



120 MHz, 32-bit  
MCUs with Cortex-M3™  
core LPC177x / LPC178x  
series

## MCUs with external memory bus, Ethernet, USB, and optional LCD

The LPC177x / LPC178x series of low-power, cost-effective microcontrollers feature up to 512 KB Flash, 96 KB SRAM, 4 KB EEPROM and a wide assortment of connectivity peripherals, including up to five UARTs, three SPI/SSP, and three I<sup>2</sup>C.

### Key Features

- ▶ ARM Cortex-M3 Core
  - Up to 120 MHz operation
  - Nested Vectored Interrupt Controller (NVIC) for fast deterministic interrupts
  - Wakeup interrupt controller allows automatic wake from any priority interrupt
  - Memory Protection Unit (MPU)
  - Four reduced-power modes: Sleep, Deep-sleep, Power-down, and Deep power-down
- ▶ Memories
  - Up to 512 KB Flash memory
  - Up to 96 KB SRAM
  - Up to 4 KB EEPROM
- ▶ Serial Peripherals
  - 10/100 Ethernet MAC
  - USB 2.0 full-speed device/host/OTG controller with on-chip PHY
  - Four UARTs & one USART with fractional baud rate generation, RS-485, smart card (ISO7816-3) mode, modem control I/O, and IrDA
  - Two CAN 2.0B controllers
  - Three SSP/SPI controllers
  - Three I<sup>2</sup>C-bus interfaces with one supporting Fast-mode Plus (1 Mbit/s data rates)
  - I<sup>2</sup>S interface for digital audio
- ▶ Analog Peripherals
  - 12-bit analog-to-digital converter with eight channels
  - 10-bit digital-to-analog converter
- ▶ Other Peripherals
  - Low-power Real-Time Clock
  - Eight-channel, general-purpose DMA controller
  - Up to 165 GPIO
  - Motor control PWM and quadrature encoder interface
  - Four 32-bit general-purpose timers/counters with eight capture/ten compare outputs
  - 12 MHz internal RC oscillator trimmed to 1% accuracy

The NXP LPC177x and LPC178x series use a low-power, cost-effective Cortex-M3 core that operates at up to 120 MHz. Each device has up to 512 KB of Flash and up to 96 KB of SRAM. The LPC177x/LPC178x series features a multi-layer AHB bus that allows high-bandwidth peripherals such as Ethernet and USB to run simultaneously, without impacting performance.



The LPC177x/LPC178x devices are available in LQFP packages with 144 or 208 pins and in TFBGA packages with 180 or 208 pins. LPC177x/LPC178x series are pin-compatible with the popular NXP LPC2400 and LPC237x/8x series of ARM7 microcontrollers. This gives designers a simple way to compare Cortex-M3 and ARM7 cores in the same socket,

so they can choose the best device for their application. The LPC1700 architecture, with its wide array of peripheral and high performance, is ideal for displays, scanners, industrial networking, alarm systems, medical diagnostics, and motor-control applications.

## Selector Guide

| Type Number                     | Flash (KB) | CPU SRAM (KB) | Peripheral SRAM (KB) | Total SRAM (KB) | EEPROM (KB) | Ethernet | USB   | UART | EMC <sup>(1)</sup> | LCD | QEI | SD/MMC |
|---------------------------------|------------|---------------|----------------------|-----------------|-------------|----------|-------|------|--------------------|-----|-----|--------|
| <b>LPC178x</b>                  |            |               |                      |                 |             |          |       |      |                    |     |     |        |
| LPC1788FBD208/<br>LPC1788FET208 | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 32-bit             | Y   | Y   | Y      |
| LPC1788FET180                   | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 16-bit             | Y   | Y   | Y      |
| LPC1788FBD144                   | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 8-bit              | Y   | Y   | Y      |
| LPC1787FBD208                   | 512        | 64            | 16 X 2               | 96              | 4           | N        | H/O/D | 5    | 32-bit             | Y   | Y   | Y      |
| LPC1786FBD208                   | 256        | 64            | 16                   | 80              | 4           | Y        | H/O/D | 5    | 32-bit             | Y   | Y   | Y      |
| LPC1785FBD208                   | 256        | 64            | 16                   | 80              | 4           | N        | H/O/D | 5    | 32-bit             | Y   | N   | Y      |
| <b>LPC177x</b>                  |            |               |                      |                 |             |          |       |      |                    |     |     |        |
| LPC1778FBD208/<br>LPC1778FET208 | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 32-bit             | N   | Y   | Y      |
| LPC1778FET180                   | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 16-bit             | N   | Y   | Y      |
| LPC1778FBD144                   | 512        | 64            | 16 X 2               | 96              | 4           | Y        | H/O/D | 5    | 8-bit              | N   | Y   | Y      |
| LPC1777FBD208                   | 512        | 64            | 16 X 2               | 96              | 4           | N        | H/O/D | 5    | 32-bit             | N   | Y   | Y      |
| LPC1776FBD208                   | 256        | 64            | 16                   | 80              | 4           | Y        | H/O/D | 5    | 32-bit             | N   | Y   | Y      |
| LPC1776FET180                   | 256        | 64            | 16                   | 80              | 4           | Y        | H/O/D | 5    | 16-bit             | N   | Y   | Y      |
| LPC1774FBD208                   | 128        | 32            | 8                    | 40              | 2           | N        | D     | 5    | 32-bit             | N   | N   | N      |
| LPC1774FBD144                   | 128        | 32            | 8                    | 40              | 2           | N        | D     | 4    | 8-bit              | N   | N   | N      |

All parts include two CAN channels, a SPIFI interface, three SSP interfaces, three I<sup>2</sup>C interfaces, one I<sup>2</sup>S interface, interface, one DAC, and an 8-channel, 12-bit ADC.

<sup>(1)</sup> Maximum data bus width of the External Memory Controller (EMC) depends on package size. Smaller widths may be used.

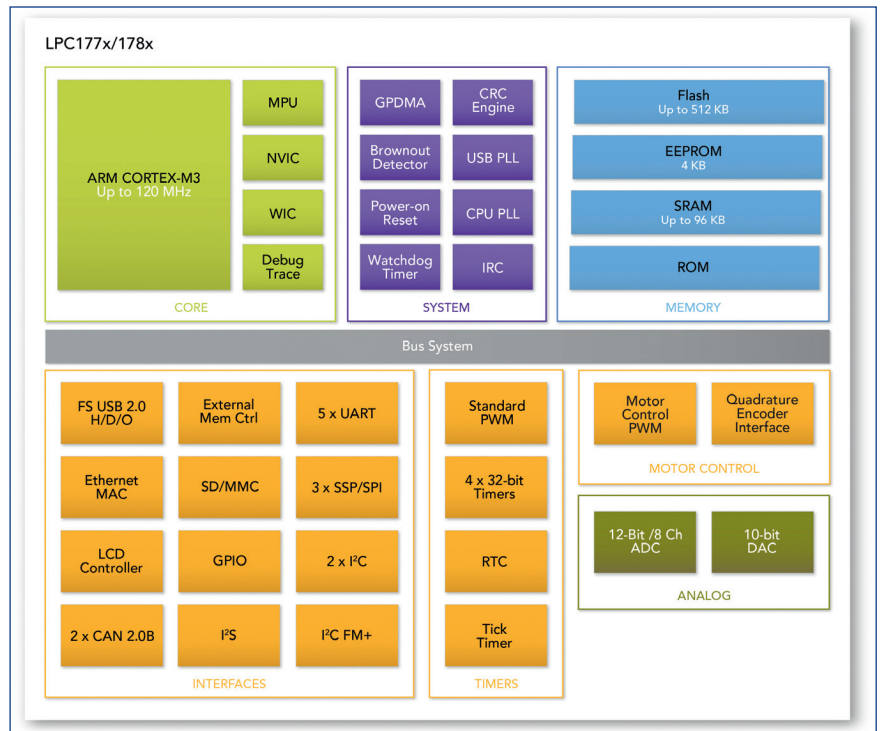
## Third-Party Development Tools

The following featured development development tools support the LPC177x/8x series:

- ▶ Evaluation Boards
  - Embedded Artists
  - IAR KSDK-LPC178x
- ▶ IDEs
  - NXP LPCXpresso
  - Hitex HiTOP IDE
  - IAR Embedded Workbench for ARM (EWARM)
  - Keil μVision3
  - CodeRed Eclipse-based Red Suite
  - NXP LPCXpresso
- ▶ JTAG debuggers
  - All debuggers supporting Cortex-M3

For more information on our development tools please visit [www.nxp.com/microcontrollers](http://www.nxp.com/microcontrollers)

## LPC177x/8x block diagram



[www.nxp.com](http://www.nxp.com)

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