nanoWatt XLP eXtreme Low Power PIC® Microcontrollers

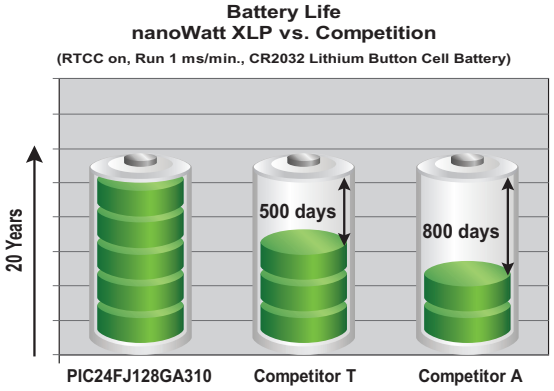
Looking Beyond Low Power MCUs

Summary

As more electronic applications require low power or battery power, energy conservation becomes paramount. Today's applications must consume little power and, in extreme cases, last for up to 15–20 years while running from a single battery. To enable applications like these, products with Microchip's nanoWatt XLP Technology offer the industry's lowest currents for Run and Sleep, where extreme low power applications spend 90–99% of their time.

Benefits of nanoWatt XLP Technology:

- Sleep currents as low as 9 nA
- Brown-out Reset down to 45 nA
- Watch-dog Timer down to 200 nA
- Real-Time Clock/Calendar down to 400 nA
- Run currents down to 35 µA/MHz
- Full analog and self-write capability down to 1.8V
- VBAT: Battery backed RTCC



Example Applications

Battery

- Utility metering
- Asset tracking
- Electronic locks
- Portable medical
- Smoke/CO_2 detectors
- Irrigation systems
- Thermostats
- Security systems/sensors
- Remote keyless entry
- Consumer

Green Initiatives

- Compliance with regulations
- Appliances
- Home electronics

Energy Harvesting

- Wireless switches
- Battery-free sensors
- Wireless sensor networks
- RF powered sensors

Low Power Peripheral Integration

Many of today's low power products need advanced peripherals. Microchip offers low power devices with peripherals like USB, LCD, op amp, CLC, MCCP, RTCC and mTouch™ capacitive sensing. This eliminates the need for additional parts in the application, saving cost, current and complexity.

Low Power Safety

Products with nanoWatt XLP have system supervisory circuits specially designed for battery powered products.

- The Low Power Brown-out Reset protects applications when batteries are depleted or changed, yet consumes a tiny 45 nA of current
- The Real-Time Clock/Calendar is a fully independent module that is unaffected by device resets
- Using a dedicated on-chip oscillator, the WDT provides protection against system failure for around 200 nA with programmable time-outs lasting up to 25 days

XLP Battery Life Estimator (Free Download)

The XLP Battery Life Estimator is free PC software to aid in developing eXtreme Low Power applications with Microchip's PIC MCUs featuring XLP technology. The utility allows users to select the target MCU and battery type, as well as input the current generated by the rest of the application. It models the active current, sleep current, and the time spent in each mode to provide an estimate of battery life.

- Easy to use
  - Select your PIC MCU with XLP technology
  - Select your battery type
  - Enter application Run and Sleep times
  - Select peripherals and input application currents
  - View battery life, average and maximum current estimates
- Flexible
  - Customizable to allow new device profiles and battery specifications to be added
  - Save profiles and compare results

Visit the XLP design center at www.microchip.com/XLP for a complete list of XLP MCUs and datasheets, XLP development tools, low power app notes, case studies, tips and tricks, webinars, and videos showing XLP performance.

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nanoWatt XLP MCU Portfolio

With many pin, memory and peripheral combinations available, Microchip's nanoWatt XLP products have the right combination of features for your low power application.

PIC® XLP MCUs

Device		Flash Memory (KB)	Pins	Sleep (nA)	WDT (nA)	RTC (nA)	1 MHz Run (µA)
PIC16F14XX	Cap Sense, USB	14	14/16/20	25	290	–	25
PIC16F15XX	Cap Sense	14	28	20	300	600	35
PIC16F17XX	Cap Sense, PSMC	3.5–9	28/40/44	50	500	–	35
PIC16F18XX	Cap Sense	3.5–7	8–20	20	300	600	39
PIC16F19XX	Cap Sense, LCD	7–28	28/44	60	500	600	150
PIC18LFXK50	Cap Sense, USB	8–16	20	24	450	790	170
PIC18LF14K22	Cap Sense	8–16	20	34	460	650	150
PIC18F46J11	Cap Sense	16–64	28/44	13	813	813	272
PIC18F46J50	Cap Sense, USB	16–64	28/44	13	813	813	272
PIC18F87K90	Cap Sense, LCD	32–128	64/80	25	350	720	181
PIC18F97J94	Cap Sense, USB, LCD	32–128	64/80/100	80	290	400	100
PIC24F32KA304	Cap Sense	16–32	20/28/44	20	400	500	205
PIC24FJ64GA104	Cap Sense	32–64	28/44	20	220	520	250
PIC24FJ64GB004	Cap Sense, USB	32–64	28/44	20	220	520	250
PIC24FJ128GA310	Cap Sense, LCD	64–128	64/80/100	20	200	400	150
PIC24FJ128GC010	Cap Sense, USB, LCD	64–128	64/100	20	200	400	180

*Base sleep current included in WDT and/or RTC numbers. Typical I/O pin leakage current ±5 nA
All numbers are typical values at minimum V_{DD}, taken from the datasheet.

XLP 8-bit Development Board (DM240313)

This board enables development with the 8-bit family of PIC XLP MCUs.

- Supports PIC16 and PIC18 devices
- Enhanced prototyping:
  - LCD display, LEDs, resistive potentiometer, temperature sensor and EEPROM

XLP 16-bit Development Board (DM240311)

Designed with eXtreme low power in mind, this board enables development with the PIC24F family of 16-bit PIC XLP MCUs.

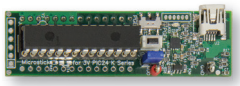
- Supports 20-/28-pin devices
- Easy Prototyping:
  - PICtail™ connector supports RF Modules, SD/MMC storage, speech playback modules and more
  - LEDs, capacitive and mechanical buttons, resistive potentiometer, temperature sensor and EEPROM

LCD Explorer Development Board (DM240314)

This board enables development with 16-bit family of PIC MCUs.

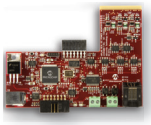
- Supports PIC24FJ 100-pin MCUs
- Flexible power options
- Enhanced prototyping:
  - 96 segments LCD display, LEDs, buttons and mTouch cap button
  - PICtail connector

Microstick for PIC24F K-Series (DM240013-1/2)



This flexible USB powered development platform is the perfect solution for those looking to get started with Microchip's lowest cost 16-bit PIC24F "KA", "KL" and "KM" microcontroller families.

MPLAB® REAL ICE™ In-Circuit Emulator Power Monitor (AC244008)



This development platform enables designers to identify and eliminate code that consumes high current, in real time. Combined with the MPLAB REAL ICE in-circuit emulator and MPLAB X IDE, it allows users to measure, graphically profile and optimize code power consumption for all of Microchip's 8-, 16- and 32-bit PIC microcontrollers.

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www.microchip.com/xlp

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Printed in the U.S.A. 10/13
DS30009941F