



# PIC12F615/12HV615

# PIC16F616/16HV616

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## 8/14-Pin, 8-Bit Flash Microcontroller Product Brief

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### High-Performance RISC CPU:

- Only 35 single-word instructions to learn
- All single-cycle instructions except for program branches which are two-cycle
- Eight-level deep hardware stack
- Direct, Indirect and Relative Addressing modes for data and instructions
- Operating speed:
  - DC – 20 MHz clock input
  - DC – 200 ns instruction cycle

### Special Microcontroller Features:

- Precision Internal Oscillator:
  - Selectable 4 MHz or 8 MHz frequency
  - Factory calibrated to  $\pm 1\%$
- Power-Saving Sleep mode
- Power-on Reset (POR)
- Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Brown-out Reset (BOR)
- Watchdog Timer (WDT) with dedicated on-chip RC oscillator for reliable operation
- Multiplexed  $\overline{\text{MCLR}}$  input pin with internal pull-up
- Programmable code protection
- Selectable oscillator options:
  - INTOSC: Precision internal oscillator
  - EXTRC: External low-cost RC oscillator
  - XT: Standard crystal/resonator
  - HS: High-speed crystal/resonator
  - LP: Power-saving, low frequency crystal
  - EC: High-speed external clock input
- In-Circuit Serial Programming™ (ICSP™)
- In-Circuit Debugging (ICD) support
- Programmable Interrupt-on-Change pins

### Low-Power Features/CMOS Technology:

- Operating current:
  - 100  $\mu\text{A}$  @ 2V, 1 MHz, typical
- Standby current:
  - 1 nA @ 2V, typical
- Low-power, high-speed Flash technology:
  - 100,000 Flash endurance
  - > 40-year retention

- Fully static design
- Wide operating voltage range:
  - 2.0V-5.5V for PIC12F615 and PIC16F616
  - 2.0V – user defined maximum voltage for PIC12HV615 and PIC16HV616
- Wide temperature range:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C

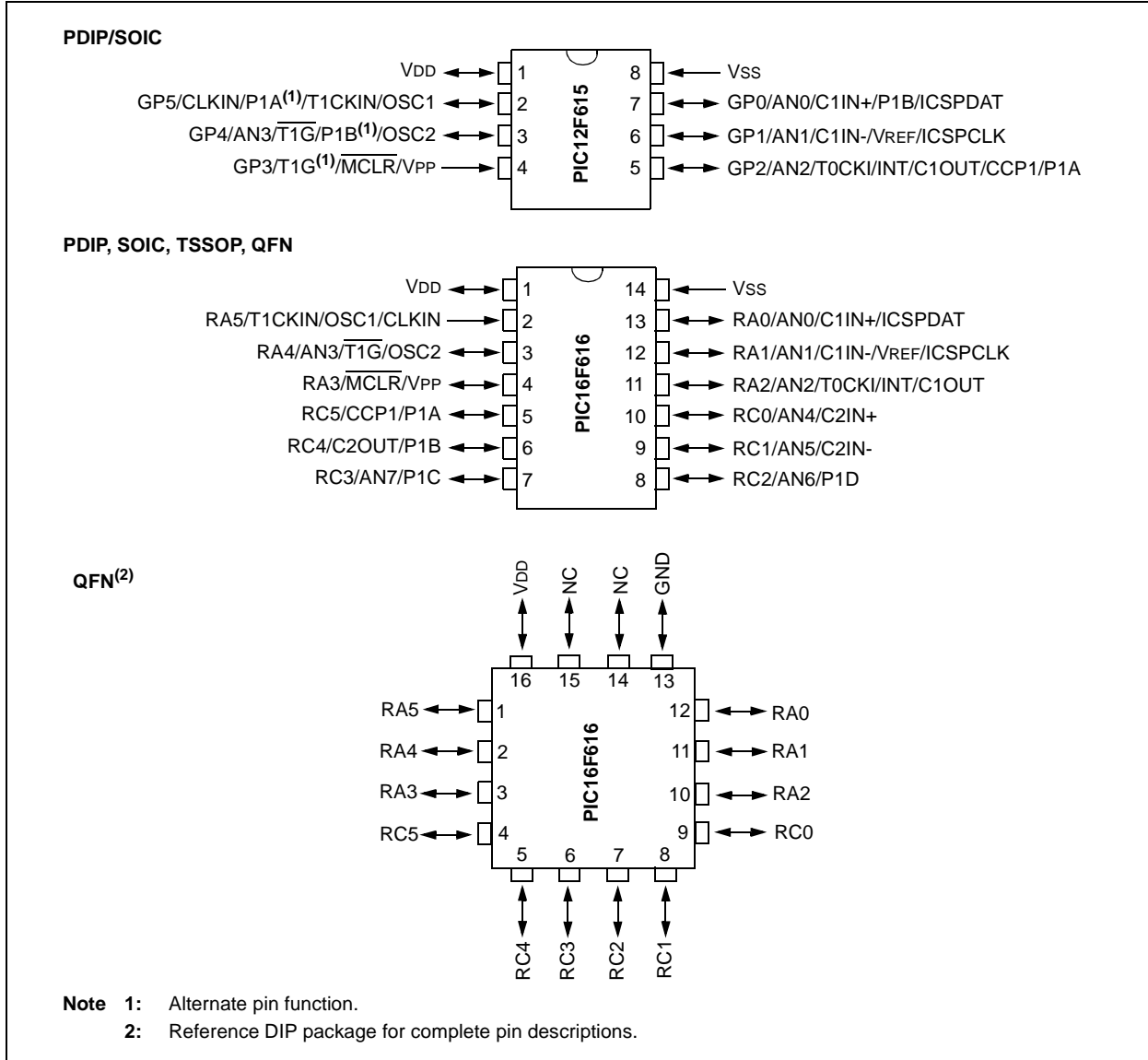
### Peripheral Features:

- I/O pins:
  - 5 I/O pins with individual direction control (PIC12F615, PIC12HV615)
  - 11 I/O pins with individual direction control (PIC16F616, PIC16HV616)
  - 1 input only pin
  - Individually selectable weak pull-ups
  - High current sink/source for direct LED drive
- Analog-to-Digital (A/D) Converter:
  - 10-bit resolution
  - 4 external channels (PIC12F615, PIC12HV615)
  - 8 external channels (PIC16F616, PIC16HV616)
  - 3 internal channels to convert internal voltage references
- Analog Comparator:
  - One comparator (PIC12F615, PIC12HV615)
  - Two comparators (PIC16F616, PIC16HV616)
  - Comparator inputs and output accessible externally
  - On-chip 0.6V absolute voltage reference
  - Programmable on-chip voltage reference (CVREF) module (% of  $V_{DD}$ )
- Timer0 module: 8-bit timer/counter with 8-bit programmable prescaler
- Enhanced Timer1 module:
  - 16-bit timer/counter with prescaler
  - External gate input
  - Option to use OSC1/OSC2 input in LP mode as Timer1 oscillator when in INTOSC mode
  - Option to use system clock source as Timer1 clock input
- Timer2 module: 8-bit timer/counter with 8-bit prescaler and postscaler

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- Enhanced Capture Compare/PWM module (ECCP):
  - 16-bit capture maximum resolution 12.5 ns
  - Compare maximum resolution 200 ns
- 10-bit PWM maximum frequency 20 kHz
- User selectable PWM output on primary or alternate pins. (Alternate pin selection PIC12HV615 only)

**FIGURE 1: PIN DIAGRAMS**



| Device     | Program Memory | Data Memory     | I/O | Timers<br>8/16 bit | 10-bit A/D<br>Channels | Comparators | Voltage<br>Regulator |
|------------|----------------|-----------------|-----|--------------------|------------------------|-------------|----------------------|
|            | Flash Words    | SRAM<br>(bytes) |     |                    |                        |             |                      |
| PIC12F615  | 1024 x 14      | 64              | 6   | 2/1                | 4                      | 1           | N                    |
| PIC16F616  | 2048 x 14      | 128             | 12  | 2/1                | 8                      | 2           | N                    |
| PIC12HV615 | 1024 x 14      | 64              | 6   | 2/1                | 4                      | 1           | Y                    |
| PIC16HV616 | 2048 x 14      | 128             | 12  | 2/1                | 8                      | 2           | Y                    |

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