Another important change deals with the OSCCON SFR. Bits have been added to both the COSC and NOSC functional definitions. Use the dsPIC30F6010A device header and include files to achieve code portability with the OSCCON SFR.

| | |
|---|---|
| **Note:** | Oscillator operation should be verified to ensure that it starts and performs as expected. You may need to adjust the load capacitor and/or the oscillator mode to achieve the proper values. |

## DEVICE CONFIGURATION REGISTERS

In support of the new oscillator modes, the FOSC Configuration register has been modified. The dsPIC30F6010A device header and include files provide the updated bit field definitions and macros for the device Configuration registers. Please refer to these new macros when embedding specific device configuration information in the C and Assembler source files.

## PERIPHERALS

Some peripheral changes have been made in regards to specific errata fixes and additional features. No new peripheral modules have been added.

Low-Voltage Detect (LVD) – This module is not available on the dsPIC6010A device.

Motor Control Pulse-Width Modulation (MCPWM) – An additional control bit has been added to the module to allow additional functionality. The Immediate Update Enable (IUE) control bit is added to the PWMCON2 SFR. Refer to the "*dsPIC30F Family Reference Manual*" (DS70046) for additional details.

Quadrature Encoder Interface (QEI) – The control bits in the DFLTCON SFR have changed to allow additional functionality. Refer to the "*dsPIC30F Family Reference Manual*" (DS70046) for additional details.

Device Oscillator – The device oscillator feature set has been enhanced to provide additional flexibility. The new oscillator modes are presented in Section 21.0 "System Integration" of the "*dsPIC30F6010A/6015 Data Sheet*" (DS70150). In support of the Fast RC oscillator (FRC), the OSCTUN Special Function Register (SFR) has been added. This register includes six FRCs tuning bits (TUN<5:0>). The new oscillator modes are supported by use of the respective dsPIC30F6010A device header (`.h`), linker (`.gld`) and include (`.inc`) files in the source code files. Refer to the "*dsPIC30F6010A/6015 Data Sheet*" (DS70150) for more information. The following oscillator modes have been added:

- HS/2 x4, x8 and x16PLL mode
- HS/3 x4, x8 and x16PLL mode
- FRC x4, x8 and x16PLL mode

## ELECTRICAL CHARACTERISTICS

Table 1 below presents a comparison of the operating MIPS vs. voltage between the dsPIC30F6010A and dsPIC30F6010 devices.

The dsPIC30F6010 and dsPIC30F6010A devices are designed using the same process technology. Therefore, the DC and AC electrical specifications are closely related. Exceptions to this are the Run, Idle and Sleep currents which should slightly improve. Consult the data sheets for further information.

**TABLE 1: OPERATING MIPS VS. VOLTAGE CHARACTERISTICS**

| VDD Range (V) | Temp. Range (°C) | Maximum MIPS | | | |
|---|---|---|---|---|---|
| | | dsPIC30F6010A-30I | dsPIC30F6010-30I | dsPIC30F6010A-20E | dsPIC30F6010-20E |
| 4.5-5.5 | -40 to +85 | 30 | 30 | — | — |
| 4.5-5.5 | -40 to +125 | — | — | 20 | 20 |
| 3.0 to 3.6 | -40 to +85 | 20 | 15 | — | — |
| 3.0 to 3.6 | -40 to +125 | — | — | 15 | 10 |
| 2.5 to 3.0 | -40 to +85 | 10 | 7.5 | — | — |

## PACKAGE MIGRATION CONSIDERATIONS

The dsPIC30F6010 device is available in a 14mm x 14mm TQFP package. The dsPIC30F6010A device is available in the same 14mm x 14mm package, as well as a 12mm x 12mm package that offers additional space savings in the customer's board.

## DEVELOPMENT TOOLS AND BOARDS

MPLAB IDE, MPLAB C30, MPLAB ICD 2 and MPLAB PM3 tools support both the dsPIC30F6010 and dsPIC30F6010A. See Table 2 below for information on version support.

MPLAB ICE 4000 supports the dsPIC30F601XA devices, however the operation of the MPLAB ICE 4000 tool is limited to dsPIC30F6010 functional operation, including all device errata listed in DS80195.

A Plug-In-Module (PIM) (MA30015) is available for the dsPIC30F6010A device. This PIM can replace the MA300013 PIM containing the dsPIC30F6010 device.

The dsPIC30F6010A is supported by all development boards that support the dsPIC30F6010 device. These boards include the dsPICDEM™ MC1, dsPICDEM 1.1, and dsPICDEM 80-pin Starter Development Board.

| **Note:** | When using the dsPIC30F6010A device on the dsPICDEM-MC1 motor control development board, the user must short resistors R37 and R40 to ensure reliable communication with the MPLAB ICD 2 in-circuit debugger. |
|---|---|

**TABLE 2: DEVELOPMENT TOOL DEVICE SUPPORT**

| Development Tools | Device Support | |
|---|---|---|
| | **dsPIC30F6010A** | **dsPIC30F6010** |
| MPLAB® IDE | MPLAB IDE 7.21 or later | All current releases |
| MPLAB C30 | MPLAB C30 1.32 or later | MPLAB C30 1.10 and later |
| MPLAB ICD 2 Programmer/Debugger | Yes | Yes |
| MPLAB REAL ICE Emulator/Debugger | Yes | Yes |
| MPLAB PM3 Device Programmer | Yes | Yes |
| MPLAB ICE 4000 | Yes(1) | Yes(1) |

**Note 1:** MPLAB ICE 4000 supports the dsPIC30F601XA devices, however the operation of the MPLAB ICE 4000 tool is limited to dsPIC30F6010 functional operation, including all device errata listed in DS80195.

## RECOMMENDED PROCEDURE FOR MIGRATING FROM dsPIC30F6010 TO dsPIC30F6010A

Follow this process to migrate from the dsPIC30F6010 to the dsPIC30F6010A :

### Prepare

1. Carefully read "*dsPIC30F6010A/6015 Rev A2 Silicon Errata" (DS80258)* to ensure there is no errata that will constrain your ability to migrate from the dsPIC30F6010 to the dsPIC306010A.

### Recompile Software

2. Reconfigure your MPLAB IDE workspace for the dsPIC30F6010A (*MPLAB IDE > Configure > Select Device > dsPIC30F6010A)*
3. Replace Device Header files and Linker scripts (default file location c:\Program Files\MPLAB C30\Support\)
4. Change Device Configuration bits as appropriate (*MPLAB IDE > Configure > Configuration Bits*)
5. Remove software work arounds in your dsPIC30F6010 project that are not needed for dsPIC30F6010A silicon. If necessary, refer to "*dsPIC30F6010 Rev. B1 Silicon Errata"* (DS80182) and "*dsPIC30F6010 Rev. B2 Silicon Errata"* (DS80195) to help identify work around items.

| | |
|---|---|
| **Note:** | To take advantage of new features added to dsPIC30F6010A devices, refer to *Appendix B. "Device Comparisons"* and *Appendix C. "Migration from dsPIC30F6010 to dsPIC30F6010A"* in the "*dsPIC30F6010A/6015 Data Sheet"* (DS70150). |

### Set up Hardware

6. Solder a dsPIC30F6010A Rev. A2 device on your target board. The pins are compatible with the dsPIC30F6010, so no board level changes are required.
   Alternatively, use a dsPIC30F6010A PIM (MA300015)

### Test

7. Run your test programs.

## APPLICATION LIBRARIES

All advanced application libraries developed for the dsPIC30F6010 device are supported on the dsPIC30F6010A devices as well.

## REFERENCE DOCUMENTS

The following documents are available on our web site, www.microchip.com, and are recommended reading:

- *"dsPIC30F6010 Data Sheet"* (DS70119)
- *"dsPIC30F6010A/6015 Data Sheet"* (DS70150)
- *"dsPIC30F Family Reference Manual"* (DS70046)
- *"dsPIC30F6010 Rev. B1 Silicon Errata"* (DS80182)
- *"dsPIC30F6010 Rev. B2 Silicon Errata"* (DS80195)
- *"dsPIC30F6010A Rev. A2 Silicon Errata"* (DS80258)

# APPENDIX A: REVISION HISTORY

## Revision A (March 2006)

Original version of the document.

## Revision B (November 2006)

This revision reflects these changes:

- Adds MPLAB REAL ICE In-Circuit Emulator to development tools
- Adds recommended procedure for migrating from dsPIC30F6010 to dsPIC30F6010A
- Adds "*dsPIC30F6010A Rev. A2 Silicon Errata*" (DS80258) to Reference Documents

**NOTES:**

**Note the following details of the code protection feature on Microchip devices:**

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families 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 Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
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