Product Change Notification / SYST-21OZFI044

Date:

22-Aug-2023

Product Category:

8-bit Microcontrollers

PCN Type:

Silicon Die Revision

Notification Subject:

ERRATA - PIC16F17114/15/24/25/44/45 Silicon Errata and Datasheet Clarifications

Affected CPNs:

SYST-21OZFI044_Affected_CPN_08222023.pdf
SYST-21OZFI044_Affected_CPN_08222023.csv

Notification Text:

SYST-21OZFI044

Microchip has released a new Errata for the PIC16F17114/15/24/25/44/45 Silicon Errata and Datasheet Clarifications of devices. If you are using one of these devices please read the document located at PIC16F17114/15/24/25/44/45 Silicon Errata and Datasheet Clarifications.

Notification Status: Final

Description of Change:
1) Added new silicon revision B3;
2) Updated datasheet revision letter to 'C';
3) Added silicon issues 1.1.2, 1.5.1, and 1.6.1.

Impacts to Data Sheet: None

Change Implementation Status: Complete

Estimated First Ship Date: 08 September 2023

NOTE: Please be advised that after the estimated first ship date customers may receive pre and post change parts.

Markings to Distinguish Revised from Unrevised Devices: Traceability Code

Attachments:

PIC16F17114/15/24/25/44/45 Silicon Errata and Datasheet Clarifications

Please contact your local Microchip sales office with questions or concerns regarding this notification.

Terms and Conditions:

If you wish to receive Microchip PCNs via email please register for our PCN email service at our PCN home page select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the PCN FAQ section.

If you wish to change your PCN profile, including opt out, please go to the PCN home page select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

Affected Catalog Part Numbers (CPN)

PIC16F17114-I/SN
PIC16F17114-I/P
PIC16F17114-I/MD
PIC16F17114T-I/SN
PIC16F17114T-I/MD
PIC16F17115-I/SN
PIC16F17115-I/P
PIC16F17115-I/MD
PIC16F17115T-I/SN
PIC16F17115T-I/MD
PIC16F17124-I/7N
PIC16F17124-I/P
PIC16F17124-I/SL
PIC16F17124-I/ST
PIC16F17124T-I/7N
PIC16F17124T-I/SL
PIC16F17124T-I/ST
PIC16F17125-I/7N
PIC16F17125-I/P
PIC16F17125-I/SL
PIC16F17125-I/ST
PIC16F17125T-I/7N
PIC16F17125T-I/SL
PIC16F17125T-I/ST
PIC16F17144-I/6N
PIC16F17144-I/SS
PIC16F17144-I/SO
PIC16F17144-I/P
PIC16F17144T-I/6N
PIC16F17144T-I/SS
PIC16F17144T-I/SO
PIC16F17145-I/6N
PIC16F17145-I/SS
PIC16F17145-I/SO
PIC16F17145-I/P
PIC16F17145T-I/6N
PIC16F17145T-I/SS
PIC16F17145T-I/SO

PIC16F17114/15/24/25/44/45 Silicon Errata and Datasheet Clarifications

PIC16F17114/15/24/25/44/45

The PIC16F17114/15/24/25/44/45 devices that you have received conform functionally to the current device data sheet (DS40002403**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 the table below.

The errata described in this document will be addressed in future revisions of the PIC16F17114/15/24/25/44/45 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		
		B0	B2	B3
PIC16F17114	0x30DB	0xA040	0xA042	0xA043
PIC16F17115	0x30E2	0xA040	0xA042	0xA043
PIC16F17124	0x30DC	0xA040	0xA042	0xA043
PIC16F17125	0x30DE	0xA040	0xA042	0xA043
PIC16F17144	0x30DD	0xA040	0xA042	0xA043
PIC16F17145	0x30DF	0xA040	0xA042	0xA043

Important: Refer to the **Device/Revision ID** section in the device data sheet for more detailed information on Device Identification and Revision IDs for your specific device.

Silicon Issue Summary

Table 2. Silicon Issue Summary

Module	Feature	Item No.	Issue Summary	Affected Revisions		
				B0	B2	B3
Analog-to-Digital Converter with Computation (ADCC)	Double Sample Conversions	1.1.1	An unexpected acquisition time is added between the first and second conversions.	X		
Analog-to-Digital Converter with Computation (ADCC)	Acquisition Time	1.1.2	Acquisition time cannot be changed through either the ADACQ or ADPRE registers.	X	X	
Comparator (CMP)	Comparator 2	1.2.1	Comparator 2 is not available on 8-pin devices.	X		
Host Synchronous Serial Port (MSSP)	I^2C Start and Stop Interrupt Function	1.3.1	A race condition can cause the Start and/or Stop flags to be set when I^2C is enabled.	X		
Configuration Words (CONFIG)	Sleep	1.4.1	Waking from Sleep may cause unexpected behavior.	X		
Digital-to-Analog Converter (DAC)	DAC Auto Enable	1.5.1	Mid-band voltage spike at code 128 may occur when $\overline{\text{DACAUTOEN}}$ is enabled and the application is incrementing the DACxDATL register from 127 to 129.	X	X	
Fixed Voltage Reference (FVR)	ADC Buffer	1.6.1	Power-down current (I_{PD}) for the ADC FVR Buffer may be higher than the current data sheet limits.			X

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

1. Silicon Errata Issues

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

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

1.1.1 Double Sample Conversions

When enabling a Double Sample Conversion (DSEN = 1) with no Precharge time (ADPRE = 0) and no Acquisition time (ADACQ = 0), the maximum number of cycles of acquisition time is inserted prior to the second conversion. The first conversion will be performed as expected with no Precharge time and no Acquisition time. It is only between the first and second conversions where a maximum number of cycles of Acquisition time is performed unexpectedly.

Work around

Method 1:

Disable Double Sample Conversion (DSEN = 0) and perform two single conversions back to back.

Method 2:

If adding acquisition time is acceptable, then select no Precharge time, along with the desired Acquisition time.

Affected Silicon Revisions

B0	B2	B3					
X							

1.1.2 Acquisition Time Cannot Be Changed through Either the ADACQ or the ADPRE Registers

ADC acquisition (sample) time cannot be modified by writing to either the ADPRE or ADACQ registers. Writes to the ADPRE or ADACQ registers will correctly delay the next conversion but will have no affect on increasing the actual sample time of the current conversion. For example, if the ADCRC is used as the clock source, the sample time will be nominally 3.33 µs, regardless of the values in either of the ADACQ or ADPRE registers.

Work around

There is essentially no work around for increasing the sample times via the ADPRE or ADACQ registers; however, there are various work arounds and/or techniques that can be implemented to acquire a more accurate ADC measurement.

- If the ADC is using the F_{OSC}, reducing the clock speed at the time of measurement will increase the overall sampling time
  - Use the NOSC/NDIV bits of OSCCON1 to reduce the oscillator speed
  - Adjust the ADCLK divider value to reduce the oscillator speed
  - Switch the ADC clock to the ADCRC
- The source input impedance (R_S) directly effects the amount of time it takes to charge the C_{HOLD} capacitor. Reducing the input impedance to a minimum will help reduce the sample time needed for the ADC measurement.

Affected Silicon Revisions

B0	B2	B3					

X	X						

1.2 Module: Comparator (CMP)

1.2.1 Comparator 2 Is Not Available

Comparator 2 is not available on 8-pin devices.

Work around

None.

Affected Silicon Revisions

B0	B2	B3					
X							

1.3 Module: MSSP

1.3.1 The I²C Start and/or Stop Flags May Be Set When I²C Is Enabled

When I²C is enabled, erroneous Start and/or Stop conditions may be detected. This can generate erroneous I²C interrupts if enabled.

Work around

Use the following procedure to correctly detect the Start and Stop conditions:

1. Disable the Start and Stop conditions interrupt functions.
2. Enable the I²C module.
3. Wait 250 ns + six instruction cycles ($F_{OSC}/4$).
4. Clear the Start and Stop conditions interrupt flags.
5. Enable the Start and Stop conditions interrupt functions if used.

```
SSPxCON3bits.SCIE = 0;          // Disable Start condition interrupt
SSPxCON3bits.PCIE = 0;          // Disable Stop condition interrupt
SSPxCON1bits.SSPEN = 1;         // Enable I2C
Delay();                        // Wait for 250 ns + 6 instruction cycles (FOSC/4)
PIRxbits.SSPxIF = 0;            // Clear the MSSP interrupt flag
SSPxCON3bits.SCIE = 1;          // Enable Start condition interrupt if used
SSPxCON3bits.PCIE = 1;          // Enable Stop condition interrupt if used
```

Affected Silicon Revisions

B0	B2	B3					
X							

1.4 Module: Configuration Words (CONFIG)

1.4.1 Waking from Sleep May Cause Unexpected Behavior

Waking from Sleep may cause unexpected behavior.

Work around

Do not use the `SLEEP` instruction. If clock switching is available and there is a need for reduced current consumption, switch to the slowest system clock.

Affected Silicon Revisions

B0	B2	B3					
X							

1.5 Module: Digital-to-Analog Converter (DAC)

1.5.1 Mid-band Voltage Spike at Code 128 May Occur when $\overline{\text{DACAUTOEN}}$ Is Enabled and the Application Is Incrementing the DACxDATL Register from 127 to 129

When the $\overline{\text{DACAUTOEN}}$ bit is enabled, a voltage glitch on the DACxOUT pin may occur at code 128 when the application is incrementing the DACxDATL register from 127 to 129 and the alternate DACxOUT pin is either tied to GND or V_{DD}. If the alternate pin is tied to V_{DD}, the glitch will be positive; if the pin is tied to GND, the glitch will be negative.

Work around

None.

Affected Silicon Revisions

B0	B2	B3					
X	X						

1.6 Module: Fixed Voltage Reference (FVR)

1.6.1 Power-down Current (I_{PD}) for the ADC FVR Buffer May Be Higher than the Current Data Sheet Limits

When using the ADC FVR Buffer as an ADC reference, the I_{PD} current may be higher than the current data sheet limits. The parameters for **B3** silicon are as follows:

Param. No.	Sym.	Device Characteristics	Min.	Typ.†	Max. +85°C	Max. +125°C	Units	Conditions	
								V_{DD}	Note
D204	$I_{PD\_FVR\_BUF1}$	FVR Buffer 1 (ADC)	—	**171**	**420**	**485**	µA	3.0V	

Work around

None.

Affected Silicon Revisions

B0	B2	B3					
		X					

2. Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS40002403**C**):

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

2.1 None

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

3. Appendix A: Revision History

Doc Rev.	Date	Comments
C	08/2023	Added new silicon revision B3; updated datasheet revision letter to 'C'; added silicon issues 1.1.2, 1.5.1, and 1.6.1.
B	8/2022	Added new silicon revision B2; updated datasheet revision letter to 'B'; added silicon issue 1.4.1.
A	3/2022	Initial release of this document.

Microchip Information

The Microchip Website

Microchip provides online support via our website at www.microchip.com/. This website is used to make files and information easily available to customers. Some of the content available includes:

- **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 (FAQs), technical support requests, online discussion groups, Microchip design partner 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

Product Change Notification Service

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

To register, go to www.microchip.com/pcn and follow the registration instructions.

Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: www.microchip.com/support

Microchip Devices Code Protection Feature

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.

Legal Notice

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 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.

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, Kleer, 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.

ISBN: 978-1-6683-2960-3

Quality Management System

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

Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
Corporate Office	**Australia - Sydney**	**India - Bangalore**	**Austria - Wels**
2355 West Chandler Blvd.	Tel: 61-2-9868-6733	Tel: 91-80-3090-4444	Tel: 43-7242-2244-39
Chandler, AZ 85224-6199	**China - Beijing**	**India - New Delhi**	Fax: 43-7242-2244-393
Tel: 480-792-7200	Tel: 86-10-8569-7000	Tel: 91-11-4160-8631	**Denmark - Copenhagen**
Fax: 480-792-7277	**China - Chengdu**	**India - Pune**	Tel: 45-4485-5910
Technical Support:	Tel: 86-28-8665-5511	Tel: 91-20-4121-0141	Fax: 45-4485-2829
www.microchip.com/support	**China - Chongqing**	**Japan - Osaka**	**Finland - Espoo**
Web Address:	Tel: 86-23-8980-9588	Tel: 81-6-6152-7160	Tel: 358-9-4520-820
www.microchip.com	**China - Dongguan**	**Japan - Tokyo**	**France - Paris**
Atlanta	Tel: 86-769-8702-9880	Tel: 81-3-6880- 3770	Tel: 33-1-69-53-63-20
Duluth, GA	**China - Guangzhou**	**Korea - Daegu**	Fax: 33-1-69-30-90-79
Tel: 678-957-9614	Tel: 86-20-8755-8029	Tel: 82-53-744-4301	**Germany - Garching**
Fax: 678-957-1455	**China - Hangzhou**	**Korea - Seoul**	Tel: 49-8931-9700
Austin, TX	Tel: 86-571-8792-8115	Tel: 82-2-554-7200	**Germany - Haan**
Tel: 512-257-3370	**China - Hong Kong SAR**	**Malaysia - Kuala Lumpur**	Tel: 49-2129-3766400
Boston	Tel: 852-2943-5100	Tel: 60-3-7651-7906	**Germany - Heilbronn**
Westborough, MA	**China - Nanjing**	**Malaysia - Penang**	Tel: 49-7131-72400
Tel: 774-760-0087	Tel: 86-25-8473-2460	Tel: 60-4-227-8870	**Germany - Karlsruhe**
Fax: 774-760-0088	**China - Qingdao**	**Philippines - Manila**	Tel: 49-721-625370
Chicago	Tel: 86-532-8502-7355	Tel: 63-2-634-9065	**Germany - Munich**
Itasca, IL	**China - Shanghai**	**Singapore**	Tel: 49-89-627-144-0
Tel: 630-285-0071	Tel: 86-21-3326-8000	Tel: 65-6334-8870	Fax: 49-89-627-144-44
Fax: 630-285-0075	**China - Shenyang**	**Taiwan - Hsin Chu**	**Germany - Rosenheim**
Dallas	Tel: 86-24-2334-2829	Tel: 886-3-577-8366	Tel: 49-8031-354-560
Addison, TX	**China - Shenzhen**	**Taiwan - Kaohsiung**	**Israel - Ra'anana**
Tel: 972-818-7423	Tel: 86-755-8864-2200	Tel: 886-7-213-7830	Tel: 972-9-744-7705
Fax: 972-818-2924	**China - Suzhou**	**Taiwan - Taipei**	**Italy - Milan**
Detroit	Tel: 86-186-6233-1526	Tel: 886-2-2508-8600	Tel: 39-0331-742611
Novi, MI	**China - Wuhan**	**Thailand - Bangkok**	Fax: 39-0331-466781
Tel: 248-848-4000	Tel: 86-27-5980-5300	Tel: 66-2-694-1351	**Italy - Padova**
Houston, TX	**China - Xian**	**Vietnam - Ho Chi Minh**	Tel: 39-049-7625286
Tel: 281-894-5983	Tel: 86-29-8833-7252	Tel: 84-28-5448-2100	**Netherlands - Drunen**
Indianapolis	**China - Xiamen**		Tel: 31-416-690399
Noblesville, IN	Tel: 86-592-2388138		Fax: 31-416-690340
Tel: 317-773-8323	**China - Zhuhai**		**Norway - Trondheim**
Fax: 317-773-5453	Tel: 86-756-3210040		Tel: 47-72884388
Tel: 317-536-2380			**Poland - Warsaw**
Los Angeles			Tel: 48-22-3325737
Mission Viejo, CA			**Romania - Bucharest**
Tel: 949-462-9523			Tel: 40-21-407-87-50
Fax: 949-462-9608			**Spain - Madrid**
Tel: 951-273-7800			Tel: 34-91-708-08-90
Raleigh, NC			Fax: 34-91-708-08-91
Tel: 919-844-7510			**Sweden - Gothenberg**
New York, NY			Tel: 46-31-704-60-40
Tel: 631-435-6000			**Sweden - Stockholm**
San Jose, CA			Tel: 46-8-5090-4654
Tel: 408-735-9110			**UK - Wokingham**
Tel: 408-436-4270			Tel: 44-118-921-5800
Canada - Toronto			Fax: 44-118-921-5820
Tel: 905-695-1980			
Fax: 905-695-2078			