
PIC18F27/47Q10 Family Silicon Errata and Data Sheet Clarifications

The PIC18F27/47Q10 devices that you have received conform functionally to the current device data sheet (DS40002043C), 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 the table below.

The errata described in this document will be addressed in future revisions of the PIC18F27/47Q10 silicon.

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current.

Table 1. Silicon Device Identification

Part Number	Device ID	Revision ID
		A4
PIC18F27Q10	0x7100	0xA044
PIC18F47Q10	0x70E0	0xA044



Important: Refer to the **Device/Revision ID** section in the current “**PIC18F2X/4XQ10 Memory Programming Specification**” (DS40001874) for more detailed information on Device Identification and Revision IDs for your specific device.

Table 2. Silicon Issue Summary

Module	Feature	Item No.	Issue Summary	Affected Revisions
				A4
Electrical Specifications	Temperature Range	1.1.1	Industrial temperature range only	X
Electrical Specifications	Sleep Current	1.1.2	Higher current after DFM write	X
Resets	MCLR Flag	1.2.1	POR may set MCLR flag by mistake	X
CWG	Auto-Shutdown Sources	1.3.1	CLC2 and CLC6 not available	X
ADCC	FVR Reference	1.4.1	Missing codes when FVR used as reference	X
ADCC	Burst Average	1.4.2	ADCNT may not increment	X
ADCC	ADCRC (FRC) Oscillator	1.4.3	Oscillator continues to run in sleep after conversion	X
ADCC	CVD	1.4.4	Unreliable high/low conversion results with small sample and hold capacitor selections	X
ADCC	Input SlewRate	1.4.5	Unreliable conversion results with fast falling slew rate	X
Windowed Watchdog Timer	Window Operation	1.5.1	Window feature of the WWDT does not operate correctly in DOZE mode	X
NVM	NVMERR	1.6.1	NVMERR bit is set by device Reset after being cleared by software	X

.....continued

Module	Feature	Item No.	Issue Summary	Affected Revisions
				A4
Oscillator	HFINTOSC	1.7.1	5% variation over temperature range	X

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

1. Silicon Errata Issues



Notice: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated by the bold font in the following tables apply to the current silicon revision.

1.1 Module: Electrical Specifications

1.1.1 Industrial Temperature Range Only

Extended temperature range devices are not released.

Work around

Operate at or below 85 degrees Celsius.

Affected Silicon Revisions

A4							
X							

1.1.2 Sleep Current - Higher Sleep Current after DFM Write Operation

When performing a DFM write operation during Sleep mode, once the write operation has completed, the system clock will stay active. This means that while the device remains in this state, a higher Sleep current will be experienced.

Work around

Once the DFM write operation is completed, wake the device out of Sleep mode and re-execute a new Sleep command.

Affected Silicon Revisions

A4							
X							

1.2 Module: Resets

1.2.1 $\overline{\text{RMCLR}}$ Flag in PCON0 Register by Mistake

On an initial power-up of the device, or when executing a software Reset, the PCON0 flag bit for MCLR Reset ($\overline{\text{RMCLR}}$) may be improperly cleared by a Power-on Reset ($\overline{\text{POR}}$) or software Reset ($\overline{\text{RI}}$), thereby indicating a false MCLR event.

Work around

None.

Affected Silicon Revisions

A4							
X							

1.3 Module: Complementary Waveform Generator (CWG)

1.3.1 CWG Auto-Shutdown Sources

Shutdown sources AS6E (CLC2_out) and AS7E (CLC6_out) are not available.

Work around

Route the CLC output through PPS to an output pin and use the AS0E source selection (Pin selected by CWGxPPS) and PPS controls to select the same pin as the shutdown source.

Affected Silicon Revisions

A4							
X							

1.4 Module: Analog-to-Digital Converter with Computation (ADCC)

1.4.1 Missing Codes with FVR Reference

Using the FVR as the positive voltage reference for the ADC can cause an increase in missing codes.

Work around

Method 1:

Increase the bit conversion time, known as TAD, to 8 μs or higher.

Method 2:

Use V_{DD} as the positive voltage reference to the ADC.

Affected Silicon Revisions

A4							
X							

1.4.2 ADC² Burst Average Mode

When the ADC² is operated in Burst Average mode (ADMD = 0b011 in the ADCON2 register) while enabling non-continuous operation and double-sampling (ADCONT = 0 in the ADCON0 register and ADDSEN = 1 in the ADCON1 register), the value in the ADCNT register does not increment beyond '0b1' toward the value in the ADRPT register.

Work around

When operating the ADC² in Burst Average mode with double-sampling, enable continuous operation of the module (ADCONT = 1 in the ADCON0 register) and set the Stop-on-Interrupt bit (ADS0I bit in the ADCON3 register). After the interrupt occurs, perform appropriate threshold calculations in the software and re-trigger ADC² as necessary.

If the CPU is in Low-Power Sleep mode, alternatively the ADC² in non-continuous Burst Average mode can be operated with single ADC conversion (ADDSEN = 0 in the ADCON1 register) compromising noise

immunity for lower power consumption by preventing the device from waking up to perform threshold calculations in the software.

Affected Silicon Revisions

A4							
X							

1.4.3 ADCRC (FRC) Oscillator Operation in Sleep

If the part is in Sleep and the ADCRC (FRC) oscillator is used as clock source to the ADC, the oscillator continues to run after the conversion is complete. This will increase the current consumption in Sleep mode. The oscillator will stop after the device exits Sleep mode and resumes normal code execution.

Work around

None.

Affected Silicon Revisions

A4							
X							

1.4.4 Unreliable High/Low CVD Conversion Results with Small Sample and Hold Capacitor Selections

When the sample and hold capacitor selection is less than half the available maximum then the apparent low precharge appears to fail resulting in a low conversion result greater than the high conversion result.

Work around

Select sample and hold values greater than half the available maximum when using the CVD feature.

Affected Silicon Revisions

A4							
X							

1.4.5 Unreliable Conversion Results with Fast Falling Slew Rate

When the ADC input falls by greater than 3.2V, with a slew rate faster than $-11V/\mu s$, the next ADC conversion will have the MSb improperly set. This is likely to happen when the ADC input channel is switched from one with a high input level to another with a low input level.

Work around

When switching between input channels, discard the first conversion result after the switch. Subsequent conversions will not be affected.

Affected Silicon Revisions

A4							
X							

1.5 Module: Windowed Watchdog Timer (WWDT)

1.5.1 Window Operation in DOZE Mode

When the Windowed mode of operation is enabled in DOZE mode, a window violation error is issued even though the window is open and has been armed. This condition occurs only when the window size is set to a value other than 100% open.

Work around

Method 1:

Use the Windowed mode of operation in any other than DOZE mode. If disabling the DOZE mode is not an option, use the WWDT module without the Window being enabled.

Method 2:

If the device is in DOZE mode, perform the arming process for the window in NORMAL mode and return to the DOZE mode.

Method 3:

If there is an ISR in the application code, the arming within the window can be done inside the ISR with the ROI bit of the CPUDOZE register being set.

Affected Silicon Revisions

A4							
X							

1.6 Module: Nonvolatile Memory (NVM)

1.6.1 NVMERR

When a Reset is issued while an NVM high voltage operation is in progress, the NVMERR bit in the NVMCON0 register is set as expected. After clearing the NVMERR bit, if a Reset reoccurs, the NVMERR bit is set again regardless of whether an NVM operation is in progress or not. A successful write operation will clear the NVMERR condition.

Work around

None.

Affected Silicon Revisions

A4							
X							

1.7 Module: Oscillator

1.7.1 Internal HFINTOSC Oscillator Varies Up To 5%

The internal HFINTOSC oscillator varies in frequency up to 5% over the voltage and temperature range.

Work around

For systems requiring more precision, use an external crystal or ceramic resonator in one of the External Oscillator modes.

Affected Silicon Revisions

A4							
X							

2. Data Sheet Clarifications

2.1 None

There are no known data sheet clarifications as of this publication date.

3. Revision History

Doc Rev.	Date	Comments
A	04/2019	Initial document release.

Microchip Devices Code Protection Feature

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.

The Microchip Web Site

Microchip provides online support via our web site at <http://www.microchip.com/>. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

Customer Change Notification Service

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at <http://www.microchip.com/>. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office

- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://www.microchip.com/support>

Microchip Devices Code Protection Feature

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.

Legal Notice

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.

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BitCloud, chipKIT, chipKIT logo, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Helder, JukeBlox, KeeLoq, Klear, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA 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.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, INICnet, Inter-Chip Connectivity, JitterBlocker, KleerNet, KleerNet logo, memBrain, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., 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 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.

© 2019, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-4442-8

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	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
<p>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</p> <p>Atlanta Duluth, GA Tel: 678-957-9614 Fax: 678-957-1455</p> <p>Austin, TX Tel: 512-257-3370</p> <p>Boston Westborough, MA Tel: 774-760-0087 Fax: 774-760-0088</p> <p>Chicago Itasca, IL Tel: 630-285-0071 Fax: 630-285-0075</p> <p>Dallas Addison, TX Tel: 972-818-7423 Fax: 972-818-2924</p> <p>Detroit Novi, MI Tel: 248-848-4000</p> <p>Houston, TX Tel: 281-894-5983</p> <p>Indianapolis Noblesville, IN Tel: 317-773-8323 Fax: 317-773-5453 Tel: 317-536-2380</p> <p>Los Angeles Mission Viejo, CA Tel: 949-462-9523 Fax: 949-462-9608 Tel: 951-273-7800</p> <p>Raleigh, NC Tel: 919-844-7510</p> <p>New York, NY Tel: 631-435-6000</p> <p>San Jose, CA Tel: 408-735-9110 Tel: 408-436-4270</p> <p>Canada - Toronto Tel: 905-695-1980 Fax: 905-695-2078</p>	<p>Australia - Sydney Tel: 61-2-9868-6733</p> <p>China - Beijing Tel: 86-10-8569-7000</p> <p>China - Chengdu Tel: 86-28-8665-5511</p> <p>China - Chongqing Tel: 86-23-8980-9588</p> <p>China - Dongguan Tel: 86-769-8702-9880</p> <p>China - Guangzhou Tel: 86-20-8755-8029</p> <p>China - Hangzhou Tel: 86-571-8792-8115</p> <p>China - Hong Kong SAR Tel: 852-2943-5100</p> <p>China - Nanjing Tel: 86-25-8473-2460</p> <p>China - Qingdao Tel: 86-532-8502-7355</p> <p>China - Shanghai Tel: 86-21-3326-8000</p> <p>China - Shenyang Tel: 86-24-2334-2829</p> <p>China - Shenzhen Tel: 86-755-8864-2200</p> <p>China - Suzhou Tel: 86-186-6233-1526</p> <p>China - Wuhan Tel: 86-27-5980-5300</p> <p>China - Xian Tel: 86-29-8833-7252</p> <p>China - Xiamen Tel: 86-592-2388138</p> <p>China - Zhuhai Tel: 86-756-3210040</p>	<p>India - Bangalore Tel: 91-80-3090-4444</p> <p>India - New Delhi Tel: 91-11-4160-8631</p> <p>India - Pune Tel: 91-20-4121-0141</p> <p>Japan - Osaka Tel: 81-6-6152-7160</p> <p>Japan - Tokyo Tel: 81-3-6880-3770</p> <p>Korea - Daegu Tel: 82-53-744-4301</p> <p>Korea - Seoul Tel: 82-2-554-7200</p> <p>Malaysia - Kuala Lumpur Tel: 60-3-7651-7906</p> <p>Malaysia - Penang Tel: 60-4-227-8870</p> <p>Philippines - Manila Tel: 63-2-634-9065</p> <p>Singapore Tel: 65-6334-8870</p> <p>Taiwan - Hsin Chu Tel: 886-3-577-8366</p> <p>Taiwan - Kaohsiung Tel: 886-7-213-7830</p> <p>Taiwan - Taipei Tel: 886-2-2508-8600</p> <p>Thailand - Bangkok Tel: 66-2-694-1351</p> <p>Vietnam - Ho Chi Minh Tel: 84-28-5448-2100</p>	<p>Austria - Wels Tel: 43-7242-2244-39 Fax: 43-7242-2244-393</p> <p>Denmark - Copenhagen Tel: 45-4450-2828 Fax: 45-4485-2829</p> <p>Finland - Espoo Tel: 358-9-4520-820</p> <p>France - Paris Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79</p> <p>Germany - Garching Tel: 49-8931-9700</p> <p>Germany - Haan Tel: 49-2129-3766400</p> <p>Germany - Heilbronn Tel: 49-7131-67-3636</p> <p>Germany - Karlsruhe Tel: 49-721-625370</p> <p>Germany - Munich Tel: 49-89-627-144-0 Fax: 49-89-627-144-44</p> <p>Germany - Rosenheim Tel: 49-8031-354-560</p> <p>Israel - Ra'anana Tel: 972-9-744-7705</p> <p>Italy - Milan Tel: 39-0331-742611 Fax: 39-0331-466781</p> <p>Italy - Padova Tel: 39-049-7625286</p> <p>Netherlands - Drunen Tel: 31-416-690399 Fax: 31-416-690340</p> <p>Norway - Trondheim Tel: 47-72884388</p> <p>Poland - Warsaw Tel: 48-22-3325737</p> <p>Romania - Bucharest Tel: 40-21-407-87-50</p> <p>Spain - Madrid Tel: 34-91-708-08-90 Fax: 34-91-708-08-91</p> <p>Sweden - Gothenberg Tel: 46-31-704-60-40</p> <p>Sweden - Stockholm Tel: 46-8-5090-4654</p> <p>UK - Wokingham Tel: 44-118-921-5800 Fax: 44-118-921-5820</p>