

# PIC16F631/677/685/687/689/690

## Versatile 20-pin Products for Embedded Control Applications

### Summary

The vast majority of modern 8-bit embedded designs require microcontrollers that are capable of performing an unprecedented variety of tasks. Integrated serial communications interfaces, replacement of antiquated components and motor control capability are now “must haves” on many engineers’ shopping lists. Microchip’s latest midrange product family provides the features to meet the demands of today’s systems.

The PIC16F631/677/685/687/689/690 devices are a comprehensive 20-pin family of microcontrollers, with six variants ranging from 3.5 Kbytes to 14 Kbytes of Flash, up to 256 bytes of RAM, and a mix of peripherals including I<sup>2</sup>C™/SPI, EUSART, Capture/Compare/PWM and onboard analog comparators. These devices are well suited for designers with applications that need more code space or I/O than 14-pin variants supply, and are looking to increase system performance and code efficiency by employing hardware motor control and communications capability. The 20-pin family brings features normally found on more expensive microcontrollers into cost-sensitive applications, with special attention paid to providing the right feature set at the right price point – including the PIC16F677 – our lowest cost microcontroller with hardware I<sup>2</sup>C capability. All devices in the family are available in 20-pin PDIP, SOIC, SSOP and QFN packages.

### Continuous Product Improvement

Microchip continues to increase the functionality and performance of its products with each successive generation, providing features that help simplify the design of embedded control systems. The 20-pin family incorporates enhancements that make designing control architectures for multi-dimensional, interconnected systems an easy task:

**Enhanced Hardware Serial Communications** – It is often necessary to interface the main microcontroller with external memories, digital sensor ICs, display devices or other controllers in a system. Our serial peripherals can be configured to use many of the communication protocols commonly used in embedded applications, which gives users flexibility while saving cost and code space

**Advanced Analog Peripherals** – The 20-pin family’s 10-bit ADCs have the precision necessary to eliminate the added cost of external ADCs from your system. In addition, new dual comparators with S/R Latch mode can be used to replace 555 timers, simple op-amps, delta-sigma ADCs and other analog functions normally available in external ICs

**In-Circuit Serial Programming™ (ICSP™)** – Make changes to your control code on your target board with any member of the PIC16F690 family. ICSP uses only two pins and saves engineers both time and cost

**Miniaturized Package Options** – The 4 mm x 4 mm 20-pin QFN allows designers to squeeze high levels of performance into space-constrained applications



### Features

- Simple, Powerful Midrange PIC® Microcontroller Architecture
  - Only 35 instructions to learn
- Dual internal Oscillators with Seamless, on the fly Clock Switching
  - Software selectable 125 KHz - 8 MHz Internal Oscillator
  - 31 KHz Low Power Oscillator
- Versatile Serial Communications Interfaces
  - Enhanced USART/SCI connectivity
  - SPI and I<sup>2</sup>C with Address Mask option
- Enhanced Capture/Compare/PWM module
  - 10-bit PWM channels with PWM Steering
- High Performance Analog
  - Enhanced analog comparator module, featuring 2 comparators with Set/Reset Latch mode
  - 12 10-bit ADC channels
  - 0.6V Internal reference for comparators and ADC
- Low Power Features
  - Ultra Low Power Wake Up
  - Enhanced Low Current Watchdog Timer
  - Low Power Timer 1 Oscillator
- Up to 18 I/O Pins
- In-Circuit Serial Programming
- Software Programmable Brown Out Reset



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## Additional Information

- PIC16F690 Family Data Sheet, DS41262
- AN734 - Using the PICmicro® SSP for Slave I<sup>2</sup>C Communication, DS00734
- AN879 - Using the Microchip Ultra Low-power Wake-up Module, DS00879
- AN893 - Low-Cost Bidirectional Brushed DC Motor Control Using the PIC16F684, DS00893
- 8-bit PIC Microcontroller Solutions Brochure, DS39630
- Low Cost Development Tools Guide, DS51560
- 2006 Product Line Card, DS00890
- Microchip Product Selector Guide, DS00148

## Samples/Purchasing Information

- Online Sampling: [www.sample.microchip.com](http://www.sample.microchip.com)
- Online Purchasing: [www.microchipdirect.com](http://www.microchipdirect.com)

20-pin 8-bit PIC® Microcontroller Family									
Product	Program Flash Memory (bytes)	RAM Bytes	I/O Pins	ADC	Comp.	Serial Comms.	Timers 8/16-bit	Operating Voltage	Packages
PIC16F631	1792	64	18	0	2	–	1/1	2.0-5.5V	20P, 20ML, 20SL, 20SS
PIC16F677	3584	128	18	12	2	I <sup>2</sup> C™/SPI	1/1	2.0-5.5V	20P, 20ML, 20SL, 20SS
PIC16F685	7168	256	18	12	2	–	2/1	2.0-5.5V	20P, 20ML, 20SL, 20SS
PIC16F687	3584	128	18	12	2	EUSART I <sup>2</sup> C/SPI	1/1	2.0-5.5V	20P, 20ML, 20SL, 20SS
PIC16F689	7168	256	18	12	2	EUSART I <sup>2</sup> C/SPI	1/1	2.0-5.5V	20P, 20ML, 20SL, 20SS
PIC16F690	7168	256	18	12	2	EUSART I <sup>2</sup> C/SPI	2/1	2.0-5.5V	20P, 20ML, 20SL, 20SS

Package Key: ML = QFN, P = PDIP, SL = SOIC (.150"), SS = SSOP



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