

Fast and Connected ARM7® for Lighting Control Systems



NXP Semiconductors' newest entry in a growing line of ARM7® microcontrollers is a perfect fit for "Connected Lighting Controller" applications. NXP combines the high-performance connectivity of a dual-AHB architecture, enlightened combinations of peripherals (Ethernet, USB OTG, and CAN) with unique, fast, and deterministic I/O ports. With the embedded Ethernet MAC and the feature-rich serial ports, designers can use the LPC24xx as a bridge from IP to DMX512. The fast I/O ports are perfect for software-based PWM intensity control of light sources. Add an external LCD controller and gain the potential for a cost-effective touchscreen lighting scene controller.

Features ▶

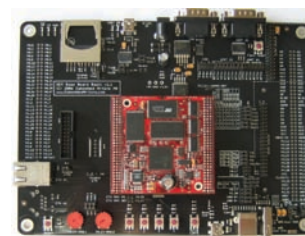
- 72 MHz, 32-bit ARM7TDMI-S with dual-AHB buses and DMA
- Fast I/O suitable for bit-banging PWM outputs at up to 17.5 MHz
- 10/100 Ethernet MAC interface with DMA and MII/RMII interface
- Wide range of peripherals, including CAN, I²S, ADC, and PWM

Benefits ▶

- Dual buses with DMA allow concurrent transactions to get the most performance possible
- External interfaces provide flexibility regarding peripherals and memory
- Give customers the flexibility of lighting control with Ethernet

Applications ▶

- Architectural or landscape lighting
- Signage and gaming
- DMX512-to-Ethernet bridges



LPC2468 demo board (OM10010)

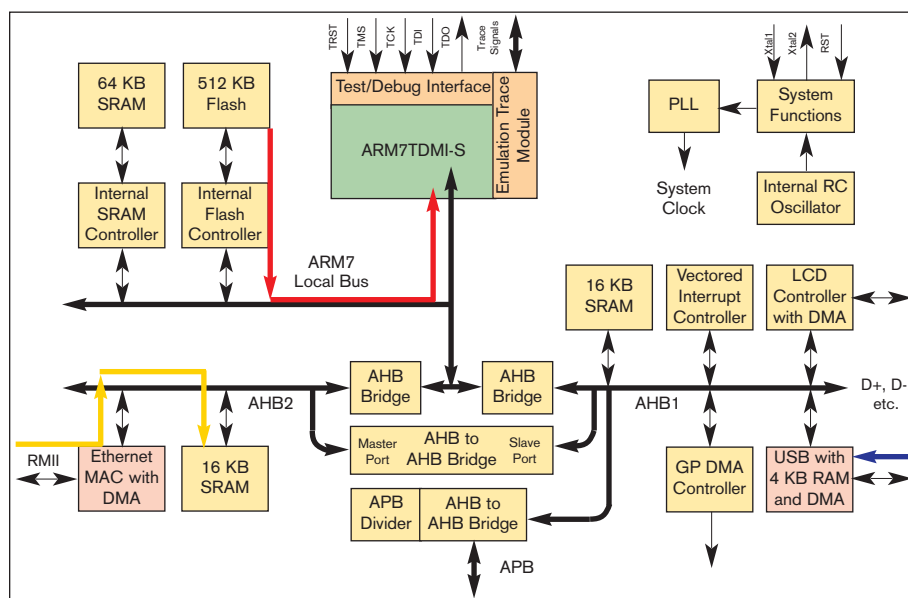
Product Specifications ▶

Part Number	Type	PWM Ch. (#)/ Res. (bits)	Flash (KB)	RAM (KB)	ZigBee® Enabled (Y/N)	Core Supply (V)	IO Supply (V)	I ² C/Ch. (#)	UART/Ch. (#)	SPI/Ch. (#)	Operating Temperature (°C)	Markets
LPC2460	General purpose ARM7® microcontroller with Ethernet, USB, and CAN	HW: 2 PWM/4 timers SW: Scalable	-	98	N	3.0-3.6	3.0-3.6	3	4	3	-40 to +85	CL TR BL SI
LPC2468		HW: 2 PWM/4 timers SW: Scalable	512	98	N	3.0-3.6	3.0-3.6	3	4	3	-40 to +85	CL TR BL SI

MARKETS LEGEND

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Development software required



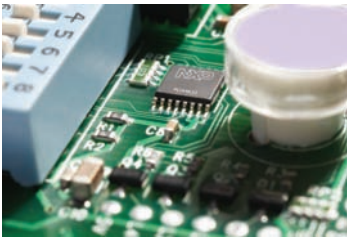
Two AHB buses with three DMA engines allow concurrent transactions for high performance





I²C LED Color Controllers

NXP Semiconductors offers a wide-variety of LED color controllers based on the I²C control bus. I²C provides easy connectivity while the integrated PWMs provide smooth color control. Drive quickly changing displays with the new PCA963x when using the fast-mode plus I²C protocol for I²C speeds up to 1 MHz and 10x the drive on the I²C bus for large networks. Set each LED to a specific brightness and dim or blink all of them with the same value. Special I²C command features optimize I²C bus commands in multi-LED control applications.



Color-mixing RGB LED drivers for mobile, entertainment, and architectural lighting

Features ▶

- I²C provides a software scalable architecture; many devices allow 126 nodes on a single bus
- Each output provides up to 25 mA of sink current and 5V tolerant outputs
- 8-bit PWMs on all devices with the PCA963x devices providing an 8-bit global PWM
- Small packages available including SO, TSSOP/MSOP, HVQFN, and HVSON
- New "sub call" command in the PCA963x devices

Benefits ▶

- Easily connects nodes in a multi-drop configuration
- High sink current, 5V tolerance is suitable for driving large transistors or constant-current sources
- 256 levels of brightness control on all devices with the PCA963x devices providing 256 levels of global brightness or blinking
- Small packages allow use in portable applications or space-constrained lighting modules
- Controls color of all devices (or four groups of devices) with a single I²C command sequence (PCA963x devices)

Applications ▶

- Architectural or landscape lighting
- Signage and gaming
- LCD backlights
- LCD or keypad backlights
- Hands-free device status indicators

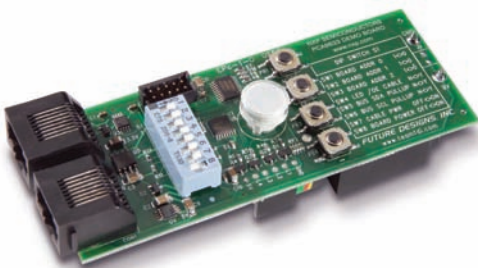
Product Specifications ▶

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PCA9530	I ² C LED dimmer 2 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9531	I ² C LED dimmer 8 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9532	I ² C LED dimmer 16 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9533	I ² C LED dimmer 4 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9550	I ² C LED blinker 2 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9551	I ² C LED blinker 8 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9552	I ² C LED blinker 16 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9553	I ² C LED blinker 4 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9633	I ² C LED color controller-4 outputs 1 MHz fast-mode plus	4/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9634	I ² C LED color controller-8 outputs 1 MHz fast-mode plus	8/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9635	I ² C LED color controller-16 outputs 1 MHz fast-mode plus	16/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI

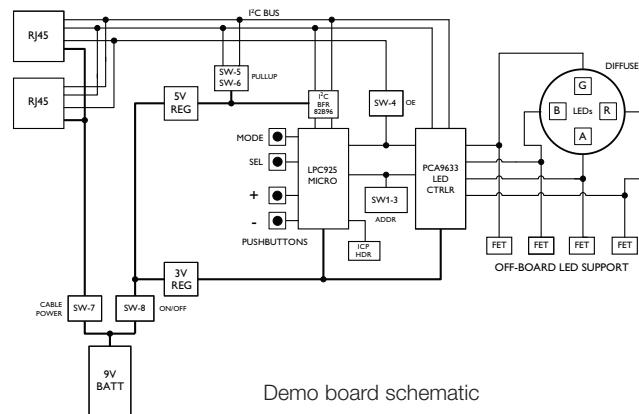
MARKETS LEGEND

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Development software required



The PCA9633 demo board drives and mixes four LED colors (RGBA) to easily demonstrate networked I²C for signage and architectural lighting applications; order number OM6276



ZigBee® Wireless Lighting Control

ZigBee® is a standard for low-power wireless mesh networks intended for monitoring and control. This makes ZigBee an ideal solution for lighting systems and enables users to fully control all lights and reduce energy costs. The ZigBee technology can be used in a number of application areas including home lighting, commercial lighting, industrial lighting, and street lighting.



Features ▶

- Low-power wireless mesh network
- Open global standard
- Based on well-known IEEE 802.15.4 specification
- Over air download

Benefits ▶

Low-Power Wireless Mesh Network

- Reliable and robust self-healing wireless network
- Ideal for battery-operated devices
- Easily extendable

Open Global Standard

- Multiple vendors with certified ZigBee® stacks available
- Standardized installation
- Suitable both for private networks and networks that require interoperability

Based on IEEE 802.15.4 Specification

- Excellent co-existence with Bluetooth® and Wi-Fi™
- Very small footprint for radios and system-on-chips
- A standardized radio ensures low-cost solutions
- Over air download: firmware can be upgraded in the field

Applications ▶

- General lighting control
- Home and building automation
- Industrial monitoring and control
- Sensor networks
- Meter reading

Product Specifications ▶

Part Number	Type	Input Voltage (V)	Over Air Data Rate (kbps)	Data Throughput (kbps)	Frequency (Hz)	Power Consumption	Range (Meters)	System Resources (KB)	Markets
CC2520	Transceiver	1.8-3.6	250	40-150	2,394 MHz-2,507 MHz	RX: 18.5 mA/sleep: <1 uA	10-400	2x 128 byte RX/TX FIFOs	CL
CC2430	System-on-chip	2.0-3.6	250	40-150	2,400 MHz-2,483 MHz	RX: 27 mA/sleep: <1 uA	10-100	4+4 kB SRAM/128 kB Flash	CL
CC2480	Network processor	2.0-3.6	250	40-150	2,400 MHz-2,483 MHz	RX: 27 mA, sleep: <1 uA	10-100	-	CL

MARKETS LEGEND

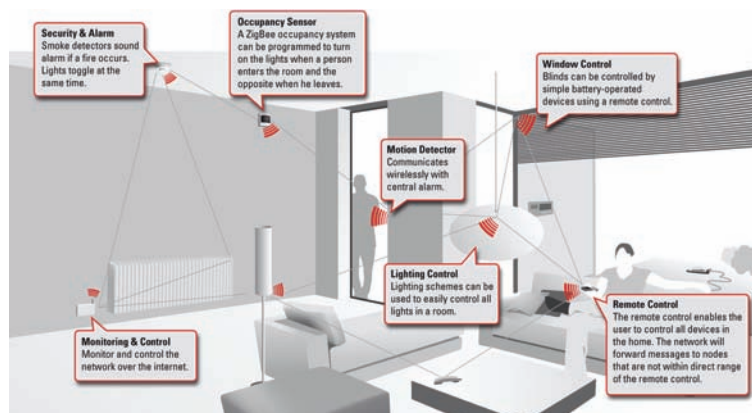
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Software ▶

In addition to hardware, TI offers a ZigBee® and ZigBee Pro compliant ZigBee protocol stack, the Z-Stack. We offer the full ZigBee stack free of charge: Z-Stack version 2.1.0, including Home Automation Profile

Development Tools

Part Number	Development Tool
CC2520	CC2520DK
CC2430	CC2430ZDK
CC2480	eZ430-RF2480



This Arrow sponsored Texas Instruments Analog eLab™ Videocast series partners with Cree, a leader in high-brightness and lighting-class LEDs, and focuses on solid-state lighting along with specific applications like solar powered lighting, cove lighting, and MR16 lamp replacement. Visit www.arrow.com/TIeLabsCree for the latest video; there will be a new videocast launched each week.



TMS320C2000™ High-Performance 32-bit Microcontrollers

C2000 MCUs can control not only the power stage, but regulate LED currents as well, eliminating the need for multiple controllers and reducing system cost. On-chip control peripherals allow accurate voltage and current regulation for precise light intensity and color mixing, temperature monitoring to prevent thermal runaway, intelligent/adaptive dimming, and fault detection (over voltage/current, blown string). C2000 also enables communication with external systems via power-line communication (PLC) or wireless technology, and interfaces with other devices via on-chip serial communication peripherals.



Features ▶

- 40 MHz to 150 MHz C28x core
- 32 KB to 512 KB Flash, 12 KB to 68 KB RAM
- Up to 16 hi-res PWM channels with 150 ps resolution
- 12-bit ADC with up to 16 ADC channels and 12.5 MSPS
- SPI, SCI, CAN, I²C, McBSP, and XINT

Benefits ▶

- Single controller simplifies design and reduces cost
- Precise LED lighting control
- Increased flexibility and additional functionality through software
- Communication with external systems and devices

Applications ▶

- LED street lighting
- LED backlighting
- LED displays
- Automobile lights

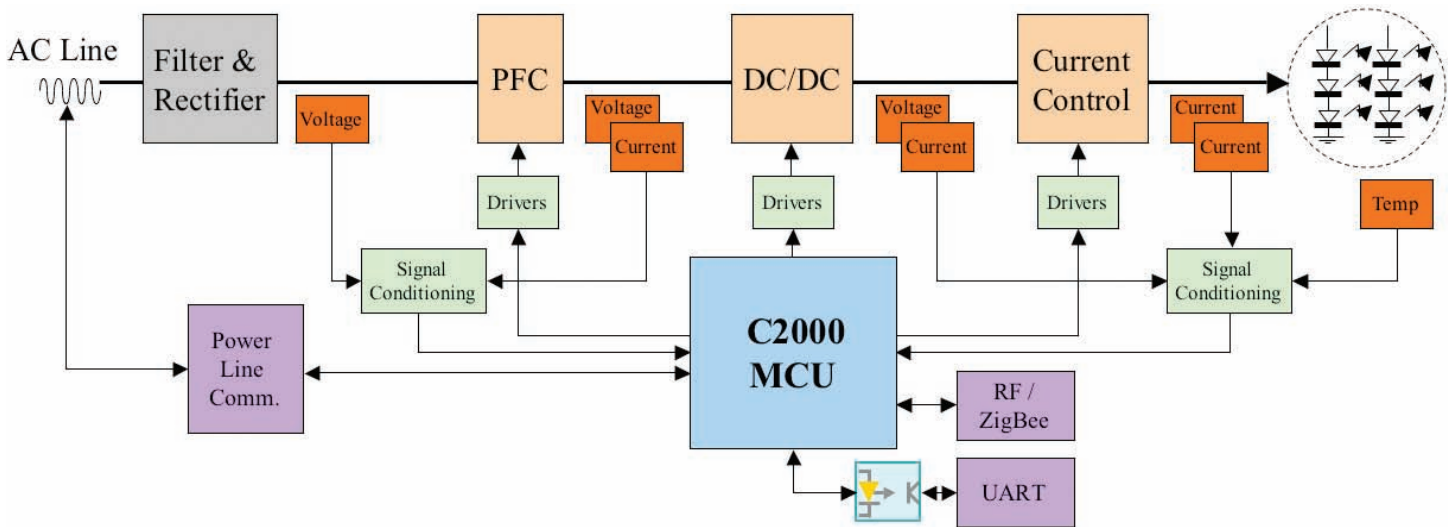
Product Specifications ▶

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TMS320F28023	38 TSSOP/48 LQFP	8/15	64	12	N	1.8	3.3	1	1	1	-40 to +125	CL TR BL SI
TMS320F28027		8/15	64	12	N	1.8	3.3	1	1	1	-40 to +125	CL TR BL SI
TMS320F28035	64 TQFP/80 LQFP	14/15	128	20	N	1.8	3.3	1	2	2	-40 to +125	CL TR BL SI
TMS320F2808	100 LQFP/100 BGA	16/15	128	36	N	1.8	3.3	1	4	3	-40 to +125	CL TR BL SI

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C2000 LED Lighting SBD



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