



ATtiny87/167

ATtiny87/167 Silicon Errata and Data Sheet Clarification

Introduction

The ATtiny87/167 devices you have received conform functionally to the current device data sheet (<http://microchip.com/DS40002167>), except for the anomalies described in this document. The erratas described in this document will likely be addressed in future revisions of the ATtiny87/167 devices.

Note:

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

Table of Contents

Introduction.....	1
1. Silicon Issue Summary.....	3
2. Silicon Errata Issues.....	4
2.1. Errata Details.....	4
2.2. System Clock and Clock Options.....	4
3. Data Sheet Clarifications.....	6
3.1. None.....	6
4. Document Revision History.....	7
4.1. Revision History.....	7
The Microchip Website.....	8
Product Change Notification Service.....	8
Customer Support.....	8
Microchip Devices Code Protection Feature.....	8
Legal Notice.....	8
Trademarks.....	9
Quality Management System.....	9
Worldwide Sales and Service.....	10

1. Silicon Issue Summary

Legend

- Erratum is not applicable.
- X** Erratum is applicable.
- * This silicon revision was never released to production.

Peripheral	Short Description	Valid for Silicon Revision					
		ATtiny87			ATtiny167		
		Rev. A	Rev. B	Rev. C	Rev. A	Rev. B	Rev. C
System Clock and Clock Options	2.2.1 Gain Control of the Crystal Oscillator	*	*	X	*	*	X
	2.2.2 "Disable Clock Source" Command Remains Enabled	*	*	X	*	*	X

2. Silicon Errata Issues

2.1 Errata Details

- Erratum is not applicable.
- X** Erratum is applicable.
- * This silicon revision was never released to production.

2.2 System Clock and Clock Options

2.2.1 Gain Control of the Crystal Oscillator

The crystal oscillator (0.4 → 16 MHz) does not latch its gain control (CKSEL/CSEL[2:0] bits):

1. The “Recover System Clock Source” command does not return the CSEL[2:0] bits.
2. The gain control can be modified on the fly if CLKSELR changes.

Work around:

1. No work around.
2. As soon as possible, after any CLKSELR modification, rewrite the appropriate crystal oscillator setting (CSEL[3]=1 and CSEL[2:0] / CSUT[1:0] bits) in CLKSELR.

Example 2-1.

```
; Select crystal oscillator ( 16MHz crystal, fast rising power)
ldi temp1, ( (0x0F<<CSEL0) | (0x02<<CSUT0) )
sts CLKSELR, temp1
; Enable clock source (crystal oscillator)
ldi temp2, (1<<CLKCCE)
ldi temp3, (0x02<<CLKC0) ; CSEL = "0010"
sts CLKCSR, temp2 ; Enable CLKCSR register access
sts CLKCSR, temp3 ; Enable crystal oscillator clock
; Clock source switch
ldi temp3, (0x04<<CLKC0) ; CSEL = "0100"
sts CLKCSR, temp2 ; Enable CLKCSR register access
sts CLKCSR, temp3 ; Clock source switch
; Select watchdog clock ( 128KHz, fast rising power)
ldi temp3, ( (0x03<<CSEL0) | (0x02<<CSUT0) )
sts CLKSELR, temp3 ; (*)
; (*) !!! Loose gain control of crystal oscillator !!!
; ==> WORKAROUND ...
sts CLKSELR, temp1
; ...
```

Affected Silicon Revisions

ATtiny87							
Rev. A	Rev. B	Rev. C					
*	*	X					

ATtiny167							
Rev. A	Rev. B	Rev. C					

.....continued

ATtiny167

*	*	X					
---	---	---	--	--	--	--	--

2.2.2 “Disable Clock Source” Command Remains Enabled

In the Dynamic Clock Switch module, the “Disable Clock Source” command remains running after disabling the targeted clock source (the clock source is set in the CLKSELR register).

Work around:

After a “Disable Clock Source” command, reset the CLKCSR register by writing 0x80.

Example 2-2.

```
; Select crystal oscillator
ldi temp1, (0x0F<<CSEL0)
sts CLKSELR, temp1
; Disable clock source (crystal oscillator)
ldi temp2, (1<<CLKCCE)
ldi temp3, (0x01<<CLKC0) ; CSEL = "0001"
sts CLKCSR, temp2 ; Enable CLKCSR register access
sts CLKCSR, temp3 ; (*) Disable crystal oscillator clock
; (*) !!! At this moment, if any other clock source is selected by CLKSELR,
; this clock source will also stop !!!
; ==> WORKAROUND ...
sts CLKCSR, temp2
```

Affected Silicon Revisions

ATtiny87							
Rev. A	Rev. B	Rev. C					
*	*	X					

ATtiny167							
Rev. A	Rev. B	Rev. C					
*	*	X					

3. Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (<http://microchip.com/DS40002167>).

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

3.1 None

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

4. Document Revision History

Note: The data sheet clarification document revision is independent of the die revision and the device variant (last letter of the ordering number).

4.1 Revision History

Doc Rev.	Date	Comments
B	03/2020	Updated the data sheet link in the Data Sheet Clarifications section
A	01/2020	Initial release of this document. - Content moved from the data sheet and restructured to the new document template - Updated the die revision list to reflect die revisions in production

The Microchip Website

Microchip provides online support via our website at <http://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 <http://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: <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, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, chipKIT, chipKIT logo, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Klear, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PackeTime, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TempTrackr, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, FlashTec, Hyper Speed Control, HyperLight Load, IntelliMOS, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, Vite, WinPath, 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, BlueSky, 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, KlearNet, KlearNet logo, 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, 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.

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.

© 2020, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-5806-7

Quality Management System

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

Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
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: http://www.microchip.com	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	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	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: 47-72884388 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