



Product Change Notification - SYST-23ZUCS225

Date:

24 Oct 2019

Product Category:

8-bit Microcontrollers

Affected CPNs:



Notification subject:

ERRATA - ATtiny214/414/814 Silicon Errata and Data Sheet Clarification

Notification text:

SYST-23ZUCS225

Microchip has released a new Product Documents for the ATtiny214/414/814 Silicon Errata and Data Sheet Clarification of devices. If you are using one of these devices please read the document located at [ATtiny214/414/814 Silicon Errata and Data Sheet Clarification](#).

Notification Status: Final

Description of Change:

- 1) Updated document template
- 2) The ADC errata, ADC Functionality Cannot be Ensured with ADCCLK Above 1.5 MHz for All Conditions, has been split into two separate erratas and rewritten.

Impacts to Data Sheet: None

Reason for Change: To Improve Productivity

Change Implementation Status: Complete

Date Document Changes Effective: 24 Oct, 2019

NOTE: Please be advised that this is a change to the document only the product has not been changed.

Markings to Distinguish Revised from Unrevised Devices: N/A

Attachment(s):

[ATtiny214/414/814 Silicon Errata and Data Sheet Clarification](#)

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Affected Catalog Part Numbers (CPN)

ATTINY214-SSF

ATTINY214-SSN

ATTINY214-SSNR

ATTINY214-SSFR

ATTINY414-SSF

ATTINY414-SSN

ATTINY414-SSNR

ATTINY414-SSFR

ATTINY814-SSF

ATTINY814-SSN

ATTINY814-SSNR

ATTINY814-SSFR



ATtiny214/414/814

ATtiny214/414/814 Silicon Errata and Data Sheet Clarification

The ATtiny214/414/814 devices you have received conform functionally to the current device data sheet ([DS40001912](#)), except for the anomalies described in this document. The erratas described in this document will likely be addressed in future revisions of the ATtiny214/414/814 devices.

Note:

- This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current.
- Refer to the Device/Revision ID section in the current device data sheet ([DS40001912](#)) for more detailed information on Device Identification and Revision IDs for your specific device, or contact your local Microchip sales office for assistance.

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			
		ATtiny214/414		ATtiny814	
		Rev. A	Rev. B	Rev. A	Rev. B
Device	2.2.1 The Temperature Sensor is Not Calibrated on Parts with Date Code 727, 728 and 1728 (Year 2017, Week 27/28)	-	X	-	-
AC	2.3.1 Coupling Through AC Pins	-	-	X	X
	2.3.2 AC Interrupt Flag Not Set Unless Interrupt is Enabled	X	-	X	X
	2.3.3 False Triggers May Occur Under Certain Conditions	X	-	-	-
	2.3.4 False Triggers May Occur Under Certain Conditions	-	-	X	X
	2.3.5 False Triggering When Sweeping Negative Input of the AC When the Low Power Mode is Disabled	-	-	X	X
ADC	2.4.1 One Extra Measurement Performed After Disabling ADC Free-Running Mode	X	X	X	X
	2.4.2 Changing ADC Control Bits During Free-Running Mode not Working	X	-	X	X
	2.4.3 ADC Wake-Up with WCOMP	X	-	X	X
	2.4.4 SAMPDLY and ASDV Does Not Work Together With SAMPLEN	X	-	-	-
	2.4.5 ADC Functionality Cannot be Ensured with CLKADC Above 1.5 MHz and a Setting of 25% Duty Cycle	X	X	X	X
	2.4.6 ADC Performance Degrades with CLKADC Above 1.5 MHz and VDD < 2.7V	X	X	X	X
	2.4.7 Pending Event Stuck When Disabling the ADC	-	-	X	X
	2.4.8 ADC Interrupt Flags Cleared When Reading RESH	-	-	X	X
CCL	2.5.1 Connecting LUTs in Linked Mode Require OUTEN Set to '1'	X	X	X	X
	2.5.2 D-latch is Not Functional	X	X	X	X
PORTMUX	2.6.1 Selecting Alternative Output Pin for TCA0 Waveform Output 0-2 also Changes Waveform Output 3-5	X	X	-	-
RTC	2.7.1 Any Write to the RTC.CTRLA Register Resets the RTC and PIT Prescaler	X	X	X	X
	2.7.2 Disabling the RTC Stops the PIT	X	X	X	X

ATtiny214/414/814

Silicon Issue Summary

.....continued					
Peripheral	Short Description	Valid for Silicon Revision			
		ATtiny214/414		ATtiny814	
		Rev. A	Rev. B	Rev. A	Rev. B
TCB	2.8.1 Minimum Event Duration Must Exceed the Selected Clock Period	X	X	X	X
	2.8.2 The TCB Interrupt Flag is Cleared When Reading CCMPH	X	-	X	X
	2.8.3 TCB Input Capture Frequency and Pulse-Width Measurement Mode Not Working with Prescaled Clock	X	-	X	X
	2.8.4 The TCA Restart Command Does Not Force a Restart of TCB	X	X	X	X
TCD	2.9.1 TCD Auto-Update Not Working	-	-	X	X
	2.9.2 TCD Event Output Lines May Give False Events	-	-	X	X
TWI	2.10.1 TIMEOUT Bits in the TWI.MCTRLB Register are Not Accessible	X	-	X	X
	2.10.2 TWI Smart Mode Gives Extra Clock Pulse	X	-	X	X
	2.10.3 TWI Master Mode Wrongly Detects the Start Bit as a Stop Bit	X	-	X	X
	2.10.4 The TWI Master Enable Quick Command is Not Accessible	X	-	X	X
USART	2.11.1 TXD Pin Override Not Released When Disabling the Transmitter	X	X	X	X
	2.11.2 Frame Error on a Previous Message May Cause False Start Bit Detection	X	X	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 Device

2.2.1 The Temperature Sensor is Not Calibrated on Parts with Date Code 727, 728 and 1728 (Year 2017, Week 27/28)

The temperature sensor is not calibrated on parts with date code 727/728 (used on QFN packages) and 1728 (used on SOIC packages).

Work around

If temperature sensor calibration data is required, devices with the affected date code may be returned through the Microchip RMA service. Devices with this date code are no longer shipped by Microchip.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	X						

ATtiny814							
Rev. A	Rev. B						
-	-						

2.3 AC - Analog Comparator

2.3.1 Coupling Through AC Pins

There is a capacitive coupling through the Analog Comparator. Toggling the selected positive AC pin may affect the selected negative input pin and vice versa.

Work around

When the AC is disabled, configure AC.MUXCTRLA.MUXNEG to DAC or internal reference.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.3.2 AC Interrupt Flag Not Set Unless Interrupt is Enabled

ACn.STATUS.CMP is not set if the ACn.INTCTRL.CMP is not set.

Work around

Enable ACn.INTCTRL.CMP or use ACn.STATUS.STATE for polling.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.3.3 False Triggers May Occur Under Certain Conditions

False triggers may occur on falling input pin:

- For common-mode voltage below 0.5V
- For common-mode voltage above 0.5V if the slew rate is greater than 1 V/ μ s

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
-	-						

2.3.4 False Triggers May Occur Under Certain Conditions

False triggers may occur on falling input pin:

- If the slew rate on the input signal is greater than 2 V/ μ s for common-mode voltage below 0.5V
- If the slew rate on the input signal is greater than 10 V/ μ s for common-mode voltage above 0.5V
- If the slew rate on the input signal is greater than 10 V/ μ s for any common-mode voltage and Low-Power mode is enabled

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.3.5 False Triggering When Sweeping Negative Input of the AC When the Low Power Mode is Disabled

A false trigger may occur if sweeping the negative input of the AC with a negative slope, and the AC has Low Power mode disabled.

Work around

Enable Low-Power mode in AC.CTRLA.LPMODE.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4 ADC - Analog-to-Digital Converter

2.4.1 One Extra Measurement Performed After Disabling ADC Free-Running Mode

The ADC may perform one additional measurement after clearing ADCn.CTRLA.FREERUN.

Work around

Write ADCn.CTRLA.ENABLE to '0' to stop the Free-Running mode immediately.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.2 Changing ADC Control Bits During Free-Running Mode not Working

If control signals are changed during Free-Running mode, the new configuration is not properly taken into account in the next measurement. This is valid for the ADC.CTRLB, ADC.CTRLA, ADC.SAMPCTRL registers and the ADC.MUXPOS, ADC.WINLT and ADC.WINHT registers.

Work around

Disable ADC Free-Running mode before updating the ADC.CTRLB, ADC.CTRLA, ADC.SAMPCTRL, ADC.MUXPOS, ADC.WINLT or ADC.WINHT registers.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.3 ADC Wake-Up with WCOMP

When waking up from STANDBY Sleep mode with ADC WCOMP interrupt, the ADC is disabled for a few cycles before the device enters ACTIVE mode. A new INITDLY is required before the next conversion.

Work around

Use INITDLY before the next conversion.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.4 SAMPDLY and ASDV Does Not Work Together With SAMPLEN

Using SAMPCTRL.SAMPLEN at the same time as CTRLD.SAMPDLY or CTRLD.ASDV will cause an unpredictable sampling length.

Work around

When setting SAMPCTRL.SAMPLEN greater than 0x0, the CTRLD.SAMPDLY and CTRLD.ASDV must be cleared.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
-	-						

2.4.5 ADC Functionality Cannot be Ensured with CLK_{ADC} Above 1.5 MHz and a Setting of 25% Duty Cycle

The ADC functionality cannot be ensured if $CLK_{ADC} > 1.5$ MHz with ADCn.CALIB.DUTYCYC set to '1'.

Work around

If ADC is operated with $CLK_{ADC} > 1.5$ MHz, ADCn.CALIB.DUTYCYC must be set to '0' (50% duty cycle).

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.6 ADC Performance Degrades with CLK_{ADC} Above 1.5 MHz and $VDD < 2.7V$

The ADC INL performance degrades if $CLK_{ADC} > 1.5$ MHz and ADCn.CALIB.DUTYCYC set to '0' for $VDD < 2.7V$.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.7 Pending Event Stuck When Disabling the ADC

If the ADC is disabled during an event-triggered conversion, the event will not be cleared.

Work around

Clear ADC.EVCTRL.STARTEI and wait for the conversion to complete before disabling the ADC.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						

.....continued							
ATtiny214/ATtiny414							
-	-						
ATtiny814							
Rev. A	Rev. B						
X	X						

2.4.8 ADC Interrupt Flags Cleared When Reading RESH

ADCn.INTFLAGS.RESRDY and ADCn.INTFLAGS.WCOMP are cleared when reading ADCn.RESH.

Work around

In 8-bit mode, read ADCn.RESH to clear the flag or clear the flag directly.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						
ATtiny814							
Rev. A	Rev. B						
X	X						

2.5 CCL - Configurable Custom Logic

2.5.1 Connecting LUTs in Linked Mode Require OUTEN Set to '1'

Connecting the LUTs in linked mode require LUTnCTRLA.OUTEN set to '1' for the LUT providing the input source.

Work around

Use an event channel to link the LUTs or do not use the corresponding I/O pin for other purposes.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						
ATtiny814							
Rev. A	Rev. B						
X	X						

2.5.2 D-latch is Not Functional

The CCL D-latch is not functional.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.6 PORTMUX - Port Multiplexer

2.6.1 Selecting Alternative Output Pin for TCA0 Waveform Output 0-2 also Changes Waveform Output 3-5

Selecting alternative output pin for TCA0 in PORTMUX.CTRLC does not work as described when TCA0 operates in split mode.

- Writing PORTMUX.CTRLC bit 0 to '1' will shift the pin position for both WO0 and WO3
- Writing PORTMUX.CTRLC bit 1 to '1' will shift the pin position for both WO1 and WO4
- Writing PORTMUX.CTRLC bit 2 to '1' will shift the pin position for both WO2 and WO5

PORTMUX.CTRLC[5:3] are non-functional.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
-	-						

2.7 RTC - Real-Time Counter

2.7.1 Any Write to the RTC.CTRLA Register Resets the RTC and PIT Prescaler

Any write to the RTC.CTRLA register resets the RTC and PIT prescaler.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						

.....continued							
ATtiny214/ATtiny414							
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.7.2 Disabling the RTC Stops the PIT

Writing RTC.CTRLA.RTCEN to '0' will stop the PIT.

Writing RTC.PITCTRLA.PITEN to '0' will stop the RTC.

Work around

Do not disable the RTC or the PIT if any of the modules are used.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.8 TCB - Timer/Counter B

2.8.1 Minimum Event Duration Must Exceed the Selected Clock Period

Event detection will fail if TCBn receives an input event with a high/low period shorter than the period of the selected clock source (CLKSEL in TCBn.CTRLA). This applies to the TCB modes (CNTMODE in TCBn.CTRLB) *Time-Out Check* and *Input Capture Frequency and Pulse-Width Measurement* mode.

Work around

Ensure that the high/low period of input events is equal to or longer than the period of the selected clock source (CLKSEL in TCBn.CTRLA).

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.8.2 The TCB Interrupt Flag is Cleared When Reading CCMPH

TCBn.INTFLAGS.CAPT is cleared when reading TCBn.CCMPH instead of CCMPL.

Work around

Read both TCBn.CCMPL and TCBn.CCMPH.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.8.3 TCB Input Capture Frequency and Pulse-Width Measurement Mode Not Working with Prescaled Clock

The TCB Input Capture Frequency and Pulse-Width Measurement mode may lock to Freeze state if CLKSEL in TCB.CTRLA is set to any other value than 0x0.

Work around

Only use CLKSEL equal to 0x0 when using Input Capture Frequency and Pulse-Width Measurement mode.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.8.4 The TCA Restart Command Does Not Force a Restart of TCB

The TCA restart command does not force a restart of the TCB when TCB is running in SYNCUPD mode. TCB is only restarted after a TCA OVF.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.9 TCD - Timer/Counter D

2.9.1 TCD Auto-Update Not Working

The TCD auto-update feature is not working.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.9.2 TCD Event Output Lines May Give False Events

The TCD event output lines can give out false events.

Work around

Use the delayed event functionality with a minimum of one cycle delay.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
-	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.10 TWI - Two-Wire Interface

2.10.1 TIMEOUT Bits in the TWI.MCTRLB Register are Not Accessible

The TIMEOUT bits in the TWI.MCTRLB register are not accessible from software.

Work around

When initializing TWI, BUSSTATE in TWI.MSTATUS should be brought into IDLE state by writing 0x1 to it.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.10.2 TWI Smart Mode Gives Extra Clock Pulse

TWI Master with Smart mode enabled gives an extra clock pulse on the SCL line after sending NACK.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.10.3 TWI Master Mode Wrongly Detects the Start Bit as a Stop Bit

If TWI is enabled in Master mode followed by an immediate write to the MADDR register the bus monitor recognizes the Start bit as a Stop bit.

Work around

Wait for a minimum of two clock cycles from TWI.MCTRLA.ENABLE until TWI.MADDR is written.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.10.4 The TWI Master Enable Quick Command is Not Accessible

TWI.MCTRLA.QCEN is not accessible from software.

Work around

None.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	-						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.11 USART - Universal Synchronous and Asynchronous Receiver and Transmitter

2.11.1 TXD Pin Override Not Released When Disabling the Transmitter

The USART will not release the TXD pin override if:

- The USART transmitter is disabled by writing the TXEN bit in USART.CTRLB to '0' while the USART receiver is disabled (RXEN in USART.CTRLB is '0')
- Both the USART transmitter and receiver are disabled at the same time by writing the TXEN and RXEN bits in USART.CTRLB to '0'

Work around

There are two possible work arounds:

- Make sure the receiver is enabled (RXEN in USART.CTRLB is '1') while disabling the transmitter (writing TXEN in USART.CTRLB to '0')
- Writing to any register in the USART after disabling the transmitter will start the USART for long enough to release the pin override of the TXD pin

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						
X	X						

ATtiny814							
Rev. A	Rev. B						
X	X						

2.11.2 Frame Error on a Previous Message May Cause False Start Bit Detection

A false start bit detection will trigger if receiving a frame with RXDATAH.FERR set and reading the RXDATA1 before the RxD line goes high.

Work around

Wait for the RxD pin to go high before reading RXDATA, for instance by polling the bit in PORTn.IN where the RxD pin is located.

Affected Silicon Revisions

ATtiny214/ATtiny414							
Rev. A	Rev. B						

ATtiny214/414/814
Silicon Errata Issues

.....continued							
ATtiny214/ATtiny414							
X	X						
ATtiny814							
Rev. A	Rev. B						
X	X						

3. Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet ([DS40001912](#)):

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	10/2019	<ul style="list-style-type: none">Updated document templateThe ADC errata, ADC Functionality Cannot be Ensured with ADCCLK Above 1.5 MHz for All Conditions, has been split into two separate erratas and rewritten.
A	06/2019	<ul style="list-style-type: none">Initial document release

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