PIC16(L)F1784/6/7 Family
Silicon Errata and Data Sheet Clarification

The PIC16(L)F1784/6/7 family devices that you have received conform functionally to the current Device Data Sheet (DS41637**C**), except for the anomalies described in this document.

The silicon issues discussed in the following pages are for silicon revisions with the Device and Revision IDs listed in Table 1. The silicon issues are summarized in Table 2.

The errata described in this document will be addressed in future revisions of the PIC16(L)F1784/6/7 silicon.

Note:	This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated in the last column of Table 2 apply to the current silicon revision (**C1**).

Data Sheet clarifications and corrections start on page 5, following the discussion of silicon issues.

The silicon revision level can be identified using the current version of MPLAB® IDE and Microchip's programmers, debuggers, and emulation tools, which are available at the Microchip corporate web site (www.microchip.com).

For example, to identify the silicon revision level using MPLAB IDE in conjunction with a hardware debugger:

1. Using the appropriate interface, connect the device to the hardware debugger.
2. Open an MPLAB IDE project.
3. Configure the MPLAB IDE project for the appropriate device and hardware debugger.
4. Based on the version of MPLAB IDE you are using, do one of the following:
   a) For MPLAB IDE 8, select *Programmer > Reconnect*.
   b) For MPLAB X IDE, select *Window > Dashboard* and click the **Refresh Debug Tool Status** icon ( ).
5. Depending on the development tool used, the part number *and* Device Revision ID value appear in the **Output** window.

Note:	If you are unable to extract the silicon revision level, please contact your local Microchip sales office for assistance.

The DEVREV values for the various PIC16(L)F1784/6/7 silicon revisions are shown in Table 1.

TABLE 1: SILICON DEVREV VALUES

Part Number	DEVICE ID<13:0>(1),(2)		
	DEV<8:0>	REV<4:0> Silicon Revision	
		C0	C1
PIC16F1784	10 1010 010	0 1001	0 1010
PIC16LF1784	10 1010 111	0 1001	0 1010
PIC16F1786	10 1010 011	0 1001	0 1010
PIC16LF1786	10 1011 000	0 1001	0 1010
PIC16F1787	10 1010 100	0 1001	0 1010
PIC16LF1787	10 1011 001	0 1001	0 1010

Note 1: The Device ID is located in the configuration memory at address 8006h.

2: Refer to the *"PIC16(L)F178X Memory Programming Specification"* (DS41457) for detailed information on Device and Revision IDs for your specific device.

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions(1)	
				C0	C1
Comparator	Low-Power mode	1.1	Improper Low-Power mode operation.	X	X
PSMC	Rising Edge Input	2.1	Period and falling edge race condition.	X	X
PSMC	64 MHz Clock	2.2	Failure to operate when PLLEN Configuration bit is set.	X	X
Resets	Low-Power Sleep	3.1	$\overline{\text{MCLR}}$ Reset during low-power Sleep will be reported as a POR Reset (PIC16F1784/6/7 devices only).	X	X
CPU	BRA/BRW	4.1	An interrupt during execution of BRA or BRW instruction can return an incorrect PC value.	X	
CCP3	Capture	5.1	TTL Input suppresses capture event.	X	
MSSP	Capture	6.1	Bit 1 always '0' when CKE = 0	X	X

Note 1: Only those issues indicated in the last column apply to the current silicon revision.

Silicon Errata Issues

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated by the shaded column in the following tables apply to the current silicon revision (**C1**).

1. Module: Comparator

1.1 No Low-Power, No Low-Speed Mode

The comparator operation in Low-Power, Low-Speed mode (CxSP = 0) may not perform properly.

Work around

Use the comparator in High-Power mode.

Affected Silicon Revisions

C0	C1						
X	X						

2. Module: PSMC

2.1 Rising Edge Inhibit

When the period and falling edge sources are from the same asynchronous input, then a race condition may occur where the period is detected before the falling edge. When this occurs, the falling edge properly terminates the cycle but subsequent rising edge inputs are ignored.

Work around

To configure the PSMC for fixed off-time and variable frequency, set the following:

- Period = Asynchronous feedback
- Rising Event = Synchronous @ PSMCxPH = 0
- Falling Event = Synchronous @ PSMCxDC = Off Time
- Output inverted so drive time is from falling event to period event.

Affected Silicon Revisions

C0	C1						
X	X						

2.2 64 MHz Clock

When the Configuration bits select both PLL enabled and INTOSC as the default system clock, then the 64 MHz PSMC clock will not operate after a device Reset until the IRCF<3:0> bits of the OSCCON register are set to '111x'. The IRCF bits can then be set to any desired value and the 64 MHz clock will continue to operate.

Work around

Ensure that the PLLEN bit of the CONFIG2 register is cleared when the FOSC<2:0> bits of the CONFIG1 register select the INTOSC (FOSC<2:0> = '100').

Affected Silicon Revisions

C0	C1						
X	X						

3. Module: Resets

3.1 Low-Power Sleep (PIC16F1784/6/7 devices only)

When the device is in low-power Sleep (VREGPM = 1 and SLEEP instruction is executed), a $\overline{MCLR}$ Reset will be reported as a POR Reset:

- $\overline{PD}$ = 1
- $\overline{POR}$ = 0
- $\overline{RDMCLR}$ = 1

Work around

Use Normal-Power Sleep mode (VREGPM = 0).

Affected Silicon Revisions

C0	C1						
X	X						

4. Module: CPU

4.1 BRA/BRW

If a BRA or BRW instruction is executed concurrently with an interrupt event, the ISR routine can restore the PC to an incorrect value.

Work around

Use the GOTO instruction rather than the BRA or BRW instruction.

Affected Silicon Revisions

C0	C1						
X							

5. Module: CCP3

5.1 CCP3 Capture (PIC16(L)F1784/7 only)

When the input threshold control for RE0 is configured for TTL, the CCP3 capture input is ignored.

Work around

Use ST Threshold.

Affected Silicon Revisions

C0	C1						
X							

6. Module: MSSP

6.1 MSSP SPI Mode

In Master and Slave mode, when the CKE bit is cleared to '0', then received data bytes may have bit 1 (where bit 0 is the Least Significant bit) improperly received as a '0'.

Work around

Set both master and slave CKE bits to '1'.

Affected Silicon Revisions

C0	C1						
X	X						

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS41637**C**):

Note:	Corrections are shown in **bold**. Where possible, the original bold text formatting has been removed for clarity.

None.

APPENDIX A: DOCUMENT REVISION HISTORY

Rev A Document (03/2013)

Initial release of this document.

Rev B Document (07/2013)

Added Module 5; Added Silicon Revision C1; Other minor corrections.

Rev C Document (10/2014)

Added Module 6.

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

ISBN: 978-1-63276-680-9

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
═ ISO/TS 16949 ═

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, 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://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

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

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

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

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

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

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

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

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

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

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: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880- 3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

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

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

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

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

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

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

Germany - Dusseldorf
Tel: 49-2129-3766400

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

Germany - Pforzheim
Tel: 49-7231-424750

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

Italy - Venice
Tel: 39-049-7625286

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

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

03/25/14