# NXP energy metering IC EM773

## Energy metering IC with ARM Cortex-M0 for non-billing applications

Supported by a complete set of development tools, this highly efficient IC has been optimized for power and cost. It is an elegant, straightforward way to add energy metering functions to non-billing applications.

### Key features
▸ 1% accurate, single-phase metrology engine
▸ Automatic calculations for a range of metrics, without CPU intervention
▸ ARM Cortex-M0 (up to 48 MHz)
▸ 32 kB flash memory
▸ 8 kB SRAM memory
▸ Integrated serial peripherals (UART, SPI, I²C, GPIO, counter/timer, WDT)
▸ 33-pin HVQFN package
▸ Supported by standard Cortex-M0 API
▸ Available with open source M-Bus sample application

### Key applications
▸ Smart appliances
▸ Industrial sub-meters
▸ Rack-mounted servers
▸ Smart plugs and plug meters
▸ Green consumer electronics

The EM773 is NXP's first ARM-based product designed specifically for energy metering in non-billing applications. Built around a low-power, cost-effective ARM Cortex-M0 core that operates at up to 48 MHz, the EM773 also includes an automatic, single-phase metrology engine for power and energy, with 32 kB of flash memory, 8 kB of SRAM memory, and a full set of serial peripherals.

The metrology engine is 1% accurate for scalable inputs sources 230 V / 50 Hz and 120 V / 60 Hz, and maintains this accuracy with a factor of 1 to 400 below the maximum current load. The engine performs calculations automatically, without intervention from the CPU. It not only calculates active power in W, but also reactive power in VAr, apparent power in VA, the power factor, Vrms, Irms, and even THD. The open source example application also generates kWh data. The metrology engine is supported by a standard API that lets the Cortex-M0 CPU initialize, start, stop, and read data from the engine.

The IC is equipped with a number of serial peripherals that enhance design flexibility. There is a UART with fractional baud generation, an internal FIFO, and RS-485 support. There is also

an SPI controller, with FIFO and multi-protocol capabilities, and an I²C-bus interface that supports the full specification, including Fast-mode Plus (Fm+) with a data rate of 1 Mbps with multiple address recognition and monitor mode. There are up to 25 general-purpose I/O (GPIO) with configurable pull-up/down resistors, three general-purpose counter/timers with two capture inputs and 10 match outputs, and a programmable Watchdog timer (WDT).

## Development platform

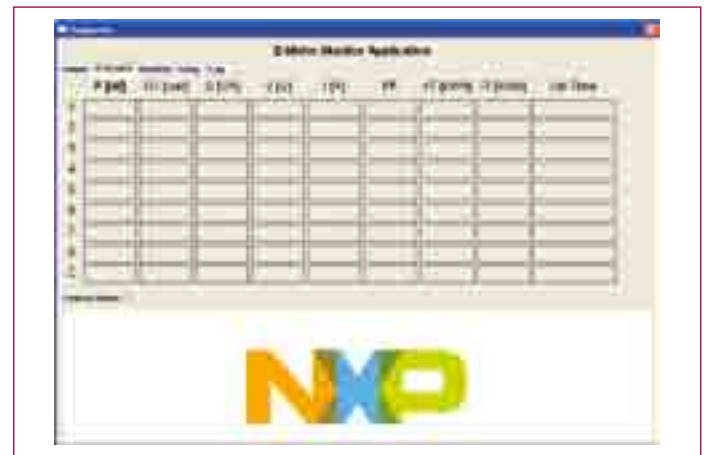For fast time-to-market, NXP offers a complete design platform for the EM773. It includes an open-source design that demonstrates a wireless (M-Bus) application. The design uses the EM773 to measure a single-phase load and transmits the data via wireless M-Bus using the NXP wireless transceiver OL2381 connected to a USB adapter based on the NXP ARM Cortex-M3 LPC1343. The data is displayed on a PC-based application.

All the example software for the plug meter, the USB transceiver, and PC application are available for download, free of charge, on the NXP smart metering website (www.nxp.com/smartmetering).

## EM773 block diagram
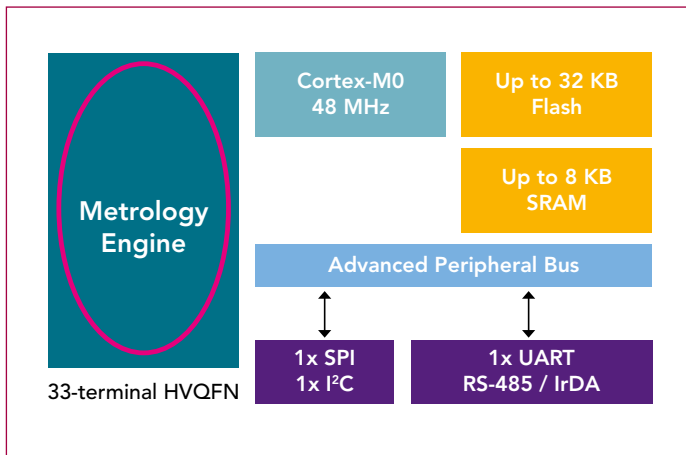


## PC-based monitoring application



## Sample M-Bus design