dsPIC30F4011/4012

dsPIC30F4011/4012 Rev. A1 Silicon Errata

dsPIC30F4011/4012 (Rev. A1) Silicon Errata

The dsPIC30F4011/4012 (Rev. A1) samples you have received were found to conform to the specifications and functionality described in the following documents:

- DS70030 – dsPIC30F Programmer's Reference Manual
- DS70135 – dsPIC30F4011, dsPIC30F4012 Data Sheet
- DS70046 – dsPIC30F Family Reference Manual

The exceptions to the specifications in the documents listed above are described in this section. The specific devices for which these exceptions are described are listed below:

- dsPIC30F4011
- dsPIC30F4012

These devices may be identified by the following message that appears in the MPLAB® ICD 2 Output Window under MPLAB IDE, when a "reset-and-connect" operation is performed within MPLAB IDE:

```
Setting Vdd source to target
Target Device dsPIC30F4012 found, revision = Rev 0x1001
...Reading ICD Product ID
Running ICD Self Test
...Passed
MPLAB ICD 2 Ready
```

The errata described in this section will be fixed in future revisions of dsPIC30F4011 and dsPIC30F4012 devices.

Silicon Errata Summary

The following list summarizes the errata described in further detail throughout the remainder of this document:

1. Data EEPROM

   The Most Significant bit of every 4th byte in data EEPROM may be corrupted.

2. Decimal Adjust Instruction

   The Decimal Adjust instruction, `DAW.b`, may improperly clear the Carry bit, C (SR<0>).

3. Special Function Registers

   Writes to certain unimplemented address locations can affect I/O Port register values.

4. PSV Operations Using SR

   In certain instructions, fetching one of the operands from program memory using Program Space Visibility (PSV) will corrupt specific bits in the Status Register, SR.

5. Early Termination of Nested DO Loops

   When using two DO loops in a nested fashion, terminating the inner-level DO loop by setting the EDT (CORCON<11>) bit will produce unexpected results.

6. Using OSC2/RC15 pin for Digital I/O

   For this revision of silicon, if the pin RC15 is required for digital input/output, the FPR<4:0> bits in the FOSC Configuration register may not be set up for FRC w/PLL 4x/8x/16x modes.

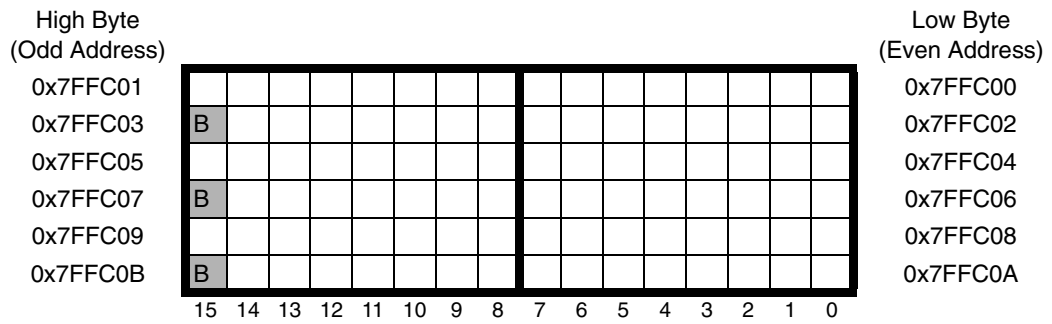
The following sections will describe the errata and work around to these errata, where they may apply.

1. Module: Data EEPROM

The Most Significant bit of every fourth byte in data EEPROM may be corrupted on any write operation. This write corruption may occur while using either PRO MATE®, MPLAB ICD 2 or Run-Time Self-Programming (RTSP).

Figure 1 shows the first twelve bytes in data EEPROM and indicates the affected bits.

FIGURE 1: dsPIC30F4011/4012 DATA EEPROM



Note 1: The shaded bits labelled “B” represent the bits that may be corrupted on a write operation.

2: The memory map shown here depicts only the first twelve bytes of device EEPROM.

Work around

Work Around 1:

Use program Flash memory instead of data EEPROM to store constant data.

Work Around 2:

Use less than 16 bits in each word in the available word of data EEPROM, excluding the Most Significant bit.

Work Around 3:

Avoid using every fourth byte. Example 1 shows how the ASM30 assembler can be used to allocate data in the EEPROM under this constraint.

EXAMPLE 1:

```
.include   "p30f4012.inc"
.section   .eedata, "r"
.align  4
.hword  0xF345
.byte   0x23
.byte   0xFF            ;Unused byte
.hword  0x1234
.byte   0x23
.byte   0xFF            ;Unused byte
```

2. Module: CPU – `DAW.b` Instruction

The Decimal Adjust instruction, `DAW.b`, may improperly clear the Carry bit, C (SR<0>), when executed.

Work around

Check the state of the Carry bit prior to executing the `DAW.b` instruction. If the Carry bit is set, set the Carry bit again after executing the `DAW.b` instruction. Example 2 shows how the application should process the Carry bit during a BCD addition operation.

EXAMPLE 2:

```
    .include "p30f4012.inc"
    .......
    MOV.b   #0x80, w0   ;First BCD number
    MOV.b   #0x80, w1   ;Second BCD number
    ADD.b   w0, w1, w2  ;Perform addition
    BRA     NC, L0      ;If C set go to L0
    DAW.b   w2          ;If not,do DAW and
    BSET.b  SR, #C      ;set the carry bit
    BRA     L1          ;and exit
L0:DAW.b    w2
L1: ....
```

3. Module: Special Function Registers

The I/O Port register values can be changed by writing to the following address locations, which are located in unimplemented memory space. A write to these unimplemented addresses could cause an I/O pin configured as an output to change states. This state change could be confirmed by reading either the Port or LAT register associated with the pin.

PORTB will be modified by a write to address 0x0C8
PORTC will be modified by a write to address 0x0CE
PORTD will be modified by a write to address 0x0D4
PORTE will be modified by a write to address 0x0DA
PORTF will be modified by a write to address 0x0E0

Work around

User software should avoid writing to the unimplemented locations listed above.

4. Module: PSV Operations Using SR

When one of the operands of instructions shown in Table 1 is fetched from program memory using Program Space Visibility (PSV), the Status Register, SR and/or the results may be corrupted. These instructions are identified in Table 1. Example 3 demonstrates one scenario where this occurs.

TABLE 1:

Instruction(2)	Examples of Incorrect Operation	Data Corruption IN
ADDC	`ADDC W0, [W1++], W2 ;See Note 1`	SR<1:0> bits(3), Result in W2
SUBB	`SUBB.b W0, [++W1], W3 ;See Note 1`	SR<1:0> bits(3), Result in W3
CPB	`CPB W0, [W1++], W4 ;See Note 1`	SR<1:0> bits(3)
RLC	`RLC [W1], W4 ;See Note 1`	SR<1:0> bits(3), Result in W4
RRC	`RRC [W1], W2 ;See Note 1`	SR<1:0> bits(3), Result in W2
ADD (Accumulator-based)	`ADD [W1++], A ;See Note 1`	SR<1:0> bits(4)
LAC	`LAC [W1], A ;See Note 1`	SR<15:10> bits(4)

Note 1: The errata only affects these instructions when a PSV access is performed to fetch one of the source operands in the instruction. A PSV access is performed when the Effective Address of the source operand is greater than 0x8000 and the PSV (CORCON<2>) bit is set to '1'. In the examples shown, the data access from program memory is made via the W1 register.

2: Refer to the Programmer's Reference Manual for details on the dsPIC30F instruction set.

3: SR<1:0> bits represent Sticky Zero and Carry status bits respectively.

4: SR<15:10> bits represent Accumulator Overflow and Saturation status bits

EXAMPLE 3:

```
.include "p30fxxxx.inc"
.......
MOV.B #0x00, W0      ;Load PSVPAG register
MOV.B WREG, PSVPAG
BSET  CORCON, #PSV   ;Enable PSV
....
MOV   #0x8200, W1    ;Set up W1 for
                     ;indirect PSV access
                     ;from 0x000200
ADD   W3, [W1++], W5 ;This instruction
                     ;works ok
ADDC  W4, [W1++], W6 ;Carry flag and
                     ;W6 gets
                     ;corrupted here!
```

Work around

Work Around 1: For Assembly Language Source Code

To work around the erratum in the MPLAB® ASM30 assembler, the application may perform a PSV access to move the source operand from program memory to RAM or a W register prior to performing the operations listed in Table 1. The work around for Example 3 is demonstrated in Example 4.

EXAMPLE 4:

```
.include "p30fxxxx.inc"
.......
MOV.B #0x00, w0      ;Load PSVPAG register
MOV.B WREG, PSVPAG
BSET  CORCON, #PSV   ;Enable PSV
....
MOV   #0x8200, W1    ;Set up W1 for
                     ;indirect PSV access
                     ;from 0x000200
ADD   W3, [W1++], W5 ;This instruction
                     ;works ok
MOV   [W1++], W2     ;Load W2 with data
                     ;from program memory
ADDC  W4, W2, W6     ;Carry flag and W4
                     ;results are ok!
```

Work Around 2: For C Language Source Code

For applications using C language, MPLAB C30 versions 1.20.04 or higher provide the following command-line switch that implements a work around for the erratum.

```
-merrata=psv
```

Refer to the "`readme.txt`" file in the MPLAB C30 v1.20.04 toolsuite for further details.

5. Module: Early Termination of Nested DO Loops

When using two DO loops in a nested fashion, terminating the inner-level DO loop by setting the EDT (CORCON<11>) bit will produce unexpected results. Specifically, the device may continue executing code within the outer DO loop forever. This erratum does not affect the operation of the MPLAB C30 compiler.

Work around

The application should save the DCOUNT SFR prior to entering the inner DO loop and restore it upon exiting the inner DO loop. This work around is shown in Example 5.

EXAMPLE 5:

```
       .include "p30fxxxx.inc"
       .......
       DO    #CNT1, LOOP0  ;Outer loop start
       ....
       PUSH  DCOUNT        ;Save DCOUNT
       DO    #CNT2, LOOP1  ;Inner loop
       ....                ;starts
       BTSS  Flag, #0
       BSET  CORCON, #EDT  ;Terminate inner
       ....                ;DO-loop early
       ....
LOOP1: MOV   W1, W5        ;Inner loop ends
       POP   DCOUNT        ;Restore DCOUNT
       ...
LOOP0: MOV   W5, W8        ;Outer loop ends

Note:  For details on the functionality of
       EDT bit, see section 2.9.2.4
       in the dsPIC30F Family Reference
       Manual.
```

6. Module: Using OSC2/RC15 pin for Digital I/O

The port pin, RC15, is multiplexed with the primary oscillator pin, OSC2. When pin RC15 is required for digital input/output, specific bits in the Oscillator Configuration register, FOSC, may be set up as follows:

- FOS<2:0> (FOSC<10:8>) bits configured for LP, LPRC, FRC, ECIO, ERCIO or ECIO w/PLL 4x/8x/16x
- FPR<4:0> (FOSC<4:0>) bits may be configured for ECIO w/PLL 4x/8x/16x

For this revision of silicon, if the RC15 digital I/O port function is desired, the FPR<4:0> bits in the FOSC Configuration register may not be set up for FRC w/PLL 4x/8x/16x modes.

Work around

None. In future revisions of silicon, port pin RC15 may also be configured for digital I/O when the FPR<4:0> bits in the FOSC Configuration register are set up for FRC w/PLL 4x/8x/16x modes.

APPENDIX A: REVISION HISTORY

Revision A (8/2004)

Original version of the document.

Revision B (11/2004)

Added silicon issues 4 (PSV Operations Using SR) and 5 (Early Termination of Nested DO Loops).

Revision C (4/2005)

Added silicon issue 6 (Using OSC2/RC15 pin for Digital I/O).

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.
- 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 products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Trademarks

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949:2002

Microchip received ISO/TS-16949:2002 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona and Mountain View, California in October 2003. The Company's quality system processes and procedures are for its PICmicro® 8-bit MCUs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://support.microchip.com
Web Address:
www.microchip.com

Atlanta
Alpharetta, GA
Tel: 770-640-0034
Fax: 770-640-0307

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

San Jose
Mountain View, CA
Tel: 650-215-1444
Fax: 650-961-0286

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8528-2100
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8676-6200
Fax: 86-28-8676-6599

China - Fuzhou
Tel: 86-591-8750-3506
Fax: 86-591-8750-3521

China - Hong Kong SAR
Tel: 852-2401-1200
Fax: 852-2401-3431

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8203-2660
Fax: 86-755-8203-1760

China - Shunde
Tel: 86-757-2839-5507
Fax: 86-757-2839-5571

China - Qingdao
Tel: 86-532-502-7355
Fax: 86-532-502-7205

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-2229-0061
Fax: 91-80-2229-0062

India - New Delhi
Tel: 91-11-5160-8631
Fax: 91-11-5160-8632

Japan - Kanagawa
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Kaohsiung
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan - Taipei
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

Taiwan - Hsinchu
Tel: 886-3-572-9526
Fax: 886-3-572-6459

EUROPE

Austria - Weis
Tel: 43-7242-2244-399
Fax: 43-7242-2244-393

Denmark - Ballerup
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Massy
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Ismaning
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

England - Berkshire
Tel: 44-118-921-5869
Fax: 44-118-921-5820

03/01/05