

PIC24FJ128GC010 Family Silicon Errata and Data Sheet Clarification

The PIC24FJ128GC010 family devices that you have received conform functionally to the current Device Data Sheet (DS30009312D), 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 PIC24FJ128GC010 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 (**B3**).

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 MPLAB ICD 3 or PICKIT™ 3:

1. Using the appropriate interface, connect the device to the MPLAB ICD 3 programmer/debugger or PICKIT 3.
2. From the main menu in MPLAB IDE, select *Configure>Select Device*, and then select the target part number in the dialog box.
3. Select the MPLAB hardware tool (*Debugger>Select Tool*).
4. Perform a "Connect" operation to the device (*Debugger>Connect*). 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 Device and Revision ID values for the various PIC24FJ128GC010 silicon revisions are shown in [Table 1](#).

TABLE 1: SILICON DEVREV VALUES

Part Number	Device ID ⁽¹⁾	Revision ID for Silicon Revision
		B3
PIC24FJ128GC010	85H	04H
PIC24FJ128GC006	89H	
PIC24FJ64GC010	84H	
PIC24FJ64GC006	88H	

Note 1: The Device and Revision IDs (DEVID and DEVREV) are located at the last two implemented addresses in program memory.

PIC24FJ128GC010 FAMILY

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions ⁽¹⁾
				B3
12-Bit Pipeline A/D	Sample Lists	1.	When multiple sample lists are configured to perform auto-scan, A/D errors may occur.	X
12-Bit Pipeline A/D	Sample Lists	2.	The A/D may not consistently generate sample list interrupt flag events when the FRC is used to derive the A/D clock.	X
12-Bit Pipeline A/D	Calibration	3.	The A/D does not hardware self-calibrate correctly when the A/D module is first powered on.	X
12-Bit Pipeline A/D	Accumulation	4.	The A/D accumulation feature with the ACCIF interrupt generation enabled.	X
12-Bit Pipeline A/D	Accuracy	5.	Unexpected A/D results under specific conditions.	X
Output Compare	Accuracy	6.	Very low speed or frequency output compare operations relying on an external timer.	X
CTMU	Edge Enable	7.	Enabling edges (EDGEN = 1) can generate a glitch.	X
CTMU	Pulse or Delay Generation	8.	Pulse or Delay Generation mode is not functional.	X

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

PIC24FJ128GC010 FAMILY

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 (**B3**).

1. Module: 12-Bit Pipeline A/D

When multiple sample lists are configured to perform auto-scan operations, and are triggered simultaneously (or close enough that the first sample list is still busy when the subsequent one is triggered), unexpected A/D result values may be generated.

Work around

If using auto-scan operations, only enable and trigger one sample list at a time.

Affected Silicon Revisions

B3						
X						

2. Module: 12-Bit Pipeline A/D

The A/D may not consistently generate sample list-specific interrupt flag events, SLxIF (ADSTATL<3:0>), when the FRC is used to derive the A/D clock (e.g., by setting the ADRC bit (ADCON3<15>)).

Work around

Sample list interrupts are generated normally when using the system clock to derive the A/D clock (e.g., ADRC = 0), even if the system clock is derived from the FRC. Alternatively, if the ADRC bit is set, the firmware may still use the top level A/D interrupt, AD1IF (IFS0<13>), as the AD1IF flag event and the A/D result data is still generated normally.

Affected Silicon Revisions

B3						
X						

3. Module: 12-Bit Pipeline A/D

The A/D does not hardware self-calibrate correctly when the A/D module is first powered on.

Work around

In order to reliably initiate a hardware self-calibration of the A/D, the firmware needs to turn on the A/D, wait until ADREADY = 1 and then write '1' to the ADCAL bit to initiate a new calibration operation. The A/D will then perform the self-calibration in the background. Once it is done, it will set the ADREADY bit to '1' and the A/D will be ready to use.

Affected Silicon Revisions

B3						
X						

4. Module: 12-Bit Pipeline A/D

When using the A/D accumulation feature with the ACCIF interrupt generation enabled (ACIE = 1), the ACCIF (ADSTATL<4>) interrupt flag is not set if the accumulation operation was started with a COUNT<7:0> (ACCONL<7:0>) value of '1'.

Work around

The ACCIF interrupt works normally for all other accumulation count values (other than '1'). If only one A/D measurement is planned, it is suggested not to use the accumulation feature. Perform a normal A/D measurement instead.

Affected Silicon Revisions

B3						
X						

PIC24FJ128GC010 FAMILY

5. Module: 12-Bit Pipeline A/D

Unexpected A/D result data may occur when the ADC is operated in Single-Ended Input mode and the analog input voltage is within the upper 1/3 of the ADC input voltage range.

Work around

A normal result is obtained when operating in Differential Input mode. If the application uses Single-Ended Input mode, a normal result can be obtained if the application simultaneously does all of the following:

- The positive ADC reference voltage is maintained lower than $(AVDD - 0.5V)$. This can be implemented either with an external reference or by using the internal BGBUF1 source (e.g., configured for 2.048V or 2.560V).
- The ADC is operated with the REFPUMP bit $(ADCON2<1>) = 1$.
- The ADC is maintained continuously converting at a high rate (e.g., ≥ 4 Msps). This can be implemented by using a low-priority list with a continuous trigger option to keep the ADC busy. The conversions required by the application should be done by using higher priority lists. The code in [Example 1](#) shows the settings for the low priority list to maintain the high conversion rate.

EXAMPLE 1: LOW-PRIORITY LIST CONFIGURATION TO MAINTAIN A HIGH CONVERSION RATE

```
//Configure Sample List 3 (SL3, which has lowest priority) to continuously use all free
//ADC clock cycles by performing dummy conversion operations on an internal channel VREF-.
ADL3CONL = 0;
ADL3CONH = 0;
ADL3CONLbits.SLSIZE = 1-1; //1 channel is scanned.
ADL3CONLbits.SLTsrc = 2; //Trigger is generated every clock when SAMP = 0.
ADTBLx = 124; //124 = VREF-. Replace ADTBLx with real value after allocating SL0-SL2.
ADL3CONLbits.SLEN = 1; //Enable SL3.
ADL3CONLbits.SAMP = 0; //Trigger SL3 on every ADC clock period.
//Use Sample Lists 0-2 for sampling the actual application ADC channel(s) of interest.
//The SL0-SL2 have higher priority than SL3 trigger events, so having SL3 free running
//at speed doesn't decrease the useful ADC bandwidth/sample rate achievable on SL0-SL2.
//Note: Avoid auto-scan when using multiple sample lists (see errata #1).
```

Affected Silicon Revisions

B3						
X						

PIC24FJ128GC010 FAMILY

6. Module: Output Compare

Certain very low-speed or frequency output compare operations, relying on an external timer (e.g., Timer2), may not work correctly if the external timer is configured for a prescaler setting other than 1:1.

Work around

If using output compare operations with an external timer, configure the timer to operate in the 1:1 Prescaler mode.

Affected Silicon Revisions

B3							
X							

7. Module: CTMU

Enabling edges (EDGEN = 1) generates a glitch (edge) if the CTEDx pin is set for a falling edge and the level on this pin is low, or if the CTEDx pin is set for a rising edge and the level on this pin is high.

Work around

External AND logic can be used for each CTEDx pin to gate these control signals. EDGEN should not be changed (always set to '1').

Affected Silicon Revisions

B3							
X							

8. Module: CTMU

When the CTMU is configured in Pulse or Delay Generation mode with the TGEN bit = 1 (CTMUCON1[12] = 1), the EDG1STAT and EDG2STAT bits (CTMUCON2[9:8]) do not get set. The CTMU current source is always disabled.

Work around

None.

Affected Silicon Revisions

B3							
X							

PIC24FJ128GC010 FAMILY

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS30009312D):

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

1. Module: Electrical Characteristics

In Table 37-28, the test conditions for A/D Accuracy Parameters AD21, AD22, AD23 and AD24 have changed. The Minimum and Maximum values for AD21 (Integral Nonlinearity) are modified. The changes are shown below in bold.

TABLE 37-28: 12-BIT PIPELINE A/D MODULE SPECIFICATIONS

AC CHARACTERISTICS			Standard Operating Conditions: 2.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +85°C for Industrial				
Param No.	Symbol	Characteristic	Min.	Typ	Max.	Units	Conditions
A/D Accuracy							
AD21	INL	Integral Nonlinearity	-9	—	+9	LSb	AVSS = VREFL = 0V, AVDD = 3.3V, VREFH = 2.56V
AD22	DNL	Differential Nonlinearity	-3	—	+3	LSb	AVSS = VREFL = 0V, AVDD = 3.3V, VREFH = 2.56V
AD23	GERR	Gain Error	-8	—	+8	LSb	AVSS = VREFL = 0V, AVDD = 3.3V, VREFH = 2.56V
AD24	E _{OFF}	Offset Error	-12	—	+12	LSb	AVSS = VREFL = 0V, AVDD = 3.3V, VREFH = 2.56V

APPENDIX A: REVISION HISTORY

Rev A Document (5/2013)

Initial release of this document.

Rev B Document (9/2013)

Added data sheet clarifications 1 (Device Overview), 2-3 (Electrical Characteristics), 4 (CMxCON Register), 5 (DOZE<2:0> and DOZEN Bits), 6 (Decoupling Capacitors) and 7 (DACxCON Register).

Rev C Document (4/2014)

Corrects device family to “PIC24FJ128GC010 family”, to be consistent with the family name provided on all other literature.

Corrects the module titles for data sheet clarifications 4 through 7, to be consistent with existing practice. The clarifications themselves are unaffected.

Added data sheet clarifications 8 (Power-Saving Features) and 9 (12-Bit High-Speed, Pipeline A/D Converter).

Rev D Document (10/2014)

Removes all data sheet clarifications as they were addressed in the new revision of the data sheet.

Rev E Document (12/2016)

Updated existing silicon errata issue 5 ([12-Bit Pipeline A/D](#)).

Rev F Document (4/2017)

Added data sheet clarification 1 ([Electrical Characteristics](#)).

Rev G Document (11/2022)

Added silicon errata issue 8 ([CTMU](#)).

PIC24FJ128GC010 FAMILY

NOTES:

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
 - Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
 - Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
 - Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "unbreakable" Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.
-

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications 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. Contact your local Microchip sales office for additional support or, obtain additional support at <https://www.microchip.com/en-us/support/design-help/client-support-services>.

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". 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 ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

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.

For information regarding Microchip's Quality Management Systems, please visit www.microchip.com/quality.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Klear, LANCheck, LinkMD, maxStylus, maxTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, TrueTime, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, KoD, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQI, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, 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.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark 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.

© 2013-2022, Microchip Technology Incorporated and its subsidiaries.

All Rights Reserved.

ISBN: 978-1-6683-1522-4

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

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
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

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

China - Beijing
Tel: 86-10-8569-7000

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

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

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

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

China - Hong Kong SAR
Tel: 852-2943-5100

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

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

China - Shanghai
Tel: 86-21-3326-8000

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

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

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

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

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

ASIA/PACIFIC

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

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

India - Pune
Tel: 91-20-4121-0141

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

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

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

Korea - Seoul
Tel: 82-2-554-7200

Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906

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

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

Singapore
Tel: 65-6334-8870

Taiwan - Hsin Chu
Tel: 886-3-577-8366

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

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

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

Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

EUROPE

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

Denmark - Copenhagen
Tel: 45-4485-5910
Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

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

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-72400

Germany - Karlsruhe
Tel: 49-721-625370

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

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
Tel: 972-9-744-7705

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

Italy - Padova
Tel: 39-049-7625286

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

Norway - Trondheim
Tel: 47-7288-4388

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

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

Sweden - Gothenberg
Tel: 46-31-704-60-40

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

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