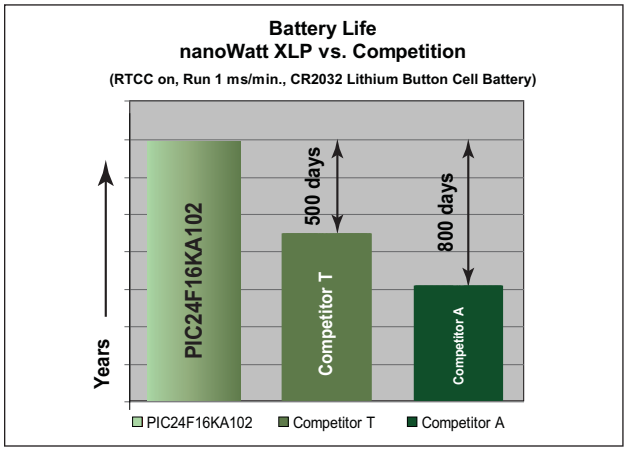
nanoWatt XLP eXtreme Low Power MCUs

Looking Beyond Low Power MCUs

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 Sleep, where extreme low power applications spend 90%-99% of their time.

Benefits of nanoWatt XLP Technology:

- Sleep currents down to 20 nA
- Brown-out Reset down to 45 nA
- Watch-dog Timer down to 400 nA
- Real-time Clock/Calendar down to 500 nA



Example Applications

Battery

- Utility Metering
- Asset Tracking
- Electronic Locks
- Portable Medical
- Smoke/CO2 Detectors
- Irrigation Systems
- Security Systems/ Sensors
- Remote Keyless Entry

Green Initiatives

- Compliance with Regulations
- Appliances
- Home Electronics

Energy Harvesting

- Wireless Switches
- Battery-less 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, RTCC and mTouch™ capacitive sensing. This eliminates the need for additional parts in the application, saving cost, current and complexity.

Low Power Safety

In addition to peripherals, products with nanoWatt XLP have system supervisory circuits specially designed for battery powered products.

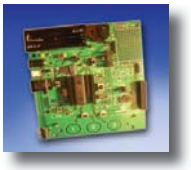
- The Deep Sleep Brown-out Reset protects applications when batteries are depleted or changed, yet consumes a tiny 45 nA of current
- The Real-time Clock Calendar is a fully independent module that is unaffected by device resets
- Using a dedicated on-chip oscillator, the WDT provides protection against system failure for less than 400 nA with programmable time-outs lasting up to 25 days

XLP Battery Life Estimator (Free Download)

The XLP Battery Life Estimator is a free software utility to aid in developing eXtreme Low Power applications with Microchip's PIC® MCUs featuring XLP technology. The tool estimates average current consumption and battery life. The utility allows users to select the target device, battery type, the application's operating conditions and model the active and power-down times for their applications.

- Pre-loaded with current specifications of all PIC® MCUs with XLP
- Pre-loaded with most common battery specifications
- Profile your application RUN & SLEEP duty cycle
- Select operating temperature and voltage
- Customize to add other device profiles and battery specifications

XLP 16-bit Development Board (Part Number: DM240311)



This board enables development of eXtreme Low Power applications on the PIC24F family of 16-bit PIC® XLP MCUs. The target PIC24F16KA102 device on the board can be powered using either a coin-cell battery (CR2032), two AAA batteries or energy harvesting (not included with the board). The board features LEDs, temperature sensors, prototyping and three mTouch buttons. The board may be interfaced to PICtail™ modules including RF transceiver modules sold separately by Microchip.

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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 features for your low power application.

Electrical Specifications of Extreme Low Power MCUs

Device Family	Memory KB	Pins	Sleep nA	Current Adders, ΔIpd		1 MHz Run µA
				WDT nA	RTC nA	
PIC16LF72X	3.5-14	28/44	20	480	480	110
PIC16LF193X	7-28	28/44	90	440	540	150
PIC18LF14K50	8-16	20	24	426	766	170
PIC18LF14K22	8-16	20	34	426	616	150
PIC18LF46K20	8-64	28/44	50	700	500	300
PIC18F46J11*	16-64	28/44	24	800	800	272
PIC18F46J50*	16-64	28/44	24	800	800	272
PIC24F04KA201*	4	14/20	20	370	490	195
PIC24F16KA102*	8-16	20/28	20	370	490	195
PIC24FJ64GA104*	32-64	28/44	20	500	500	250
PIC24FJ64GB004*	32-64	28/44	20	500	500	250

*RTC is with Hardware RTCC module.
All numbers are typical values at minimum V_{DD}, taken from the data sheet.

Development Tools from Microchip

Part Number	Development Tool	Description
DM240311	nanoWatt XLP 16-bit Development Board	Low-cost Development Board for PIC24 MCUs in extreme low power applications
–	nanoWatt XLP Battery Life Estimator	Free software tool to estimate battery life for applications by specifying PIC® MCUs, battery type and operating conditions
DM183032	PIC18 Explorer	Low-cost Development Board for PIC18 MCUs
DM240001	16-bit Explorer	Low-cost Development Board for 16-bit PIC MCUs
MA240017	PIC24F16KA102 PIM	Plug-in Module for Explorer 16
MA180023	PIC18F46J11 PIM	Plug-in Module for PIC18 Explorer
MA180024	PIC18F46J50 FS USB Development Board	Stand Alone USB Evaluation Board, can be used with PIC18 Explorer
DV164131	PICkit™ 3 Debug Express	In-Circuit Debugger/Programmer
DV164035	MPLAB® ICD 3 In-Circuit Debugger Kit	In-Circuit Debugger/Programmer
DV007004	MPLAB PM3 Universal Device Programmer	Full-featured Modular Device Programmer
DV244005	MPLAB REAL ICE™ In-Circuit Emulator	High Speed Emulation System
SW007002	MPLAB IDE – includes: MPASM™ Assembler, MPLINK™ Linker/MPLIB™ Librarian and MPLAB SIM Software Simulator	Integrated Development Environment (download free of charge at www.microchip.com)
SW500005	HI-TECH C® Pro for PIC10/12/16 MCU Family	C Compiler – Free version available
SW006011	MPLAB C Compiler for PIC18 MCU Family	C Compiler – Free version available
SW006014	MPLAB C Compiler for PIC24 MCU Family	C Compiler – Free version available

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