



# PIC16F87/88/89

## 18/20-Pin Enhanced FLASH Microcontroller Product Brief

### High Performance RISC CPU:

- Only 35 single-word instructions to learn
- All single cycle instructions except for program branches, which are two cycle
- Operating speed: DC - 20 MHz clock input  
DC - 200 ns instruction cycle
- 4K x 14 words of FLASH Program Memory, 192 x 8 bytes of Data Memory (RAM), 64 x 8 bytes of EEPROM data memory
- 18-pin devices are pinout compatible to other 18-pin PIC16CXXX and PIC16FXXX microcontrollers

### Peripheral Features:

- Timer0 module: 8-bit timer/counter with 8-bit prescaler
- Timer1 module: 16-bit timer/counter with prescaler, can be incremented during SLEEP via external crystal/clock
- Timer2 module: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- One Capture, Compare, PWM module
- Synchronous Serial Port (SSP) module with two modes of operation (only on PIC16F89):
  - 3-wire SPI™ (supports all 4 SPI modes)
  - I<sup>2</sup>C™ Slave mode
- Addressable USART module:
  - Supports interrupt on Address bit
- High Sink/Source Current: 25 mA

### CMOS Technology:

- Low power, high speed FLASH/EEPROM technology
- Fully static design
- Wide operating voltage range (2.0V to 5.5V)
- Commercial and Industrial temperature ranges
- Low power consumption

### Analog Features:

- 10-bit 4-channel Analog-to-Digital Converter (A/D) (PIC16F88 and PIC16F89 only)
- Brown-out Reset (BOR)
- Analog Comparator module with:
  - Two analog comparators
  - Programmable On-Chip Voltage Reference (VREF) module
  - Programmable input multiplexing from device inputs and internal voltage reference
  - Comparator outputs are externally accessible

### Special Microcontroller Features:

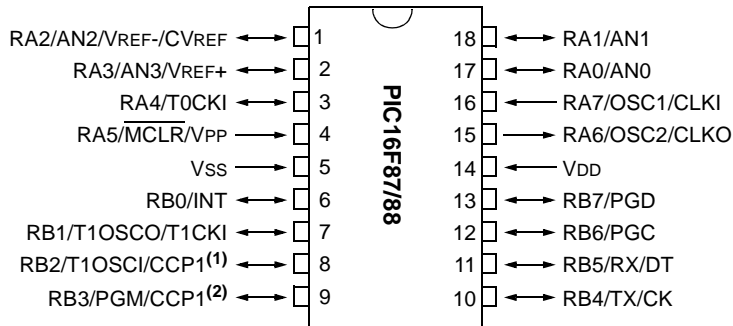
- 100,000 erase/write cycle Enhanced FLASH program memory typical
- 1,000,000 erase/write cycle Data EEPROM memory typical
- Data EEPROM Retention > 40 years
- Self reprogrammable under software control
- In-Circuit Serial Programming™ (ICSP™) via two pins
- Single supply 5V In-Circuit Serial Programming
- Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation
- Programmable code protection
- Power saving SLEEP mode
- Selectable oscillator options, including internal oscillator
- MPLAB® In-Circuit Debug (ICD) via two pins

Device	Program Memory		Data SRAM (Bytes)	EEPROM (Bytes)	I/O	10-bit A/D (ch)	CCP (PWM)	MSSP		USART	Timers 8/16-bit	Comparators
	Bytes	# Single Word Instructions						SPI	Slave I <sup>2</sup> C			
PIC16F87	7.2K	4096	192	64	16	—	1	No	No	Yes	2 / 1	2
PIC16F88	7.2K	4096	192	64	16	4	1	No	No	Yes	2 / 1	2
PIC16F89	7.2K	4096	192	64	18	4	1	Yes	Yes	Yes	2 / 1	2

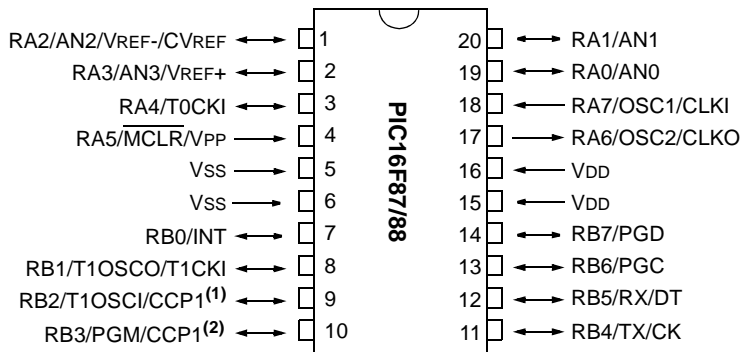
# PIC16F87/88/89

## Pin Diagrams:

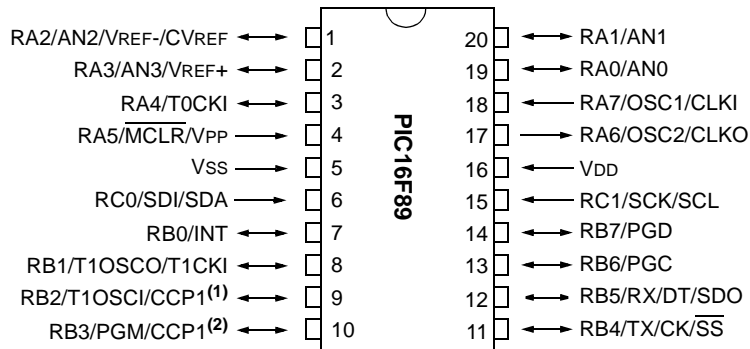
### PDIP, SOIC



### SSOP



### PDIP, SOIC, SSOP



- Note 1:** When low voltage ICSP is enabled, CCP1 is on RB2.  
**Note 2:** When low voltage ICSP is disabled, CCP1 is on RB3.  
**Note 3:** Pinouts subject to change.

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**Note the following details of the code protection feature on PICmicro® MCUs.**

- The PICmicro family meets the specifications contained in the Microchip Data Sheet.
- Microchip believes that its family of PICmicro microcontrollers is one of the most secure products of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the PICmicro microcontroller in a manner outside the operating specifications contained in the data sheet. The person doing so may be engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable”.
- Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our product.

If you have any further questions about this matter, please contact the local sales office nearest to you.

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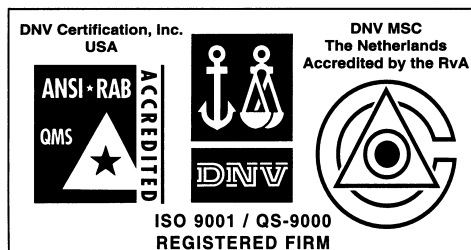
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