Section 1. Introduction

HIGHLIGHTS

This section of the manual contains the following topics:

1.1   INTRODUCTION

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

- 8-bit general purpose microcontrollers (PIC® MCUs)
- 16-bit and 32-bit microcontrollers
- 16-bit dsPIC® digital signal controllers (DSCs)
- 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 the 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).

Part 1 of this manual describes the following dsPIC33F 16-bit devices:

- dsPIC33FJ64GP206
- dsPIC33FJ64GP306
- dsPIC33FJ64GP310
- dsPIC33FJ64GP706
- dsPIC33FJ64GP708
- dsPIC33FJ64GP710
- dsPIC33FJ64MC506
- dsPIC33FJ64MC508
- dsPIC33FJ64MC510
- dsPIC33FJ64MC706
- dsPIC33FJ64MC710
- dsPIC33FJ128GP206
- dsPIC33FJ128GP306
- dsPIC33FJ128GP310
- dsPIC33FJ128GP706
- dsPIC33FJ128GP708
- dsPIC33FJ128GP710
- dsPIC33FJ128MC506
- dsPIC33FJ128MC510
- dsPIC33FJ128MC706
- dsPIC33FJ128MC708
- dsPIC33FJ128MC710
- dsPIC33FJ256GP506
- dsPIC33FJ256GP510
- dsPIC33FJ256GP710
- dsPIC33FJ256MC510
- dsPIC33FJ256MC710

- dsPIC33FJ64GP206A
- dsPIC33FJ64GP306A
- dsPIC33FJ64GP310A
- dsPIC33FJ64GP706A
- dsPIC33FJ64GP708A
- dsPIC33FJ64GP710A
- dsPIC33FJ64MC506A
- dsPIC33FJ64MC508A
- dsPIC33FJ64MC510A
- dsPIC33FJ64MC706A
- dsPIC33FJ64MC710A
- dsPIC33FJ128GP206A
- dsPIC33FJ128GP306A
- dsPIC33FJ128GP310A
- dsPIC33FJ128GP706A
- dsPIC33FJ128GP708A
- dsPIC33FJ128GP710A
- dsPIC33FJ128MC506A
- dsPIC33FJ128MC510A
- dsPIC33FJ128MC706A
- dsPIC33FJ128MC708A
- dsPIC33FJ128MC710A
- dsPIC33FJ256GP506A
- dsPIC33FJ256GP510A
- dsPIC33FJ256GP710A
- dsPIC33FJ256MC510A
- dsPIC33FJ256MC710A

This manual explains the operation of the dsPIC33F family architecture and peripheral modules, but does not cover the specifics of each device. Refer to the data sheet for device specific information. The information that can be found in the data sheet includes the following:

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

Code examples are provided throughout this manual. These examples are for reference purposes only and may need to be modified to suit a specific processor or MPLAB® tools version.

1.2 DEVICE STRUCTURE

Each part of the dsPIC DSC can be placed into one of the following groups:

• CPU Core
• System Integration
• Peripherals

1.2.1 CPU Core

The CPU core pertains to the basic features required to make the device operate. The following sections of Part 1 of the manual relate to the CPU core:

• **Section 2. "CPU"**
• **Section 3. "Data Memory"**
• **Section 4. "Program Memory"**
• **Section 6. "Interrupts"**

1.2.2 System Integration

System integration functions help to accomplish the following:

• Decrease system cost
• Increase system reliability
• Increase design flexibility

The following sections of Part 1 of the manual discuss dsPIC33F system integration functions:

• **Section 5. "Flash Programming"**
• **Section 7. "Oscillator"**
• **Section 8. "Reset"**
• **Section 9. "Watchdog Timer and Power-Saving Modes"**
• **Section 23. "CodeGuard™ Security"**
• **Section 24. "Programming and Diagnostics"**
• **Section 25. "Device Configuration"**

1.2.3 Peripherals

The dsPIC DSC has many peripherals that allow it to be interfaced to external circuitry. Peripherals are discussed in the following sections of the manual:

• **Section 10. "I/O Ports"**
• **Section 11. "Timers"**
• **Section 12. "Input Capture"**
• **Section 13. "Output Compare"**
• **Section 14. "Motor Control PWM"**
• **Section 15. "Quadrature Encoder Interface (QEI)"**
• **Section 16. "Analog-to-Digital Converter (ADC)"**
• **Section 17. "UART"**
• **Section 18. "SPI"**
• **Section 19. "I²C™"**
• **Section 20. "Data Converter Interface (DCI)"**
• **Section 21. "ECAN™"**
• **Section 22. "Direct Memory Access (DMA)"**

1.3 DEVELOPMENT SUPPORT

Microchip offers a wide range of development tools that allow you to efficiently develop and debug application code. Microchip's development tools generally fall into the following categories:

• Code generation
• Hardware and software debugging
• Device programming
• Product development boards

A full description of each of Microchip's development tools is provided in **Section 26. "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 development support in the following forms:

• Application notes
• Reference designs
• Microchip web site
• Local sales offices with Field Application Engineering support
• Corporate support line

The Microchip web site (www.microchip.com) also lists other web sites that may be useful references.

1.4   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 semiconductor industry uses many symbols and non-conventional word definitions and abbreviations. Table 1-1 provides a description for many of the conventions contained in this document. A glossary is located at the end of this manual that provides additional word and abbreviation definitions used throughout this document.

Table 1-1:   **Document Conventions**

Symbol or Term	Description
set	To force a bit or register to a value of logic '1'.
clear	To force a bit or register to a value of logic '0'.
Reset	1. To force a bit or register 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 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, the designation 0x13F or 13Fh may be used.
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, the designation B'10100000' may be used.
R-M-W	Read-Modify-Write. This occurs when a register or port is read, 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.
LSb, MSb	Indicates the Least Significant or Most Significant bit in a field.
LSB, MSB	Indicates the Least Significant or Most Significant Byte in a field of bits.
lsw, msw	Indicates the least significant or most significant word in a field of bits.
: (colon)	Used to specify a range or the concatenation of registers, bits or pins. One such example is TMR3:TMR2, which is the concatenation of two 16-bit registers to form a 32-bit timer value. Concatenation order (left to right) usually specifies a positional relationship (MSb to LSb, higher to lower).
< >	Specifies bit(s) locations in a particular register. One example is OSCCON<14:12> (or COSC<2:0>), which specifies the register and associated bits or bit positions.
Courier New Font	Used for code examples and binary numbers and for instruction mnemonics that appear in the text.
Times New Roman Font, Italics	Used for equations and variables. For example: $$F_{VCO} = F_{IN} \times \left(\frac{M}{N1}\right) = F_{IN} \times \left(\frac{(PLLDIV + 2)}{(PLLPRE + 2)}\right)$$
Note	A Note presents information that we want to re-emphasize, either to help you avoid a common pitfall or to make you aware of operating differences between some device family members. Notes are presented either in a shaded box (as shown below), or are placed at the bottom of a table, register, figure or example.

Note: This is a note in a shaded box.

1.5 RELATED DOCUMENTS

Microchip, as well as other sources, offers additional documents that can aid in your development with dsPIC33F devices. The succeeding sections contain the most common documents, but other documents may also be available.

1.5.1 Microchip Documents

The following dsPIC DSC documents are 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 dsPIC DSCs. Please check the Microchip web site (www.microchip.com) for the latest published technical documents.

1. *dsPIC30F/dsPIC33F Programmer's Reference Manual* (DS70157)

   This reference manual provides information about the dsPIC DSC programmer's model and instruction set. A description of each instruction, along with syntax examples, is provided in this document.

2. *dsPIC33FJXXXGPX06/X08/X10 Data Sheet* (DS70286)

   This document provides a summary of the available dsPIC33F family variants that are best suited for general purpose applications. This document includes device pinouts, memory sizes and available peripherals.

3. *dsPIC33FJXXXMCX06/X08/X10 Data Sheet* (DS70287)

   This document provides a summary of the available dsPIC33F family variants that are best suited for motor control applications. This document includes device pinouts, memory sizes and available peripherals.

4. *dsPIC33FJXXXGPX06A/X08A/X10A Data Sheet* (DS70593)

   This document provides a summary of the available dsPIC33F family variants that are best suited for general purpose applications. This document includes device pinouts, memory sizes and available peripherals.

5. *dsPIC33FJXXXMCX06A/X08A/X10A Data Sheet* (DS70594)

   This document provides a summary of the available dsPIC33F family variants that are best suited for motor control applications. This document includes device pinouts, memory sizes and available peripherals.

1.5.2 Third-Party Documents

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 dsPIC DSCs. Please refer to the Microchip web site for third-party documents related to the dsPIC DSCs.

1.6   REVISION HISTORY

Revision A (May 2007)

This is the initial release of this document.

Revision B (June 2009)

This revision incorporates the following content updates:

- Added the dsPIC33FJXXXGPX06A/X08A/X10A and dsPIC33FJXXXMCX06A/X08A/X10A families of devices (refer to the second column of the device list in **1.1 "Introduction"**)
- Additional minor corrections such as language and formatting updates have been incorporated throughout the document.

NOTES:

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