

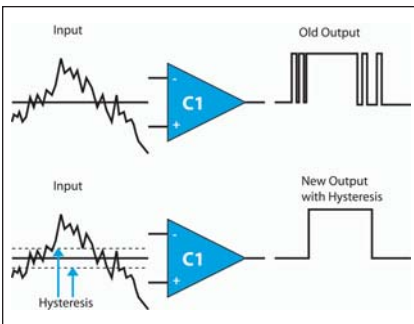
# PIC12F609/HV609, PIC12F615/HV615, PIC16F610/HV610 and PIC16F616/HV616

8-bit PIC® Microcontrollers with High Voltage Support and Fan Control Capabilities

## Summary

Designing the simplest solution to a complex problem such as fan/motor control on a system board can often be challenging. Microchip has simplified both the design and implementation of such applications by introducing the new PIC12F609/HV609, PIC12F615/HV615, PIC16F610/HV610 and PIC16F616/HV616. The first PIC microcontrollers of their kind, the 14-pin PIC16F616 provide an increased feature set inclusive of an enhanced full bridge Enhanced Capture/Compare Pulse Width Modulation (ECCP), eight 10-bit ADC channels, 2 comparators with selectable hysteresis, 4/8 MHz internal oscillator and 2K words of Flash program memory. The 8-pin PIC12F615, provides a half bridge ECCP, four 10-bit ADC channels, 1 comparator with selectable hysteresis, 4/8 MHz internal oscillator and 1K words of Flash program memory. The simplified PIC16F610 and PIC12F609 provide similar features without the ADC and ECCP. All of these PIC microcontrollers are available with high voltage variants and provide an integrated shunt voltage regulator allowing high voltage V<sub>DD</sub> support. The PIC12HV609, PIC12HV615, PIC16HV610 and PIC16HV616 provide the ability to run as low as 2.0V, up to an unspecified user-defined maximum voltage. The shunt regulator is active when the external V<sub>DD</sub> input is greater than 5V and disabled otherwise. These high voltage variations are ideal for cost sensitive applications with high voltage power rails.

## Comparator with Hysteresis



As with most PIC microcontrollers, the PIC12F609, PIC12F615, PIC16F610, PIC16F616, and High Voltage variants PIC12HV609, PIC12HV615, PIC16HV610 and PIC16HV616, can easily be utilized in a wide array of general purpose applications. Additional unique features make them particularly well

suited for focused applications such as motor or fan control. The comparator on all variants is steerable and designed with greater hysteresis to provide the ability to use a Hall Effect element for speed monitoring of a fan or motor. Due to the differential signaling of the Hall Effect element, traditional comparators do not always provide the ability to accurately translate the varying frequency of the Hall Effect element into a manageable digital signal. With the addition of hysteresis, these newly designed comparators will in effect provide a trigger window and ultimately greater ease in such translations. This, paired with the integrated PWM, makes these products a robust fan-control solution that is more cost effective and flexible than traditional dedicated fan control methods.



## Features

- High Voltage V<sub>DD</sub> Support (available only on the HV variants)
  - Any application with native high voltage rails
  - Saves external component cost
- PWM
  - Full ECCP with dead band control
  - Steerable
- Comparator with hysteresis
  - Direct interface to Hall Effect element
  - Ideal for fan/motor control and monitoring
  - Any application requiring the ability to monitor speed and/or position
- TMR1 Gate
  - Running directly from 4/8 MHz internal oscillator
  - Ideal for power supplies and battery chargers
  - Ideal for any application requiring conditional event or error counting
  - Applications needing pulse width measurements



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## Additional Information

- PIC16F616/16HV616 Data Sheet, DS41288
- PIC12F615/12HV615, PIC16F616/16HV616 Product Brief, DS41272
- AN1035 - Designing with HV Microcontrollers, DS01035
- 8-bit PIC Microcontroller Solutions Brochure, DS39630
- Low Cost Development Tools Guide, DS51560
- 2006 Product Line Card, DS00890
- Microchip Product Selector Guide, DS00148

## Links/Sample/Purchasing Information

- Web Link: [www.microchip.com/fancontrol](http://www.microchip.com/fancontrol)
- Web Link: [www.microchip.com/motorcontrol](http://www.microchip.com/motorcontrol)
- Web Link: [www.microchip.com/startnow](http://www.microchip.com/startnow)
- Online Sampling: [www.sample.microchip.com](http://www.sample.microchip.com)
- Online Purchasing: [www.microchipdirect.com](http://www.microchipdirect.com)

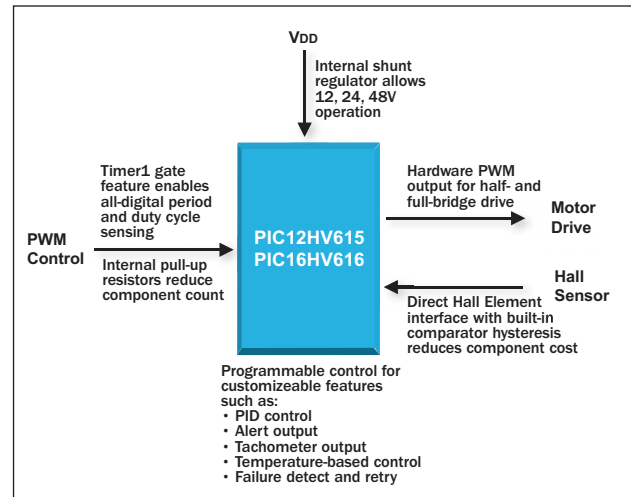
## Microchip Fan Control Solution

Component Cost Savings:

- Voltage Regulator
- Input Signal Conditioning
- Hall Effect Sensor

Improvements:

- Hardware PWM
- Greater control and response
- Meets latest industry fan control specifications



## High Voltage and Fan Control 8-bit PIC® Microcontrollers

Product	Flash Program Memory Words	RAM Bytes	I/O Pins	Analog			Internal Oscillator	Digital		High Voltage Support	Packages
				ECCP*	ADC	Comp.†		Timers/WDT			
PIC12F609	1K	64	6	-	-	1	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	No	8MD, 8P, 8SN	
PIC12HV609	1K	64	6	-	-	1	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	Yes	8MD, 8P, 8SN	
PIC12F615	1K	64	6	Half Bridge	4 x 10-bit	1	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	No	8MD, 8P, 8SN	
PIC12HV615	1K	64	6	Half Bridge	4 x 10-bit	1	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	Yes	8MD, 8P, 8SN	
PIC16F610	1K	72	12	-	-	2	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	No	14P, 14SL, 14ST, 16ML	
PIC16HV610	1K	72	12	-	-	2	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	Yes	14P, 14SL, 14ST, 16ML	
PIC16F616	2K	128	12	Full Bridge	8 x 10-bit	2	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	No	14P, 14SL, 14ST, 16ML	
PIC16HV616	2K	128	12	Full Bridge	8 x 10-bit	2	4/8 MHz	1 16-bit, 2 8-bit, 1 EWDT	Yes	14P, 14SL, 14ST, 16ML	

Package Key: MD = DFN, ML = QFN, P = PDIP, SL = SOIC (14-lead .150"), SN = (8-lead .150"), ST = TSSOP

Tape & reel as well as extended temperature options are available.

\*Enhanced Capture/Compare Pulse Width Modulation

†Comparator hysteresis can be disabled and used like a typical comparator.



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