
Section 1. Introduction

HIGHLIGHTS

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1.1 Introduction

Microchip is a leading provider of microcontrollers and analog semiconductors. The company's focus is on products that meet the needs of the embedded control market. We are a leading supplier of:

- 8-bit general purpose microcontrollers (PICmicro® MCUs)
- dsPIC30F 16-bit microcontrollers
- Speciality and standard non-volatile memory devices
- Security devices (KEELOQ®)
- Application specific standard products

Please request a Microchip Product Line Card for a listing of all the interesting products that we have to offer. This literature can be obtained from your local sales office, or downloaded from the Microchip web site (www.microchip.com).

1.2 Manual Objective

PICmicro and dsPIC30F devices are grouped by the size of their Instruction Word and Data Path. The current device families are:

1. Base-Line: 12-bit Instruction Word length, 8-bit Data Path
2. Mid-Range: 14-bit Instruction Word length, 8-bit Data Path
3. High-End: 16-bit Instruction Word length, 8-bit Data Path
4. Enhanced: 16-bit Instruction Word length, 8-bit Data Path
5. dsPIC30F: 24-bit Instruction Word length, 16-bit Data Path

This manual describes the dsPIC30F 16-bit MCU family of devices.

This manual explains the operation of the dsPIC30F MCU family architecture and peripheral modules, but does not cover the specifics of each device. The user should refer to the data sheet for device specific information. The information that can be found in the data sheet includes:

- Device memory map
- Device pinout and packaging details
- Device electrical specifications
- List of peripherals included on the device

Code examples are given throughout this manual. These examples sometimes need to be written as device specific as opposed to family generic, though they are valid for most other devices. Some modifications may be required for devices with variations in register file mappings.

1.3 Device Structure

Each part of the dsPIC30F device can be placed into one of three groups:

1. CPU Core
2. System Integration
3. Peripherals

1.3.1 CPU Core

The CPU core pertains to the basic features that are required to make the device operate. The sections of the manual related to the CPU core include:

1. CPU
2. Data Memory
3. Program Memory
4. DSP Engine
5. Interrupts

1.3.2 System Integration

System integration functions help to:

- Decrease system cost
- Increase system reliability
- Increase design flexibility

The following sections of the manual discuss dsPIC30F system integration functions:

1. Oscillator
2. Reset
3. Low Voltage Detect
4. Watchdog Timer and Power Saving Modes
5. Flash and EEPROM Programming
6. Device Configuration

1.3.3 Peripherals

The dsPIC30F has many peripherals that allow the device to be interfaced to the external world. The peripherals discussed in this manual include:

1. I/O Ports
2. Timers
3. Input Capture Module
4. Output Compare Module
5. Quadrature Encoder Interface (QEI)
6. 10-bit A/D Converter
7. 12-bit A/D Converter
8. UART Module
9. SPI™ Module
10. I²C™ Module
11. Data Converter Interface (DCI) Module
12. CAN Module

1.3.4 Memory Technology

At the time of this writing, all dsPIC30F devices use Flash program memory technology. The Flash program memory can be electrically erased or programmed.

1.4 Development Support

Microchip offers a wide range of development tools that allow users to efficiently develop and debug application code. Microchip's development tools can be broken down into four categories:

1. Code generation
2. Hardware/Software debug
3. Device programmer
4. Product evaluation boards

A full description of each of Microchip's development tools is discussed in **Section 25. "Development Tool Support"**. As new tools are developed, the latest product briefs and user guides can be obtained from the Microchip web site (www.microchip.com) or from your local Microchip Sales Office.

Microchip offers other reference tools to speed the development cycle. These include:

- Application Notes
- Reference Designs
- Microchip web site
- Local Sales Offices with Field Application Support
- Corporate Support Line

The Microchip web site lists other sites that may be useful references.

1.5 Style and Symbol Conventions

Throughout this document, certain style and font format conventions are used. Most format conventions imply a distinction should be made for the emphasized text. The MCU industry has many symbols and non-conventional word definitions/abbreviations. Table 1-1 provides a description for many of the conventions contained in this document. Located at the rear of this document, a glossary provides additional word and abbreviation definitions used throughout this manual.

1.5.1 Document Conventions

Table 1-1 defines some of the symbols and terms used throughout this manual.

Table 1-1: Document Conventions

Symbol or Term	Description
set	To force a bit/register to a value of logic '1'.
clear	To force a bit/register to a value of logic '0'.
Reset	1) To force a register/bit to its default state. 2) A condition in which the device places itself after a device Reset occurs. Some bits will be forced to '0' (such as interrupt enable bits), while others will be forced to '1' (such as the I/O data direction bits).
0xnn or nnh	Designates the number 'nn' in the hexadecimal number system. These conventions are used in the code examples. For example, 0x13F or 13Fh.
B'bbbbbbbb'	Designates the number 'bbbbbbbb' in the binary number system. This convention is used in the text and in figures and tables. For example, B'10100000'.
R-M-W	Read-Modify-Write. This is when a register or port is read, then the value is modified, and that value is then written back to the register or port. This action can occur from a single instruction (such as bit set, BSET), or a sequence of instructions.
: (colon)	Used to specify a range or the concatenation of registers/bits/pins. One example is TMR3:TMR2, which is the concatenation of two 16-bit registers to form a 32-bit timer value. Concatenation order (left-right) usually specifies a positional relationship (MSb to LSb, higher to lower).
< >	Specifies bit(s) locations in a particular register. One example is PTCON<PTMOD1:PTMOD0> (or PTMOD<1:0>), which specifies the register and associated bits or bit positions.
MSb, MSbit, LSb, LSbit	Indicates the Least Significant or Most Significant bit in a field.
MSByte, MSWord, LSByte, LSWord	Indicates the Least/Most Significant Byte or Word in a field of bits.
Courier Font	Used for code examples, binary numbers and for instruction mnemonics in the text.
Times Font	Used for equations and variables.
<i>Times, Bold Font, Italics</i>	Used in explanatory text for items called out from a graphic/equation/example.
Note	A Note presents information that we wish to re-emphasize, either to help you avoid a common pitfall, or make you aware of operating differences between some device family members. A Note is always in a shaded box (as below), unless used in a table, where it is at the bottom of the table (as in this table).
	Note: This is a Note in a shaded note box.

1.5.2 Electrical Specifications

Throughout this manual, there will be references to electrical specifications and their parameter numbers. Table 1-2 shows the parameter numbering convention for dsPIC30F devices. A parameter number represents a unique set of characteristics and conditions that is consistent between every data sheet, though the actual parameter value may vary from device to device. This manual describes a family of devices and therefore, does not specify the parameter values. The user should refer to the "Electrical Specifications" section of the device data sheet for the actual parameter values for that device.

Table 1-2: Electrical Specification Parameter Numbering Convention

Parameter Number Format	Comment
DXXX	DC Specification
AXXX	DC Specification for Analog Peripherals
XXX	Timing (AC) Specification
PDXXX	Device Programming DC Specification
PXXX	Device Programming Timing (AC) Specification

Legend: XXX represents a number.

1.6 Related Documents

Microchip, as well as other sources, offers additional documentation which can aid in your development with dsPIC30F MCUs. These lists contain the most common documentation, but other documents may also be available. Please check the Microchip web site (www.microchip.com) for the latest published technical documentation.

1.6.1 Microchip Documentation

The following dsPIC30F documentation is available from Microchip at the time of this writing. Many of these documents provide application specific information that gives actual examples of using, programming and designing with dsPIC30F MCUs.

1. *dsPIC30F Programmer's Reference Manual (DS70030)*

The dsPIC30F Programmer's Reference Manual provides information about the dsPIC30F programmer's model and instruction set. A description of each instruction and syntax examples are provided in this document.

2. *dsPIC30F Family Overview (DS70043)*

This document provides a summary of the available dsPIC30F family variants, including device pinouts, memory sizes and available peripherals.

3. *dsPIC30F Data Sheets (DS70082 and DS70083)*

The data sheets contain device specific information, such as pinout and packaging details, electrical specifications and memory maps.

1.6.2 Third Party Documentation

There are several documents available from third party sources around the world. Microchip does not review these documents for technical accuracy. However, they may be a helpful source for understanding the operation of Microchip dsPIC30F devices. Please refer to the Microchip web site for third party documentation related to the dsPIC30F.

1.7 Revision History

Revision A

This is the initial released revision of this document.

Revision B

There were no technical content or editorial revisions to this section of the manual, however, this section was updated to reflect Revision B throughout the manual.

Revision C

There were no technical content revisions to this section of the manual, however, this section was updated to reflect Revision C throughout the manual.

NOTES: