



NXP ARM® Cortex™-M3 MCUs LPC1500 series

Motion control – simplified

Equipped with an optimized motion-control unit comprised of interconnected 2 Msps ADCs, high-speed PWMs with dead time, on-chip comparators, and a Cortex-M3 core, these advanced MCUs simplify development and reduce time-to-market for sensed and sensorless motion-control applications in industrial and consumer segments.

KEY FEATURES

- ▶ 72-MHz ARM Cortex-M3
- ▶ Operating voltage: 2.4 to 3.6 V
- ▶ Up to 256 kB Flash
- ▶ Up to 36 kB SRAM
- ▶ 4 kB EEPROM with EEPROM ROM drivers
- ▶ Serial interfaces: C_CAN controller, FS USB with PHY, three USART, one I²C, two SPI
- ▶ State-configurable timer and PWM block (SCTimer/PWM) for advanced control functions
- ▶ Two 12-bit ADCs, one 12-bit DAC, and four comparators
- ▶ 18-channel DMA engine
- ▶ Quadrature Encoder Interface (QEI)
- ▶ ROM API support
- ▶ Up to 78 GPIO
- ▶ Extended temp range of -40 to +105 °C
- ▶ Compact LQFP package

TARGET APPLICATIONS

- ▶ Motion drives
- ▶ Motor control
- ▶ Digital power supplies
- ▶ Solar inverters
- ▶ Home appliances
- ▶ Building and factory automation
- ▶ Industrial and medical

The NXP LPC1500 series are 32-bit microcontrollers that integrate an extensive set of motion-control peripherals. They include special features for sensorless and sensed operation, and can control two motors simultaneously. They enable simpler development, with faster time-to-market, for cost-optimized, low-power systems that deliver advanced performance.

Each LPC1500 MCU is equipped with a PWM/timer subsystem that includes a total of four state-configurable timers (SCTimer/PWMs), a peripheral function exclusive to NXP that makes it easy to configure the advanced PWM and timing functions necessary for motion control. The on-chip QEI is ideal for applications that use sensed motion control.

Each LPC1500 device has two ADCs, each supporting a resolution of up to 12 bits and a fast conversion rate of up to 2 MHz. The ADCs are supported by a 12-bit DAC and four analog comparators. Sequences of A-to-D conversions can be triggered by multiple sources, including internal connections to other on-chip peripherals such as the SCTimer/PWM and analog comparator outputs. A temperature sensor completes this sophisticated analog subsystem.

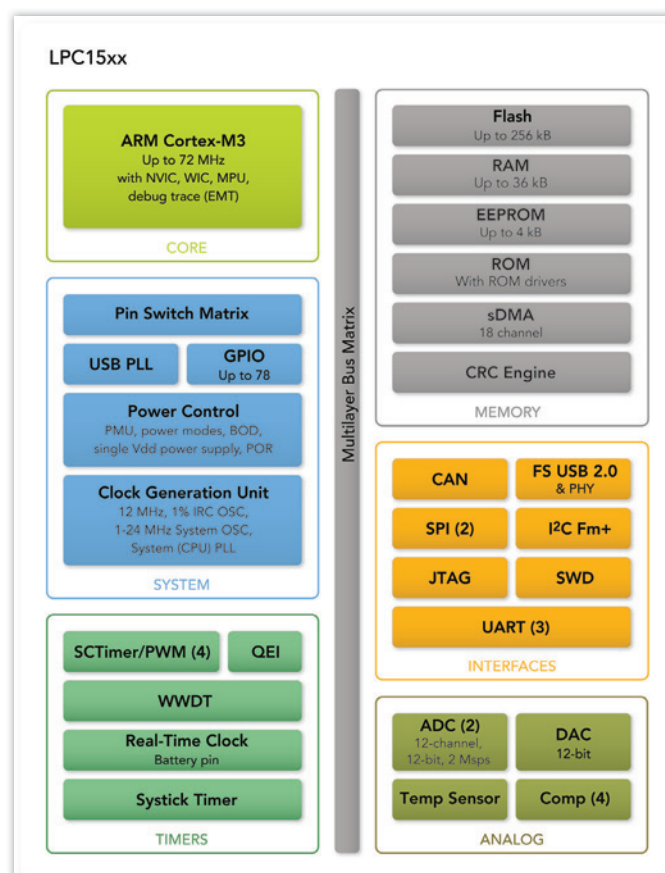


The DMA controller, which has 18 channels and 20 programmable input triggers, services memory and peripheral resources.

Putting special functions in ROM helps improve time-to-market, reduce code size, and simplify development. Pre-loaded into the ROM are a boot loader, In-System Programming (ISP) and In-Application Programming (IAP) support for Flash (with an IAP erase command), and for EEPROM. There are ROM-based USB drivers and USB-compliant stacks for HID, CDC, and MS classes, as well as C_CAN drivers. Flash updates via USB and C_CAN are also supported. There are ROM-based drivers for USART, I²C, and DMA ROM-based power profiles configure power consumption, PLL settings, and power-saving modes.

To simplify the development of motion-control applications, the LPC1500 is equipped with “Quick Drive” firmware, which demonstrates sensed and sensorless motion-control functions. The firmware uses a fast Field Oriented Control (FOC) algorithm and a PI loop controller to maintain speed and torque, and minimize the code footprint.

The LPC1500 series is supported by NXP’s LPCXpresso IDE v6, a cross-platform C/C++ development suite that supports all of NXP’s LPC microcontrollers.



Selection guide

Feature*	LPC1517	LPC1518	LPC1519	LPC1547	LPC1548	LPC1549
Flash (kB)	64	128	256	64	128	256
SRAM (kB)	12	20	36	12	20	36
Full-Speed USB with PHY	-	-	-	1	1	1
2 MHz ADC (bit/channel)	2x 12-ch/12 b	2x 12-ch/12 b	2x 12/12	2x 12-ch/12 b	2x 12/12	2x 12/12
Packages	LQFP48/64	LQFP64/100	LQFP64/100	LQFP48/64	LQFP64/100	LQFP48/64/100

* Common features: CAN, I²C, SPI, UART, four SCTimer/PWMs, four comparators, 12-bit DAC, QEI, CRC engine

LPCware: www.lpcware.com

LPCXpresso: www.nxp.com/lpcxpresso/home

www.nxp.com/microcontrollers

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