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NEW PRODUCT: nRF51 SERIES 2.4GHz, ANT & BLUETOOTH LOW ENERGY SoCs

Nordic's new nRF51 Series ULP wireless SoCs slash power consumption, up RF performance, and free designers from proprietary software frameworks

The first two ICs to debut in the nRF51 Series are the nRF51822, a multi-protocol Bluetooth low energy / 2.4GHz proprietary RF SoC, and the nRF51422, the world's first ANT / ANT+ SoC. These devices share a new higher performance, lower power 2.4GHz multi-protocol radio and a 32-bit ARM Cortex-M0 based processor. These enhancements deliver up to 50% lower power consumption, RF link budget improvements of up to 9.5dB, and over 10x more processing power compared to Nordic's previous generation of ULP wireless ICs - redefining class-leading industry benchmarks

Oslo, Norway – June 28, 2012 – Ultra low power (ULP) RF specialist Nordic Semiconductor ASA (OSE: NOD) today announces the first members of its new nRF51 Series of ultra-low power (ULP) RF integrated circuits (ICs) that feature a new multi-protocol 2.4GHz radio and a 32-bit ARM[®] Cortex[™]-M0 based processor. Nordic's novel software architecture for *Bluetooth*[®] low energy and ANT[™] System-on-Chip (SoC) solutions frees designers from the integration effort, complexities, and restrictions of chip vendor-supplied software frameworks and instead allows customers to develop their designs quickly and easily using the highly popular and familiar ARM Cortex programming environment.

This major benefit is achieved by using a new and novel software architecture featuring a unique and powerful separation between protocol stack and user application code. This separation provides developers a clean boundary between application and protocol stack, and removes the need to struggle with integration of application code as part of a vendor-imposed application development framework. Code development is now greatly simplified and accelerated and at the same time risks associated with integration of application and stack code are significantly reduced. Customers can expect lower bug rates and improved robustness for their applications.

With the launch of the Nordic Semiconductor nRF51 Series, developing applications based on class-leading devices from any of the three main ULP wireless sub-categories – *Bluetooth* low energy, ANT / ANT+[™], and 2.4GHz proprietary RF – has never been so straightforward or accessible to the widest possible range of developers.

The first two Flash-based ICs to debut in the new nRF51 Series (see 'About the nRF51 Series' below) are the nRF51822 multi-protocol *Bluetooth* low energy / 2.4GHz proprietary RF SoC (see 'About the nRF51822' below), and the nRF51422 – the world's first ANT SoC (see 'About the nRF51422' below).

"We have worked closely with our most trusted customers for several years on the nRF51 Series and we are confident that this latest Nordic product range once again sets a new benchmark for *Bluetooth* low energy, ANT, and 2.4GHz RF proprietary ultra low power applications," comments Thomas Embla Bonnerud, Director of Product Management at Nordic Semiconductor.

Bonnerud continues: "Our new multi-protocol radio combined with the ARM Cortex-M0 based processor not only slashes power consumption, but also significantly improves performance and available processing power, and also extends the range of applications we can cover with our new SoC solutions. We have also taken a completely novel approach with our software architecture for *Bluetooth* low energy and ANT SoCs that accelerates product development and lowers risks by offering developers unprecedented flexibility, ease-of-use, and code safety."

Availability

nRF51822 and nRF51422 are sampling to lead customers now. General availability is scheduled for early September 2012 and mass production is scheduled for Q4 2012.

Nordic will continue to introduce additional ICs and protocol stacks for the nRF51 Series expanding customer's choices of memory size, package types, serial interfaces, mixed signal peripherals, and wireless connectivity.

About the nRF51 Series

The new multi-protocol 2.4GHz radio provides an unprecedented combination of high-performance, ultra low power consumption, and flexibility. Key features and benefits of the radio include:

- -92.5dB RX sensitivity in *Bluetooth* low energy mode;
- Up to +4dBm output power in all modes;
- Up to 9.5dBm improvement in link budget compared to Nordic's previous generation radio;
- Sub-10mA peak currents running off a 3V coin cell battery;
- *Bluetooth* low energy (*Bluetooth* v4.0) compliant;
- 100% on air compatibility with Nordic's existing nRF24L series ICs;
- Support for non-concurrent and concurrent operation of a range of protocols including *Bluetooth* low energy, ANT, and proprietary 2.4GHz RF;
- Full range received signal strength indication (RSSI).

The nRF51 series SoC architecture is designed specifically to minimize average current consumption and enable single chip implementations of a wide range of wireless applications. Key features and benefits of the architecture include:

- Powerful, low power consumption 32-bit ARM Cortex-M0 processor with 2 μ s start-up time that minimizes active time and improves code density compared to a 8/16-bit processor;
- Advanced and fine-grained power management scheme. Individual system blocks can be powered on or off independently and control their clock autonomously based on activity level;
- Programmable Peripheral Interconnect (PPI) system. Enables peripherals such as radio, timers' and I/O to interact autonomously with each other without involving the processor. Saves power by minimizing processor active time and at the same time relaxes real time requirements for the processor;
- Highly efficient EasyDMA radio interface with flexible RAM mapped FIFOs;
- Flexible GPIO mapping eases PCB design and helps minimize the number of routing layers;
- Custom 2-region Memory Protection Unit (MPU) enabling program memory and run-time protection of pre-compiled protocol stacks such as *Bluetooth* low energy and ANT.

The nRF51 series software architecture features a unique and powerful separation between protocol stack and user application code providing application developers maximum flexibility, ease-of-development, and code safety.

- Protocol stacks, for example *Bluetooth* low energy or ANT, are delivered as a pre-compiled binary or pre-programmed on devices;
- Stacks are 100% asynchronous and event driven and provide thread-safe Supervisor Call (SVC) based application program interfaces (API) to the application layer;
- Very simple programming model, no proprietary application framework or scheduler/RTOS dependencies, ease and accelerate code development;
- Protocol stack and application code have no link time dependencies and can be compiled and updated/programmed separately;
- Stacks are fully run-time protected ensuring interoperability and reducing the risk of application bugs affecting stack operation;
- Stacks are delivered as verified and qualified binary objects.

All nRF51 Series ICs are code-compatible and groups of ICs will be pin-compatible enabling developers to keep and maintain a single code base that can be used and re-used across a range of different projects. Pin compatible ICs enable developers to both re-use hardware designs for different projects and migrate easily from one IC to another during development, prototyping, and production.

About the nRF51822

The Nordic Semiconductor nRF51822 is a multi-protocol *Bluetooth* low energy / 2.4GHz proprietary RF Flash-based SoC that is designed specifically to be used as a single-chip solution for a range of *Bluetooth* low energy and 2.4GHz proprietary designs in cost, power, and size constrained applications including PC peripherals, connected TV remote controls, sports/fitness/healthcare sensors, toys, and automation.

Key IC features include:

- 256kB on-chip Flash and 16kB RAM;
- Wide range of digital and mixed signal peripherals including SPI, 2-wire, ADC, and a quadrature decoder;
- 16 PPI channels;
- 1.8-to-3.6V supply range with on-chip LDO, 1.75-to-1.95V supply range for LDO bypass mode;
- On-chip drop down DC/DC converter for 3V batteries such as coin cells;
- +/- 250 ppm 32kHz RC oscillator enabling the implementation of *Bluetooth* low energy applications without an external 32kHz crystal, saving cost and board space;
- 6x6mm 48-pin QFN package with up to 32 GPIOs;
- Complete *Bluetooth* protocol stack solution (Link layer to Profiles).

The S110 *Bluetooth* low energy stack for the nRF51822 is provided as a downloadable, royalty-free, pre-compiled binary that can be programmed and updated separately. Key features of the stack include:

- Asynchronous and event driven SVC-based API;
- Run-time protection;
- GATT, GAP and L2CAP level APIs;
- Peripheral and Broadcaster Roles;
- GATT client and server;
- Non-concurrent multi-protocol operation with 2.4GHz RF proprietary protocols;
- Requires less than 128kB code space and 6kB of RAM, leaving more than 128kB flash and 10kB RAM for application code;
- Compared to two-chip implementations using Nordic's previous generation nRF8001 the nRF51822 running the S110 stack slashes power consumption by up to 50%.

The S110 stack and the nRF51822 are complemented by the nRF518 SDK that includes a comprehensive set of *Bluetooth* low energy profiles, services, and example applications.

For proprietary applications the nRF51822 is complemented by a new and improved Gazell™ 2.4GHz RF protocol stack providing interoperability with nRF24L Series Gazell-based applications. The combination of the nRF51822 and the new Gazell protocol stack slashes power consumption by up to 30% compared to Nordic's previous generation nRF24LE1.

About the nRF51422

The Nordic Semiconductor nRF51422 Flash-based ANT SoC is the world's first single chip solution for ANT applications. It is a third generation Nordic ANT solution, and an ideal fit for cost, power, and size-constrained applications such as sports, fitness, and healthcare sensors.

Key IC features include:

- 256kB on-chip Flash and 16kB RAM;
- Wide range of digital and mixed signal peripherals including SPI, 2-wire, ADC, and a quadrature decoder;
- 16 PPI channels;
- 1.8-to-3.6V supply range with on-chip LDO, 1.75-to-1.95V supply range for LDO bypass mode;
- On-chip drop down DC/DC converter for 3V batteries such as coin cells;
- 6x6mm 48-pin QFN package with up to 32 GPIOs;

The IC is identical to the nRF51822, but is supplied, pre-programmed, with the S210 software stack which includes Dynastream Innovation's ANT protocol stack. Key features of the S210 stack include:

- Asynchronous and event driven SVC-based API;
- Run-time protection;
- Broadcast, Acknowledged, and Burst communication modes;
- Support for up to eight concurrent ANT channels;

- 60kbps burst rate – 300% faster than previous generation;
- Requires less than 32kB of code space and 2kB of RAM, leaving more than 224kB of Flash and 14kB of RAM available for application code.

The nRF51422 is complemented by the nRF514 SDK that includes a comprehensive set of ANT+ profiles, ANT FS, and example applications.

About Nordic Semiconductor ASA

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