



## NXP energy measurement IC EM783

# Application processor for energy measurement with metrology engine

Available in a number of variants that support different configurations, this highly integrated yet low-cost application processor uses a powerful ARM Cortex-M0 core and delivers accuracy up to 1%.

### KEY FEATURES

- ▶ Up to 1% accuracy metrology engine
- ▶ Dynamic range up to 1,000: 1 below the maximum current load
- ▶ Multiple variants for design flexibility: single- and multi-channel, single- and three-phase
- ▶ Configurable uptime for period of measurement
- ▶ Power line frequency detection and tracking of power-line frequency
- ▶ Built-in temperature sensor with accuracy to within 3 °C.
- ▶ ARM Cortex-M0 (up to 48 MHz)
- ▶ 4 kB on-chip EEPROM for calibration parameters and energy consumption log
- ▶ 32 kB flash memory
- ▶ 8 kB SRAM memory
- ▶ Integrated serial peripherals (UART, SPI, I2C, GPIO, counter/ timer, watchdog timer)
- ▶ Up to 22 GPIOs depending on the number of peripherals used
- ▶ 33-pin HVQFN package

### KEY APPLICATIONS

- ▶ Smart plugs and plug meters
- ▶ Single-phase residential meters
- ▶ DALI/DMX and KNX nodes with metering functionality
- ▶ Industrial sub-meters
- ▶ Power monitors for servers
- ▶ Smart appliances

### GENERAL DESCRIPTION

The EM783 is an application processor for energy measurement. It includes a built-in metrology engine with an accuracy of up to 1%, and is available in several variants to support a range configuration requirements. Each variant is built around a low-power, cost-effective, industry-standard ARM Cortex-M0 core that runs at up to 48 MHz and includes 4 kB of EEPROM, 32 kB of flash, 8 kB of SRAM, and a number of serial peripherals. Each variant also includes an on-chip temperature sensor. The variants are configured for single-channel (SC), single-phase (SP), three-phase (TP), and multi-channel (MC) operation. The SP variant, for example, is an ideal fit for billing-grade, single-phase electricity meters.



With a scalable input source of 120 or 230 V and a power-line frequency of between 45 and 65 Hz, the EM783 delivers an accuracy of 1%. It maintains this accuracy over a dynamic range of 1,000:1 below the maximum current load.

The device performs a number of calculations: power in W, reactive power in VAR, apparent power in VA, power factor, Vrms, Irms, THD, and power-line frequency. It can compensate for temperature variations and can store calibration data in the on-chip EEPROM.

The EM783 runs an open-source application that generates kWh data, and works with an easy-to-use API that lets the designer initialize, start, stop, and read data from the Cortex-M0 CPU.

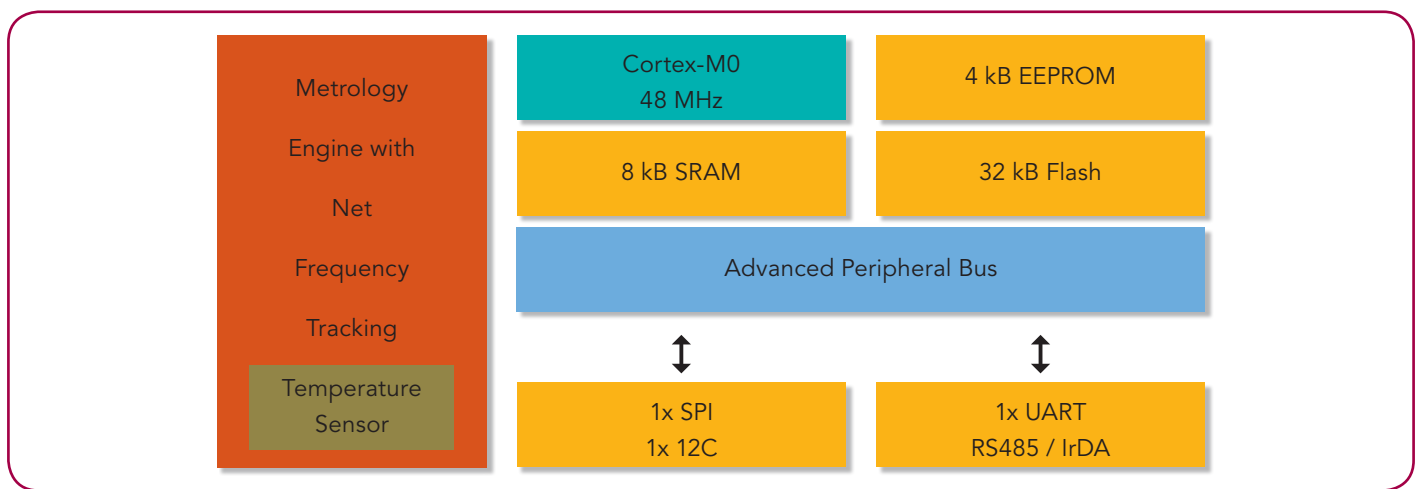
## DEVELOPMENT PLATFORM

For fast time-to-market, NXP offers a complete EM783 development platform that supports single- and multi-channel applications.

The development platform includes an evaluation board equipped with an LCD panel and a USB interface. The designer can view metrology data directly on the board's LCD panel or, with the board connected to a PC, can use the platform's PC application to generate graphs for voltage, current, harmonics, and so on.

Portions of the development platform, including the application software, a schematic of the EM783 evaluation board, and the PC application, are available for download, free of charge. Please contact NXP for details.

## EM783 block diagram



## Selection guide

Product	Type	I/U channels	Accuracy	SRAM	Flash	CPU (minimum)
EM783-SC	Single-channel	1x current, 1x voltage	1%	7.5 KB	28 KB	24 MHz
EM783-SP	Single-phase	2x current, 1x voltage	1%	7.2 KB	26 KB	24 MHz
EM783-MC3	Multi-channel	3x current, 1x voltage	1%	7.2 KB	26 KB	36 MHz
EM783-TP	Three-phase	3x current, 3x voltage	2%	6.5 KB	24 KB	36 MHz
EM783-MC6	Multi-channel	6x current, 1x voltage	2%	6.5 KB	24 KB	36 MHz

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