PIC32MM0064GPL036 Family Silicon Errata and Data Sheet Clarification

The PIC32MM0064GPL036 family devices that you have received conform functionally to the current Device Data Sheet (DS60001324**B**), 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 PIC32MM0064GPL036 family 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 (**B0**).

Data Sheet clarifications and corrections start on page 6, 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 PIC32MM0064GPL036 family silicon revisions are shown in Table 1.

TABLE 1: SILICON DEVREV VALUES

Part Number	Device ID(1)	Revision ID for Silicon Revision(1)
		B0
PIC32MM0016GPL020	06B04053	0004
PIC32MM0032GPL020	06B0C053	
PIC32MM0064GPL020	06B14053	
PIC32MM0016GPL028	06B02053	
PIC32MM0032GPL028	06B0A053	
PIC32MM0064GPL028	06B12053	
PIC32MM0016GPL036	06B06053	
PIC32MM0032GPL036	06B0B053	
PIC32MM0064GPL036	06B16053	

Note 1: The Device IDs and Revision ID (DEVID and DEVREV) are shown in hexadecimal format.

© 2016 Microchip Technology Inc.

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions[1]
				B0
ADC	12-Bit Mode Conversion	1.	ADC has missing codes.	X
ADC	Format Options	2.	ADC format option is incorrect.	X
Reset	$\overline{\text{MCLR}}$ Pin	3.	$\overline{\text{MCLR}}$ Reset does not work in Retention Sleep mode.	X
UART	Receive Buffer Overflow Detection	4.	Overflow disable feature is not functional.	X
Primary XT and HS Oscillator (POSC)	Primary Oscillator Start-up Timer (OST)	5.	OST may indicate oscillator is ready for use and set the POSCRDY bit (CLKSTAT<2>) too early.	X

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

© 2016 Microchip Technology Inc.

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 (**B0**).

1. Module: ADC

The 1023, 2046, 2047, 3070 and 3071 codes may be missing in 12-bit mode.

Work around

Use 10-bit mode if all codes are desired in the application.

Affected Silicon Revisions

B0							
X							

2. Module: ADC

The ADC result of the 32-bit signed format option (FORM<2:0> bits = b101) is the same as the result of the 16-bit signed format option (FORM<2:0> = b001).

Work around

In the software, expand the Data Output Format bits to convert the output format from 16-bit signed integer to 32-bit signed integer.

Affected Silicon Revisions

B0							
X							

3. Module: Reset

$\overline{\text{MCLR}}$ is not a source of wake-up from Retention Sleep mode. Reprogramming the device may not work when the device is in Retention Sleep.

Work around

Use other wake-up sources (such as an external interrupt or Change Notification interrupt) or implement other means in the application to prevent entering into Retention Sleep mode during programming.

Affected Silicon Revisions

B0							
X							

4. Module: UART

The receive buffer overflow disable feature, controlled by the OVFDIS bit, is not functional.

Work around

None.

Affected Silicon Revisions

B0							
X							

5. Module: Primary XT and HS Oscillator (POSC)

The Primary Oscillator Start-up Timer (OST) may indicate the oscillator is ready for use and set the POSCRDY bit (CLKSTAT<2>) too early. Clocking the device before the oscillator is ready may result in incorrect execution and exceptions. This issue exists when the POSC is requested at power-on, during clock switching, when waking from Sleep or when a peripheral module requests the POSC directly. This issue affects XT and HS modes only.

Work around

Make sure that the Primary Oscillator clock is ready before using it by following these steps:

1. Running on a non-POSC source, request the POSC clock using a peripheral such as REFO.
2. Provide a delay to stabilize POSC.
3. Switch to the POSC source.

Example 1 shows a work around for the device power-on and Example 2 explains the work around when the device wakes from Sleep.

EXAMPLE 1: USING POSC AT POWER-ON

```
#pragma  config FNOSC = FRCDIV           // Oscillator Selection bits (Fast RC oscillator (FRC))
// Clock Switching Enabled (Failsafe Clock Monitor can be enabled or disabled)
#pragma  config FCKSM = CSECMD
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
void main()
{
    // configure REFO to request POSC
    REFO1CONbits.ROSEL = 2;              // POSC = 2
    REFO1CONbits.OE = 0;                 // disable output
    REFO1CONbits.ON = 1;                 // enable module

    // wait for POSC stable clock
    // this delay may vary depending on different application conditions
    // such as voltage, temperature, layout, XT or HS mode and components
    {                                    // delay for 9 ms
        unsigned int start = __builtin_mfc0(_CP0_COUNT, _CP0_COUNT_SELECT);
while((__builtin_mfc0(_CP0_COUNT, _CP0_COUNT_SELECT)) - start < (unsigned int)(0.009*8000000/2));
    }

    // unlock OSCCON
    SYSKEY = 0;
    SYSKEY = 0xAA996655;
    SYSKEY = 0x556699AA;
    // switch to POSC = 2
    OSCCONCLR = _OSCCON_NOSC_MASK | _OSCCON_CLKLOCK_MASK | _OSCCON_OSWEN_MASK;
    OSCCONSET = (2<<_OSCCON_NOSC_POSITION) | _OSCCON_OSWEN_MASK;
    while(OSCCONbits.OSWEN == 1);        // wait for switch
```


© 2016 Microchip Technology Inc.

EXAMPLE 2: USING POSC WHEN WAKING FROM SLEEP

```
    // Clock Switching Enabled (Failsafe Clock Monitor can be enabled or disabled)
    #pragma config FCKSM = CSECMD
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    // unlock OSCCON
    SYSKEY = 0;
    SYSKEY = 0xAA996655;
    SYSKEY = 0x556699AA;
    // switch to FRC = 0 before entering to sleep
    OSCCONCLR = _OSCCON_NOSC_MASK | _OSCCON_CLKLOCK_MASK | _OSCCON_OSWEN_MASK;
    OSCCONSET = (0<<_OSCCON_NOSC_POSITION) | _OSCCON_OSWEN_MASK;
    while(OSCCONbits.OSWEN == 1);            // wait for switch

    // enter sleep mode
    asm     volatile("wait");

    // configure REFO to request POSC
    REFO1CONbits.ROSEL = 2;                  // POSC = 2
    REFO1CONbits.OE = 0;                     // disable output
    REFO1CONbits.ON = 1;                     // enable module

    // wait for POSC stable clock
    // this delay may vary depending on different application conditions
    // such as voltage, temperature, layout, XT or HS mode and components
    {                                        // delay for 9 ms
        unsigned int start = __builtin_mfc0(_CP0_COUNT, _CP0_COUNT_SELECT);
while((__builtin_mfc0(_CP0_COUNT, _CP0_COUNT_SELECT)) - start < (unsigned int)(0.009*8000000/2));
    }

    // switch to POSC = 2
    OSCCONCLR = _OSCCON_NOSC_MASK | _OSCCON_CLKLOCK_MASK | _OSCCON_OSWEN_MASK;
    OSCCONSET = (2<<_OSCCON_NOSC_POSITION) | _OSCCON_OSWEN_MASK;
    while(OSCCONbits.OSWEN == 1);            // wait for switch
```

Affected Silicon Revisions

B0							
X							

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS60001324**B**):

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

None.

© 2016 Microchip Technology Inc.

APPENDIX A: DOCUMENT REVISION HISTORY

Rev A Document (4/2016)

Initial release of this document; issued for silicon revision B0.

Rev B Document (6/2016)

Corrected the codes in silicon issue 2 (ADC).

Added silicon issue 5 (Primary XT and HS Oscillator (POSC)).

NOTES:

© 2016 Microchip Technology Inc.

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.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE**.** Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

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.

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

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KeeLoq, KeeLoq logo, Kleer, LANCheck, LINK MD, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC32 logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, ETHERSYNCH, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and QUIET-WIRE are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KleerNet, KleerNet logo, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PureSilicon, RightTouch logo, REAL ICE, Ripple Blocker, Serial Quad I/O, SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2016, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-0710-2

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 - Dongguan
Tel: 86-769-8702-9880

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

ASIA/PACIFIC

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

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

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: 886-7-213-7828

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 - Karlsruhe
Tel: 49-721-625370

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

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

07/14/15

© 2016 Microchip Technology Inc.