Microcontrollers offer a Flash memory range from 32 up to 384 Kbytes

STMicroelectronics today announced the extension of its 32-bit STM32L series of microcontrollers. The expansion of the family now includes devices with memory densities of 256 and 384 Kbytes, thereby offering a Flash memory range from 32 up to 384 Kbytes for embedded application engineers. The series is now entering into volume manufacturing and the first devices, offering 64 and 128-Kbyte memory densities, are expected to be available in production maturity by the end of March 2011. STM32L series MCUs with 32-Kbyte memories will follow in Q2 2011.

The STM32L microcontrollers are the industry's first ultra-low-power ARM® Cortex™-M3 MCUs available from a top-10 silicon supplier and offer 33 DMIPS performance at 32MHz (max). The series is part of ST's extensive 32-bit STM32 family, which now has more than 180 variants offering complete pin, software and peripheral compatibility for maximum flexibility.

The STM32L combines a dedicated low-leakage 130nm process technology and optimized power-saving architecture that are both unique to ST, to deliver industry-leading energy-saving performance. The series is also part of ST's EnergyLite™ platform of ultra-low-power products, which enable designers to optimize performance, functionality and battery life, and to meet efficiency-related criteria such as eco-design targets. Additionally, for touch-sensing applications, the STM32L is supported by the availability of ST's third-generation STMTouch™ capacitive-touch-sensing firmware library, which now supports more than 200 devices within ST's 8-bit STM8 and 32-bit STM32 families.

ST also announced today that the STM32L's USB drivers are ready for use in Continua Health Alliance[1] [1] certified applications. Full certification is expected by the end of Q1 2011. The success of the USB interface in medical applications has led to standardization and the development of a dedicated class of device called the Personal Healthcare Device Class (PHDC). This new class enables health-related devices, such as exercise watches, blood pressure monitors, thermometers, weighing scales and glucose meters, to connect to a host and ease the communication between individuals and their fitness coach, or patients and their doctor.

"The ultra-low-power STM32L series delivers the optimal balance between power consumption and performance for developers of leading-edge embedded applications," said Michel Buffa, General Manager of ST's Microcontroller Division. "The extension of the series to include an even wider range of memory capacities, in addition to the certification from Continua, will bolster STM32L's credentials to be the first choice microcontroller for 'energy-lite' applications across a range of markets from healthcare to consumer to industrial."

Pricing

The MCUs are priced from $1.60 for the STM32L151, with 32-Kbyte Flash in the LQFP48 package, to $2.81 for the STM32L152, with 128-Kbyte Flash in LQFP100, for orders of 10,000 units.

STM32L Series – Further Technical Details

- **Continua PHDC USB Package**

The USB Personal Healthcare Device Class (PHDC) is the first wired communication transport layer approved and adopted by the Continua Health Alliance, an open industry consortium that has more than 230 member companies around the world, including ST, with the mission to harmonize developments in the healthcare sector.

ST provides the PHDC USB package with a medical application's USB stack on the STM32L MCU along with a complete set of USB classes, such as mass storage, human interface devices, audio and DFU for firmware updates in the field. This stack is based on USB PHDC and IEEE-11073 standards and enables communication between the device and the host according to Continua standards. The STM32L's integrated USB 2.0 Full Speed support also makes the devices 'handset ready'.

- **Security and Safe-System Features**

In addition to its extreme energy efficiency, the STM32L series also has many features promoting data security and safe system operation, including flexible Brown-Out Reset; on-board Flash with Error Correction Code (ECC) support; a Memory Protection Unit (MPU); and JTAG fuse. These features are recommended for

all applications that require safe product behavior and highly secure code and user-data management.

- **EnergyLite™ Platform Architecture**

The key to the STM32L's industry-leading energy efficiency is ST's ultra low-power EnergyLite™ platform. This platform is also common to ST's 8-bit STM8L MCU family and is based on 130nm proprietary technology, which is optimized for ultra-low leakage to maximize efficiency when the microcontroller is active or when sleeping. In addition, its embedded memory is based on a unique low-power Flash technology developed by ST. Integrated support for Direct Memory Access (DMA) allows peripherals to remain active, allowing developers to realize significant savings by turning off the Flash – and the CPU - while the application is running. Additionally, the STM32L's embedded LCD drivers enable easier, cheaper and smaller application designs.

- **Ultra-Low-Power Modes**

In addition to its underlying process-related power savings, the STM32L series provides numerous features allowing developers to optimize the application power consumption. Six ultra-low-power modes allow the device to fulfill its tasks while consuming the least possible energy at any given time.

The available modes (for 1.8V and 3V at 25°C) are:

  - 9uA at 1.8V/3V in Low-Power Run mode at 32kHz
  - 4.9uA at 1.8V/3V in Low-Power Sleep mode with one timer active
  - 1.3uA at 1.8V and 1.6uA at 3V in STOP mode: Real-Time Clock (RTC), context preserved, RAM retention
  - 0.45uA at 1.8V and 0.5uA at 3V in STOP mode: no RTC, context preserved, RAM retention
  - 1.0uA at 1.8V and 1.3uA at 3V in Stand-By mode: RTC, back-up register preserved
  - 0.3uA at 1.8V/3V in Stand-By mode: no RTC, Back-up register preserved

The two low-power modes – 'Low-Power Run' and 'Low-Power Sleep' – have been implemented in the STM32L series, to drastically reduce power consumption at low frequency operation by using an ultra-low-power regulator and oscillator. The regulator allows current demand to be independent from the supply voltage.

- **Energy Efficiency**

The STM32L also offers dynamic voltage scaling, a power-efficient system that allows dynamic changing of speed and voltage at runtime, thereby increasing

energy efficiency without impacting performance, in particular for medium and low operating frequencies. The current drawn, in normal Run mode, from Flash memory is as low as 222uA/MHz and the STM32L delivers a consumption/performance ratio as low as 180uA/DMIPS.

In addition, the STM32L circuitry is designed to deliver high performance at low voltages, which enables battery-operated equipment to operate for longer before recharging. The integrated analog features are capable of operating at supply voltages down to 1.8V. The digital functions are able to operate from a supply voltage as low as 1.65V, allowing prolonged operation in battery-powered equipment as the battery voltage decays.

- **256 and 384-Kbyte MCU Features**

The new 256 and 384-Kbyte STM32L MCUs will also offer dual-bank Flash for Read-while-Write operation, an external memory interface, additional communication peripherals, SDIO interface, up to three low-bias operational amplifiers, a 32-bit timer, and a 40-channel ADC with 39-channel touch sensing.

- **STMTouch™ Firmware Library**

ST's third-generation STMTouch™ capacitive-touch-sensing firmware library supports touch detection via charge-transfer, which delivers high sensitivity and robustness. In addition, simultaneous channel acquisition reduces CPU usage to help designers optimize application features and power consumption. The library also provides improved wheel and slider controls that feature 256-level resolution while using only three microcontroller I/Os as sensor channels.

Touch controls implemented using the STMTouch firmware library occupy a low memory footprint and require minimal use of STM32L peripherals, allowing developers to consolidate user-interface and application tasks in a single device. In addition, ST's PC-based STM Studio software, used in conjunction with the touch-sensing library, offers an easy-to-use GUI that provides visual indication of sensor responses and enables developers to tune touch-sensing parameters.

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