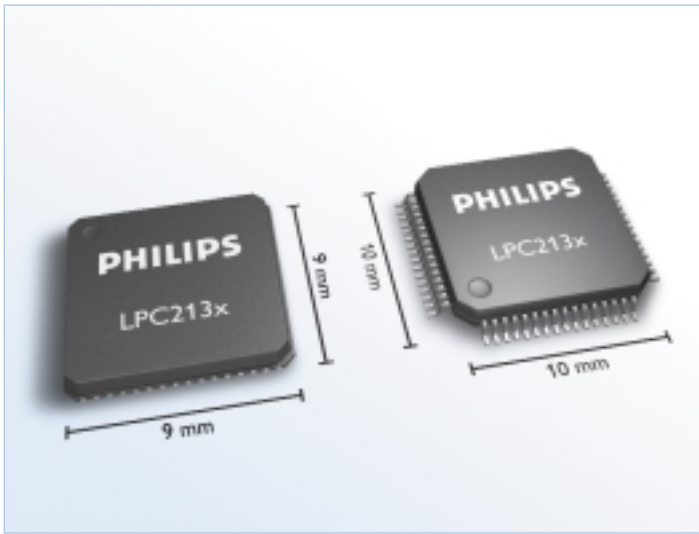


# LPC213x family

## Tiny 32-bit ARM7TDMI-S™ processors with ADC and DAC

These tiny ARM-based microcontrollers, optimized for low power consumption, improve performance in a variety of industrial, medical, communication, and general-purpose applications. Integrating 512 KB of on-chip Flash, up to 32 KB of on-chip RAM, and up to two 10-bit ADCs.



### Key Features

- 60-MHz operation from single-chip 32-bit ARM7TDMI-S processor
  - LPC2131 with 32KB Flash, 8KB RAM, 1x 10-bit ADC, and low-power options
  - LPC2132 with 64 KB Flash, 16 KB RAM, 1x 10-bit ADC, 10-bit DAC, and low-power options
  - LPC2134 with 128K Flash, 16 KB RAM, 2x 10-bit ADC, 10-bit DAC, and low power options
  - LPC2136 with 256K Flash, 32 KB RAM, 2x 10-bit ADC, 10-bit DAC, and low power options
  - LPC2138 with 512 KB Flash, 32 KB RAM, 2x 10-bit ADCs, 10-bit DAC, and low-power options
- Optional 16-bit Thumb Mode for critical code-size applications
- Very fast Flash programming via on-chip boot-loader software
- Two 32-bit timers, PWM unit, real-time clock, watchdog timer
- Multiple serial interfaces: two UARTs, two Fast I<sup>2</sup>C-bus, two SPI
- Temperature range: -40 °C to +85 °C
- Tiny HVQFN64 or LQFP64 package (9 mm x 9 mm or 10 mm x 10 mm)

### Applications

- Access control, point-of-sale, industrial control, medical systems
- Communication gateways, protocol converters, embedded soft modems
- General-purpose applications



These 32-bit ARM7TDMI-S microcontrollers, housed in tiny LQFP or HVQFN packages, use a 128-bit-wide memory interface and a unique accelerator architecture to enable 32-bit code execution at a maximum clock rate of 60 MHz. For code-size critical applications, they use an alternative 16-bit Thumb Mode that reduces code by more than 30% with minimal performance penalty.

The initial part in the family is the LPC2138. Optimized for low-power operation, it has 512 kB of Flash and 32 kB of SRAM. There are two 8-channel 10-bit A/D converters (for a total of 16 analog inputs) with conversion times as low as 2.44  $\mu$ s per channel. It has a 10-bit D/A converter for generating variable analog outputs and offers up to forty-seven 5V-tolerant GPIO. It uses a single power supply with POR (Power On Reset) and BOD (Brown Out Detection) circuits. The real-time clock uses independent power and clock supplies, so power consumption in the power-save modes is extremely low. It has a CPU operating voltage range of 3.0V to 3.6V (3.3V  $\pm$ 10%).

In-System (ISP) and In-Application (IAP) software minimize programming time — each 256-byte line takes only 1 ms to program, while single selector or full-chip erases take only 400 ms.

It has a Vectored Interrupt Controller (VIC), and uses Embedded ICE-RT and ETM (Embedded Trace Macrocell) to provide extensive, real-time debug capabilities.

There are two 32-bit timers (with four capture and four compare channels each), a PWM unit (with 6 outputs), a real-time clock, and a watchdog timer. Multiple serial interfaces, including two UARTs (16C550), two Fast I<sup>2</sup>C (400 kbps) and two SPI serial interfaces (one with buffering and variable data-length capabilities), increase design flexibility.

# PHILIPS

# LPC213x family

Tiny 32-bit ARM7TDMI-S processors with ADC and DAC



32 / 64 / 128 / 256 / 512 KB ISP IAP 128-b wide FLASH	E-ICE / RTM Interface Embedded Trace
8 / 16 / 32 KB SRAM	Vectored Interrupt Controller
AHB Interface 32-bit ARM7TDMI-S™ APB Interface	
Power Management, RTC, WDT, PLL	
2 x 8 Channel 10-bit A/D Converter (LPC2134, LPC2136 and LPC2138) 1 x 8 Channel 10-bit A/D Converter (LPC2132) 1-Channel 10-bit DAC (no DAC on LPC2131)	
Capture / Compare Timer 0 / 1	PWM
UART0	2 x I <sup>2</sup> C
UART1 (Modem Control LPC2138/2136/2134 only)	SPI 0, 1
I/O Ports (47)	

LPC213x block diagram



Purchase of Philips I<sup>2</sup>C components conveys a license under the Philips' patent to use the components in the I<sup>2</sup>C system provided the system conforms to the I<sup>2</sup>C specification defined by Philips.



## Third-party development tools

Through third-party suppliers, Philips offers an extensive portfolio of development tools for these microcontrollers. For the most current listing, please visit [www.semiconductors.philips.com/markets/mms/products/microcontrollers/support/development\\_tools/](http://www.semiconductors.philips.com/markets/mms/products/microcontrollers/support/development_tools/) for the most current list of available tools.

## Development tool support selection

Tool Name	Vendor	Tool Name	Vendor
<b>Emulators</b>		<b>Integrated Development Environment</b>	
Multi-ICE	ARM	ADS	ARM
MultiTrace	ARM	RealView	ARM
RealView ICE	ARM	AsIDE ARM	Ashling
Genia	Ashling	MULTI	Green Hills
Opella	Ashling	Embedded Workbench	IAR Systems
Vitra	Ashling	Vision3	Keil
Tanto	Hitex	Crossworks	Rowley
j-link	IAR Systems	<b>Monitors/Debuggers/Simulators</b>	
ULINK	Keil	PathFinder-2100	Ashling
TRACE32-ICD	Lauterbach	C-SPY	IAR Systems
TRACE32-PowerTrace	Lauterbach	Vision3	Keil
EMUL-ARM-PC	Nohau	'Seehau'	Nohau
JTAGjet	Signum	Universal Debug Engine	PLS
<b>Development &amp; Evaluation Boards</b>		Chameleon	Signum Systems
MCB2130	Keil	<b>Real-Time Operating Systems</b>	
<b>In-Systems Programming Software</b>		ChronOS	Interniche
Flash ISP Utility	Philips	C/OSII	Micrium
		<b>TCP/IP Stacks</b>	
		NicheStack	Interniche

## Philips Semiconductors

Philips Semiconductors is a worldwide company with over 100 sales offices in more than 50 countries. For a complete up-to-date list of our sales offices please e-mail [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com).

A complete list will be sent to you automatically.

You can also visit our website <http://www.semiconductors.philips.com/sales>

© Koninklijke Philips Electronics N.V. 2005

SCL76

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release: April 2005

document order number: 9397 750 14627

Published in USA