio) in Shunt configuration. The Quality Factor (Q) for a Shunt-configured DTC is ~35 for lowest capacitance state (at 1 GHz).

To address the requirements of peripheral interface programming, both 3-wire SPI-compatible (PE64904) and 2-wire I2C-compatible (PE64905) serial control versions are available. These interface options allow multiple DTCs to be controlled by a single serial interface. I2C programming interface is further described in Peregrine’s AN28 application note.

Both devices are manufactured on Peregrine's UltraCMOS silicon-on-sapphire (SOS) process technology which optimize the devices' high RF power handling (>+38 dBm @ 50 O, 30 Vpk RF); wide power supply range (2.3-3.6V); low current consumption (typ. 140 µA at 2.6V); built-in bias voltage generation and exceptional 2kV HBM ESD tolerance on all pins. The new DTCs maintain excellent linearity: IIP2 is +105 dBm and IIP3 is +65 dBm (typ) across a wide operating range of 100 MHz to 3 GHz, and, as with all UltraCMOS-based devices, the DTCs are immune to latch-up. The Company's HaRP technology design enhancements have been applied to deliver excellent harmonic performance of 75 dBc (2fo and 3fo) across the tuning range; fast 12 µs switching time; 10 µs settling time; and low-power operation (140 µA).

The PE64904 and PE64905, scheduled for volume production in Q3 2011, are housed in the tiny 2x2mm 10-lead QFN package and priced at $1.45 each (10K units). Evaluation Kits for each device, which are designed for accurate DTC impedance measurement and loss, include cables and USB interface board and are priced at $168.00 each. Design-in quantities and Evaluations Kits are available through Peregrine's global network of fully trained "DTC Advocates" which can be located on the DTC support page at dtc.psemi.com. Samples are available to qualified customers through Peregrine's global direct sales representatives.

About DuNE Technology
By applying proven, patented UltraCMOS process and HaRP switch technologies, engineers at Peregrine Semiconductor developed DuNE technology, a new design methodology used to design the new DTCs. DuNE technology uses RF design building blocks and processing technologies that are already shipping in the millions per week to the handset industry. All parameters of DuNE devices, including capacitance values, tuning ratio, quality factor, and power handling, can be changed by circuit design instead of materials engineering, making it very fast to spin new designs. Supporting a wide range of tuning applications—from tuning the center frequency of mobile-TV and cellular antennas to tunable impedance matching and filters—DuNE products offer power handling, performance, and size advantages unmatched by any other commercially-available digital tuning technology.

About Peregrine Semiconductor
Peregrine Semiconductor is a fabless provider of high performance radio frequency integrated circuits, or 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 ability to achieve the high levels of performance of traditional specialty processes, with the fundamental benefits of standard CMOS, the most widely used semiconductor process technology. UltraCMOS technology utilizes a synthetic sapphire substrate, a near-perfect electrical insulator, providing low parasitic capacitance and enabling high signal isolation and excellent broadband linearity. These attributes result in RF devices with excellent high-frequency performance and power handling

performance, reduced crosstalk between frequencies, and enhanced network efficiency. 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 offer a broad portfolio of high performance RFICs including switches, digital attenuators, frequency synthesizers, mixers and prescalers, and are developing power amplifiers (PAs), DTCs, and DC-DC converters. Our products are sold worldwide through our direct sales and field applications engineering staff and our network of independent sales representatives and distribution partners. Additional information is available on the Company website at www.psemi.com [1].

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