K0S Family

μPD789881

Ultra-Low-Power 8-Bit Microcontroller with LCD Controller

Description

The μPD789881 is ideal for-battery-powered applications as it was designed for ultra-low power consumption of 18 μA at 2.7 volts during normal operation and 0.9 μA in STOP mode. It also has an LCD controller that can directly drive 104 LCD segments.

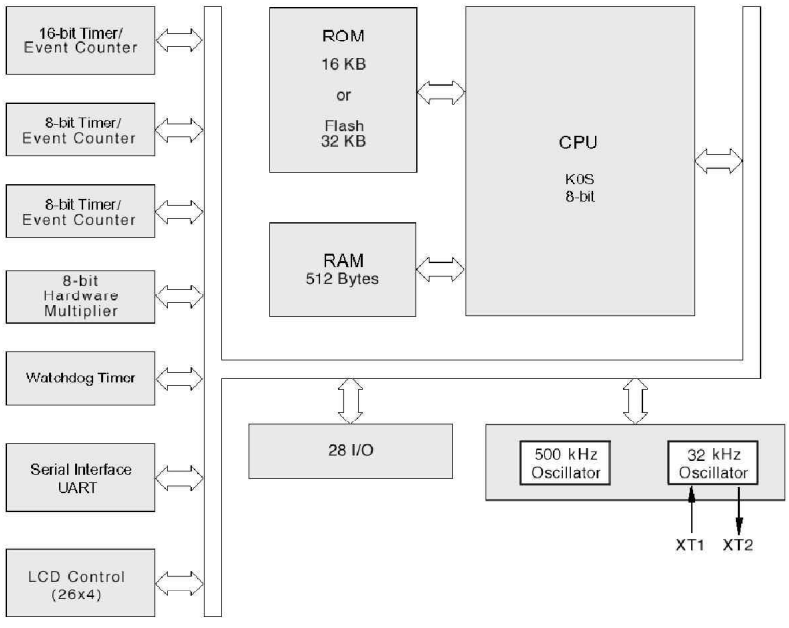
A built-in 500 kHz on-chip oscillator drives the CPU clock, while all peripherals operate from an external 32 kHz clock. Users can dynamically switch between the two clock speeds to accomodate the performance and power consumption requirements for their applications.

The product's extensive tool chain contains a software simulator, C compiler, relocatable assembler, debugger, and in-circuit emulator. Programming examples for the on-chip peripherals can be found in the microcontroller section of www.necel.com.

Features

- 18 μA operating current consumption
- 0.9 μA standby current consumption
- 26x4 LCD controller/driver
- 32 KB flash and 16 KB ROM versions
- 512 KB SRAM
- Peripherals operating from external 32 kHz clock
- 500 kHz internally generated CPU clock
- 4 μs instruction execution time (min.)
- Hardware multiplier
- Bit manipulation instructions
- Serial UART interface
- 8-bit timer/counter
- 16-bit counter/timer
- Watchdog timer
- Real-time clock
- Up to 28 I/O pins
- Interrupt controller
- Standby control (HALT, STOP modes)
- Power supply voltage: 2.7-3.5 V
- Operating temperature: -40 to +85°C
- 64-pin QFP (10 x 10 mm)

Block Diagram



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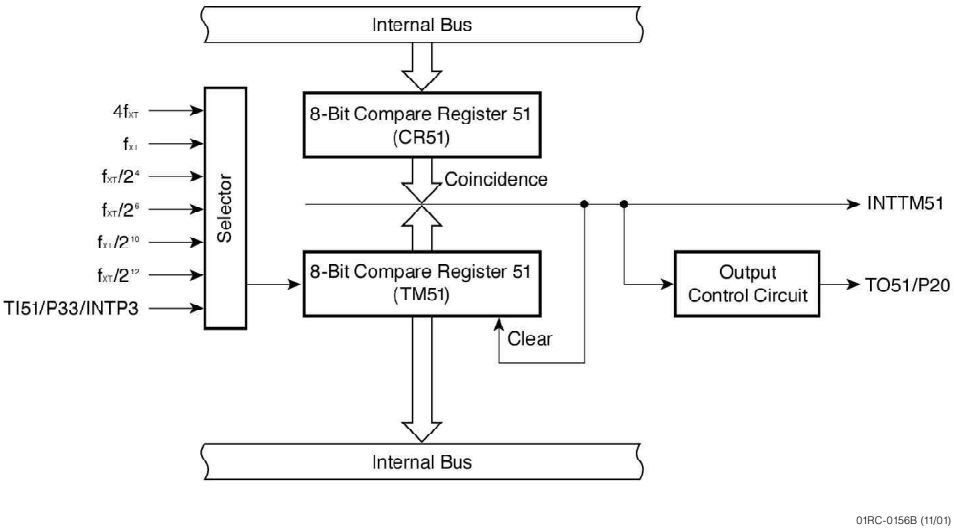
Power-Saving Modes

To maximize power savings, the μPD789881 has a STOP mode in which all functions are shut down except for timer 51. In this mode, the device draws less than 0.9 μA. Timer 51 can be used as a very flexible real-time clock that can be dynamically modified by the user.

Block Diagram

Figure 1: 8-Bit Timer/Event Counter 51



Timer 51 (Figure 1) can have either an internal clock input or an external clock input. If a clock input is selected, the input frequency can be selected by the value specified in a special function register. The available input frequencies were carefully chosen to provide extensive timing capabilities.

For example, if the $f_{xt}/2^{12}$ clock input is selected, it provides a signal to the Timer Register (TM51) every 0.125 seconds. If the 8-bit Compare Register (CR51) is set with a value of 8, then the device wakes up every 1 second. Altering the Compare Register value yields wake-up times between 0.125 and 32 seconds. This flexibility comes from using only one of the seven different clock inputs.

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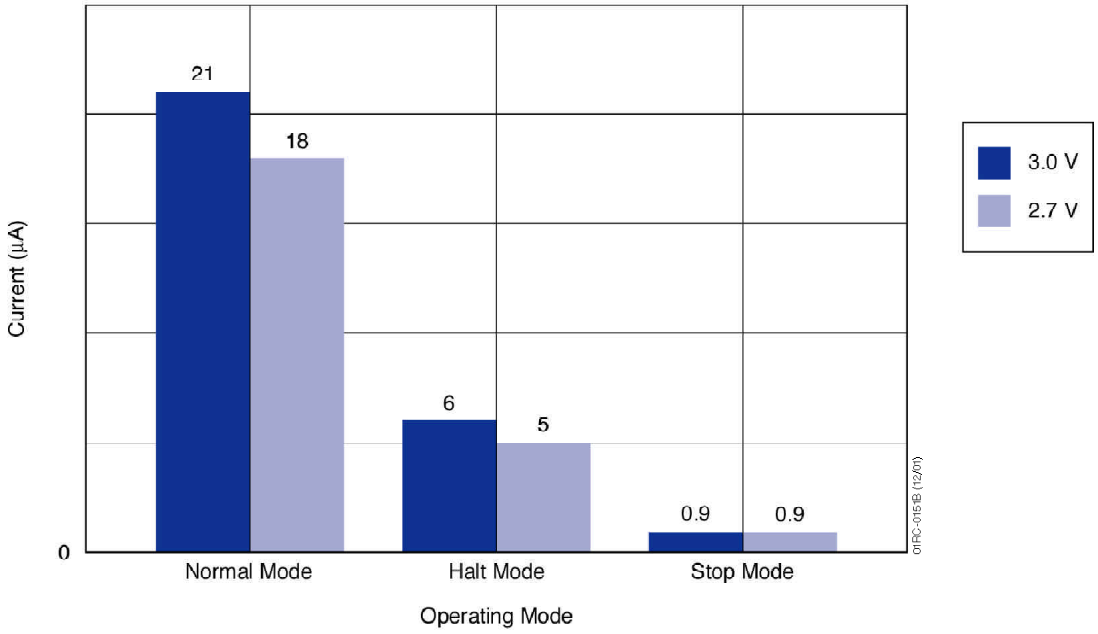
Power-Saving Modes

Voltage	Modes and Typical Current at 500 kHz		
	Normal Mode: Chip 100% On Main and Subsytem Clocks On	Halt Mode: CPU Clock Off Main and Subsytem Clocks On	Stop Mode 32 kHz Subsystem Clock On
3.0 V	21 μA	6 μA	0.9 μA
2.7 V	18 μA	5 μA	0.9 μA

Microcontroller Power Consumption



Ordering Information

Part Number	Internal ROM
μPD789881GB-xxx-8EU	16 KB mask ROM
μPD78F9882GB-8EU	32 KB flash ROM

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To find out more about the products and services available from NEC Electronics,
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