



ATmega164A/PA/324A/PA/ 644A/PA/1284/P

Silicon Errata and Data Sheet Clarifications

Introduction

The ATmega164A/PA/324A/PA/644A/PA/1284/P devices you have received conform functionally to the current device data sheet (www.microchip.com/DS40002070), except for the anomalies described in this document. The errata described in this document will likely be addressed in future revisions of the ATmega164A/PA/324A/PA/644A/PA/1284/P devices.

Note:

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

1. Silicon Issue Summary

- Erratum is not applicable.
- X** Erratum is applicable.

Peripheral	Short Description	Valid for Silicon Revision				
		ATmega164A/PA	ATmega324A/PA		ATmega644A/PA	ATmega1284/P
		Rev. E ₁	Rev. F ₁	Rev. G	Rev. F ₁	Rev. B ₁
Device	No known errata					

Note:

1. This revision is the initial release of the silicon.

2. Silicon Errata Issues

2.1 None

There are no known errata as of this publication date.

3. Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (www.microchip.com/DS40002070).

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

3.1 Electrical Characteristics – $T_A = -40^{\circ}\text{C}$ to 85°C

A clarification for the power-down specification limit has been made. This clarification has corrections that are impractical to mark in bold. All the following tables in this section contain the most current information and notes.

Table 28-2. ATmega164A DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.3	0.55	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.4	3.5	
		Active 8 MHz, $V_{CC} = 5\text{V}$		4.8	12	
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.07	0.5	
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.25	1.5	
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.0	5.5	
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$		0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$		0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$		5.0	15	
		WDT disabled, $V_{CC} = 3\text{V}$		0.17	3.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

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Table 28-3. ATmega164PA DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.3	0.5	mA	
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.4	2.7		
		Active 8 MHz, $V_{CC} = 5\text{V}$		4.8	9.0		
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.07	0.15		
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.25	0.7		
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.0	5.0		
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$			0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$			0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			5.0	8.0	
		WDT disabled, $V_{CC} = 3\text{V}$			0.17	2.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C . Maximum values are test limits in production.**

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Table 28-4. ATmega324A DC characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.3	0.55	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.5	3.5	
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.2	12	
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.5	
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.35	1.5	
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.3	5.5	
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$		0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$		0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$		4.2	15	μA
		WDT disabled, $V_{CC} = 3\text{V}$		0.15	3.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

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Table 28-5. ATmega324PA DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.3	0.5	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.5	2.7	
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.2	9	
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.15	
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.35	0.7	
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.3	5.0	
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$		0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$		0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$		4.2	8.0	μA
		WDT disabled, $V_{CC} = 3\text{V}$		0.15	2.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

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Table 28-6. ATmega644A DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.38	0.5	mA	
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.8	2.7		
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.6	9.0		
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.15		
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.2	0.7		
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.1	2.5		
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$			0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$			0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			4.2	20	
		WDT disabled, $V_{CC} = 3\text{V}$			0.15	3.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

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Table 28-7. ATmega644PA DC characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.38	0.5	mA	
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.8	2.7		
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.6	9.0		
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.15		
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.2	0.7		
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.1	4.0		
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$			0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$			0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			4.2	8.0	
		WDT disabled, $V_{CC} = 3\text{V}$			0.15	2.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

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Table 28-8. ATmega1284 DC characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.38	0.55	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.8	3.5	
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.6	12	
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.5	
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.2	1.5	
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.1	5.5	
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$		0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$		0.6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$		4.2	15	μA
		WDT disabled, $V_{CC} = 3\text{V}$		0.15	5.0	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

Table 28-9. ATmega1284P DC characteristics. $T_A = -40^{\circ}\text{C}$ to 85°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$		0.38	0.5	mA	
		Active 4 MHz, $V_{CC} = 3\text{V}$		1.8	2.9		
		Active 8 MHz, $V_{CC} = 5\text{V}$		5.6	9.0		
		Idle 1 MHz, $V_{CC} = 2\text{V}$		0.06	0.15		
		Idle 4 MHz, $V_{CC} = 3\text{V}$		0.2	0.7		
		Idle 8 MHz, $V_{CC} = 5\text{V}$		1.1	5.0		
	Power-save mode ⁽²⁾	32.768 kHz T_{OSC} enabled, $V_{CC} = 1.8\text{V}$			0.5		μA
		32.768 kHz T_{OSC} enabled, $V_{CC} = 3\text{V}$			0.6		
Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			4.2	10	μA	
	WDT disabled, $V_{CC} = 3\text{V}$			0.15	5		

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C . Maximum values are test limits in production.**

3.2 Electrical Characteristics – $T_A = -40^{\circ}\text{C}$ to 105°C

A clarification for the power-down specification limit has been made. This clarification has corrections that are impractical to mark in bold. All the following tables in this section contain the most current information and notes.

Table 29-1. ATmega164PA DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 105°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units	
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$			0.7	mA	
		Active 4 MHz, $V_{CC} = 3\text{V}$			3		
		Active 8 MHz, $V_{CC} = 5\text{V}$			11		
		Idle 1 MHz, $V_{CC} = 2\text{V}$			0.17		
		Idle 4 MHz, $V_{CC} = 3\text{V}$			0.85		
		Idle 8 MHz, $V_{CC} = 5\text{V}$			6		
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$				15	μA
		WDT disabled, $V_{CC} = 3\text{V}$				5	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C . Maximum values are test limits in production.**

Table 29-2. ATmega324PA DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 105°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$			0.7	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$			3	
		Active 8 MHz, $V_{CC} = 5\text{V}$			11	
		Idle 1 MHz, $V_{CC} = 2\text{V}$			0.17	
		Idle 4 MHz, $V_{CC} = 3\text{V}$			0.85	
		Idle 8 MHz, $V_{CC} = 5\text{V}$			6	
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			15	μA
		WDT disabled, $V_{CC} = 3\text{V}$			5	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

Table 29-3. ATmega644PA DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 105°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$			0.7	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$			3	
		Active 8 MHz, $V_{CC} = 5\text{V}$			11	
		Idle 1 MHz, $V_{CC} = 2\text{V}$			0.17	
		Idle 4 MHz, $V_{CC} = 3\text{V}$			0.85	
		Idle 8 MHz, $V_{CC} = 5\text{V}$			6	
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			15	μA
		WDT disabled, $V_{CC} = 3\text{V}$			5	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **The current consumption values include input leakage current.**

Table 29-4. ATmega1284P DC Characteristics. $T_A = -40^{\circ}\text{C}$ to 105°C , $V_{CC} = 1.8\text{V}$ to 5.5V (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
I_{CC}	Power supply current ⁽¹⁾	Active 1 MHz, $V_{CC} = 2\text{V}$			0.8	mA
		Active 4 MHz, $V_{CC} = 3\text{V}$			3	
		Active 8 MHz, $V_{CC} = 5\text{V}$			11	
		Idle 1 MHz, $V_{CC} = 2\text{V}$			0.17	
		Idle 4 MHz, $V_{CC} = 3\text{V}$			0.85	
		Idle 8 MHz, $V_{CC} = 5\text{V}$			6	
	Power-down mode ⁽²⁾	WDT enabled, $V_{CC} = 3\text{V}$			18	μA
		WDT disabled, $V_{CC} = 3\text{V}$			13	

Notes:

1. All bits set in the 'PRR0 – Power Reduction Register 0' on page 56 in the data sheet.
2. **Maximum and Typical values for 25°C. Maximum values are test limits in production.**

4. Document Revision History

Note: The document revision is independent of the silicon revision.

4.1 Revision History

Doc Rev.	Date	Comments
B	03/2022	Data Sheet Clarifications added: <ul style="list-style-type: none">• 3.1. Electrical Characteristics – TA = -40°C to 85°C• 3.2. Electrical Characteristics – TA = -40°C to 105°C
A	01/2020	Initial document release. <ul style="list-style-type: none">• Content moved from the data sheet and restructured to the new document template• Updated the die revision list to reflect die revisions in production

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