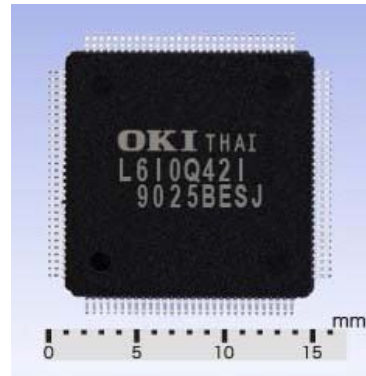


Oki Semiconductor Expands its Family of Ultra Low Power 8-bit Flash Microcontrollers for Portable Applications

- Two New Models for 200- to 800-dot LCDs for Use in Compact Portable Products Such as Wristwatches -

TOKYO, February 25, 2009 – Oki Semiconductor Co., Ltd. announces the addition of 2 new products, the ML610Q421 and the ML610Q422, to its 8-bit flash microcontroller family, the ML610Q400 series. The ML610Q421/Q422 incorporates 1.1V flash memory based on Oki Semiconductor's proprietary low-power technology, achieving one of the lowest power operation in the industry. Sample of the products are available now and volume shipment is scheduled to start from April 2009.



The ML610Q400 series is capable of operating at only 1.1 V, thanks to Oki Semiconductor's proprietary low-power technology. Since these MCUs can operate on a single battery (1.5 V), they are suitable for use in compact portable products driven by a 1.55-V silver oxide battery, such as wristwatches. Incorporating comprehensive and precise power-management functions and a highly efficient RISC-type CPU*1, the ML610Q400 series reduces the HALT mode current (at 32-kHz crystal oscillator frequency) by about 65% and the operating current (at 4-MHz PLL oscillator frequency) by about 15% compared to our previous product (a general-purpose microcontroller with internal mask ROM). Equipped with a variety of CPU peripheral functions, such as an LCD driver, two types of A/D converters, and an on-chip debug function, these models are suitable for portable products equipped with black-and-white LCDs (e.g., wristwatches, thermo-hygrometers, and pedometers).

“With the new ML610Q421/Q422 models joining the others in the ML610Q400 series (the ML610Q431/Q432 and ML610Q411/Q412/Q415), we can offer the most suitable microcontroller—from low-end to high-end models—to match the function and performance of a specific end-product,” said Naotaka Fujita, General Manager, Low power LSI Development Unit at Oki Semiconductor. “We will continue to improve our low-power technology and to expand the lineup of ultra-low-power 8-bit flash microcontrollers optimized for low-power applications.”

Built-in low-voltage, low-power-consumption flash memory

Based on Oki Semiconductor's proprietary low-power technology, The ML610Q421 and Q422 operate over a wide voltage range, from 1.1 V to 3.6 V and achieve lower current consumption levels compared to that of our previous microcontrollers with built-in mask ROMs. Thus, The ML610Q421 and Q422 can offer advantage of flash memory's features, such as short development and production periods, while utilizing their low-power-consumption characteristics.

Comprehensive and precise power-management functions

The ML610Q421 and Q422 include three power management functions: HALT mode, STOP mode and Triple clock mode. HALT mode aborts the CPU's command execution without interrupting the operation of built-in peripheral circuits. STOP mode terminates the operation of the CPU and peripheral circuits. The triple clock enables the selection of the most suitable clock frequency from 32.768 kHz, 500 kHz, and 4 MHz according to the processing type, thus minimizing the operating current. These power-management functions help prolong battery life and reduce product size.

Highly efficient RISC-type CPU

The ML610Q421 and Q422 are equipped with Oki Semiconductor's original nX-U8/100 RISC CPU, which features a RISC architecture. This CPU executes most instructions in a single machine cycle by using a three-stage pipeline processing*2. In addition, it has a bit operation instruction for high-speed access to the memory as well as a multiplication/division algorithm, thus ensuring high performance.

LCD driver

The ML610Q422 is capable of driving an LCD of up to 800-dot (50 seg x 16 com) resolution, while the ML610Q421 can drive an LCD of up to 400-dot (50 seg x 8 com) resolution. They both include a charge pump circuit. Because they do not require an external driver and reduce external circuits for LCD drive voltage generation, their footprints are smaller, which in turn contributes to the downsizing of end-products.

LCD allocation RAM

The ML610Q421 and Q422 feature a programmable allocation function that uses the mapping data on the dedicated RAM built into the microcontroller for the allocation of LCD segments to drive. This only requires a change to the mapping data on the dedicated RAM when designing an LCD panel or changing the wiring scheme; thus, it eliminates the need to revise the software used for display control. Mapping data can be created easily using Oki Semiconductor's LCD Tool*3.

Sales plan

- Product name: ML610Q421, ML610Q422
 - Sample shipment: February 2009
 - Volume shipment: April 2009
 - Shipment of software development tool (on-chip debugging emulator: uEASE), LCD Tool:
February 2009
-

Major characteristics

Operating voltage

1.1 V - 3.6 V

Power consumption (Typ.)

0.15 μ A (STOP mode), 0.5 μ A (HALT mode), 5 μ A (32.768kHz crystal oscillation with 100% CPU operation), 70 μ A (built-in RC oscillator, 500kHz), 800 μ A (built-in PLL, 4MHz)

Operating frequency

32.768 kHz (crystal), 500 kHz (on chip RC),
4MHz (on chip PLL, Crystal or Ceramic oscillation (operation voltage 1.8V or higher)

Memory

ROM 16 KW (Flash memory), RAM 2 KB (including 1KB for LCD configuration)

LCD driver

ML610Q422: 800 dot max. (50 seg x 16 com)

ML610Q421: 400 dot max. (50 seg x8 com)

A/D converter

24-bit RC oscillator type x 2ch,
12-bit successive approximation type x 2ch (operation voltage 2.2V or higher)

Timers

8-bit timer x 4ch, watch dog timer, time-base counter, etc.

Other features

Detect battery level, PWM, buzzer, melody, clock output

Package

Bare chip, 120pin TQFP (TQFP120-P-1414-0.40-K)

Operating Temperature

Commercial: -20 degree C to +70 degree C

Industrial: -40 degree C to +85 degree C

Glossary

- *1 :RISC (Reduced Instruction Set Computer) -type CPU:
This is a high-speed processor using reduced instruction sets. However, Oki Semiconductor's proprietary CPU, "nx-U8/100" has 58 instructions including bit operation and multiplication/division instructions.
- *2 :pipeline
This enables parallel instruction execution by dividing execution units (fetch, decode and execute) and operating them individually.
- *3 LCD Tool
The LCD Tool is used to check the settings of the registers allocated to the COM/SEG pins of the LCD driver and also allows easy creation of mapping data to be defined in the LCD allocation RAM. After a bit map file of the LCD panel image and information on the LCD panel layout are input, the LCD Tool automatically generates a sample of the mapping data and control program.

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