



Product Change Notification

Product Change Notification Number: WC124803B (REVISED 06/19/13) **Notification Date:** February 11, 2013
See “Chip erase time during programming” Change on Page 6

| | | | |
|--|---|---|--|
| Title: Die Revision Change for ATxmega16D4 / ATxmega32D4 | | | |
| Product Identification: | | | |
| ATxmega16D4-AU | | ATxmega32D4-AU | |
| ATxmega16D4-AUR | | ATxmega32D4-AUR | |
| ATxmega16D4-CU | | ATxmega32D4-CU | |
| ATxmega16D4-CUR | | ATxmega32D4-CUR | |
| Note: The PCN for the QFN package option (-MH/-MHR) is estimated to be available March 2013. | | | |
| Reason for Change: | <input checked="" type="checkbox"/> Material / Composition <input type="checkbox"/> Processing / Manufacturing | <input checked="" type="checkbox"/> Design / Firmware <input type="checkbox"/> Logistics | <input type="checkbox"/> Manufacturing Location <input checked="" type="checkbox"/> Quality / Reliability |
| Change Description: | | | |
| <p>This notification is to advise our customers that Atmel will introduce new revisions of the AVR microcontroller products listed above. The new revisions are package and pin compatible to the existing revisions. They are introduced in order to remove errata and enhance the product. Actual devices changes are minimal, but for your reference they are listed here together with enhancements that are a pure superset of existing functions.</p> <p>Samples are only available in bulk and can be ordered through Atmel Sample Centre by logging on to https://samples.atmel.com/scripts/samplecenter.dll?atmel?cmd=menu</p> <p>Specific ordering codes for new die revision samples only are shown in the table below, and are available for sample orders only until the proposed first shipment date. For all production orders, only standard existing ordering codes will be accepted.</p> | | | |
| Part number | | Ordering code for samples | |
| ATxmega16D4-AU | | ATxmega16D4-AUK | |
| ATxmega16D4-CU | | ATxmega16D4-CUK | |
| ATxmega32D4-AU | | ATxmega32D4-AUK | |
| ATxmega32D4-CU | | ATxmega32D4-CUK | |
| Note that the K in sample ordering codes will not be marked on the package. | | | |

Changes

The new revision change the following:

- Reduced current consumption in Active and Idle modes
- Increased typical current consumption in Power-down and Power-save modes
- Increased maximum ADC sample rate
- Brown-Out Detection (BOD) levels.
- The BOD is forced on only during selected NVM programming commands
- Chip erase time during programming
- Access to unused registers removed
- 32kHz internal ULP oscillator frequency
- Bonding wire material has changed from gold to copper
- The I/O pins comply with the JEDEC LVTTTL and LVCMOS specification and the high- and low level input and output voltage limits reflect or exceed this specification.

New configuration options and functions

The new revision includes new configuration options and functions that are a superset of existing functions. This means that existing software for the existing device revisions will work on the new revision without changing existing configuration or enabling new functions.

See Appendix 1 for more details on changes.

See Appendix 2 for more details on added functions.

Identification Method to Distinguish Change:

For packages where space allows for die ID to be part of marking, new revision material is identified to 359P5GI.

| | | | |
|----------------------------|---|--|---|
| Qualification Data: | <input checked="" type="checkbox"/> Available | <input type="checkbox"/> Will be available (mm/dd/yr): | <input type="checkbox"/> Not Applicable |
| Samples: | <input checked="" type="checkbox"/> Available | <input type="checkbox"/> Will be available (mm/dd/yr): | <input type="checkbox"/> Not Applicable |

Quantifiable Impact on Quality & Reliability:

None

Proposed First Ship Date*: May 8, 2013

**The Proposed First Ship Date is the forecasted date that a customer may expect to receive changed product. This is determined by the estimated date of inventory depletion on the PCN issue date. This may be affected by fluctuations in supply and demand. Consequently, although customers should be prepared to receive changed product on this date, Atmel will continue to ship pre-changed product until a time in which inventory has been depleted. This may result in pre-changed product being shipped to customers after this forecasted date.*

Atmel Contact: Please contact your Atmel Sales Representative or Distributor for additional information (when replying via e-mail please include PCN number in subject line).

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CUSTOMER ACKNOWLEDGEMENT OF RECEIPT: Atmel requests you acknowledge receipt of this PCN. Please complete and email to pcnadm@atmel.com and the Atmel Contact listed above. In your acknowledgement, you can grant approval or request additional information. **Atmel will deem this change accepted unless specific conditions of acceptance are provided in writing within 30 days from the date of this notice.**

Company:
Name:
Title:
Date:
Email Address:
Location:
Comments:

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Appendix 1: Change Description Details

Reduced current consumption Active and Idle mode

The table below lists the typical and maximum current consumption in the existing and new revision.

| Parameter | Condition | | Existing revisions | | | New revision | | | Units |
|------------------------------|---|------------------------|--------------------|------|-----|--------------|------|-----|-------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| Active power consumption | 32kHz, Ext. Clk | V _{CC} = 1.8V | | 68 | | | 40 | | μA |
| | | V _{CC} = 3.0V | | 145 | | | 80 | | |
| | 1MHz, Ext. Clk | V _{CC} = 1.8V | | 260 | | | 200 | | |
| | | V _{CC} = 3.0V | | 540 | | | 410 | | |
| | 2MHz, Ext. Clk | V _{CC} = 1.8V | | 460 | 600 | | 350 | 600 | mA |
| | | V _{CC} = 3.0V | | 0.96 | 1.4 | | 0.75 | 1.4 | |
| Idle power consumption | 32kHz, Ext. Clk | V _{CC} = 1.8V | | 2.4 | | | 2.0 | | μA |
| | | V _{CC} = 3.0V | | 3.9 | | | 2.8 | | |
| | 1MHz, Ext. Clk | V _{CC} = 1.8V | | 62 | | | 42 | | |
| | | V _{CC} = 3.0V | | 118 | | | 85 | | |
| | 2MHz, Ext. Clk | V _{CC} = 1.8V | | 125 | 225 | | 85 | 225 | |
| | | V _{CC} = 3.0V | | 240 | 350 | | 170 | 350 | |
| Power-down power consumption | T = 25°C | V _{CC} = 3.0V | | 0.1 | 1.0 | | 0.1 | 1.0 | μA |
| | | | | 1.2 | 4.5 | | 2.0 | 4.5 | |
| | WDT and sampled BOD enabled, T = 25°C | | | 1.3 | 3.0 | | 1.4 | 3.0 | |
| | WDT and sampled BOD enabled, T = 85°C | | | 2.4 | 6.0 | | 3.0 | 6.0 | |
| Power-save power consumption | RTC from ULP clock, WDT and sampled BOD enabled, T = 25°C | V _{CC} = 1.8V | | 1.2 | | | 1.5 | | |
| | | V _{CC} = 3.0V | | 1.3 | | | 1.5 | | |
| | RTC from 1.024kHz low power 32.768kHz TOSC, T = 25°C | V _{CC} = 1.8V | | 0.6 | 2.0 | | 0.6 | 2.0 | |
| | | V _{CC} = 3.0V | | 0.7 | 2.0 | | 0.7 | 2.0 | |
| | RTC from low power 32.768kHz TOSC, T = 25°C | V _{CC} = 1.8V | | 0.8 | 3.0 | | 0.8 | 3.0 | |
| | | V _{CC} = 3.0V | | 1.0 | 3.0 | | 1.0 | 3.0 | |
| Reset power consumption | Current through RESET pin subtracted | V _{CC} = 3.0V | | 320 | | | 300 | | |

Increased ADC maximum samples rate

The maximum ADC clock frequency and sample rate is increased, as shown in the table below.

| Parameter | Existing revisions | | | New revision | | | Units |
|---------------------|--------------------|-----|------|--------------|-----|------|-------|
| | Min | Typ | Max | Min | Typ | Max | |
| ADC clock frequency | 100 | | 1400 | 100 | | 1800 | kHz |
| ADC samples rate | 14 | | 200 | 16 | | 300 | kSPS |

Reduced Analog Comparator propagation delay

The Analog Comparator propagation delay is reduced, as shown in the table below.

| Parameter | Condition | Existing revisions | | | New revision | | | Units |
|-------------------|-------------------------------------|--------------------|-----|-----|--------------|-----|-----|-------|
| | | Min | Typ | Max | Min | Typ | Max | |
| Propagation delay | V _{CC} = 3.0V, T=85°C | | 30 | 90 | | 16 | 90 | ns |
| Propagation delay | V _{CC} = 1.6V-3.6V, T=25°C | | 30 | | | 16 | | ns |

Brown-Out Detection (BOD) levels.

The table below lists the BOD levels in the existing revisions, and the expected BOD levels in the new revision.

| Parameter | Existing revisions | | | New revision | | | Units |
|-------------------------------------|--------------------|------|------|--------------|------|------|-------|
| | Min | Typ | Max | Min | Typ | Max | |
| BOD level 0 falling V _{CC} | 1.60 | 1.62 | 1.72 | 1.50 | 1.62 | 1.75 | V |
| BOD level 1 falling V _{CC} | | 1.8 | | | 1.8 | | |
| BOD level 2 falling V _{CC} | | 2.0 | | | 2.0 | | |
| BOD level 3 falling V _{CC} | | 2.2 | | | 2.2 | | |
| BOD level 4 falling V _{CC} | | 2.4 | | | 2.4 | | |
| BOD level 5 falling V _{CC} | | 2.6 | | | 2.6 | | |
| BOD level 6 falling V _{CC} | | 2.8 | | | 2.8 | | |
| BOD level 7 falling V _{CC} | | 3.0 | | | 3.0 | | |

The BOD forced on only during selected NVM programming commands

For existing revisions the BOD is forced on for all Non-Volatile Memory (NVM) programming. For the new revision, the BOD is only forced on during chip erase and when the PDI is enabled. For other NVM programming operations, the POR threshold voltage (V_{POT+}) is the limit for aborting.

Chip erase time during programming

For the existing revisions the chip erase time is about 40ms, while in the new revision this is increased to 45ms for ATxmega16D4 and 50ms for ATxmega32D4.

| Device | Existing revision Chip erase time | Existing New revision Chip erase time |
|-------------|--------------------------------------|---|
| ATxmega16D4 | 40 ms | 45 ms |
| ATxmega32D4 | 45 ms | 50ms |

32kHz internal ULP oscillator frequency

The frequency of the 32kHz internal ULP oscillator is increased to match its nominal frequency with guaranteed accuracy.

| Parameter | Condition | Existing revisions | | | New revision | | | Units |
|------------------------------|---------------------|--------------------|-----|-----|--------------|-----|-----|-------|
| | | Min | Typ | Max | Min | Typ | Max | |
| Factory calibrated frequency | | | 26 | | | 32 | | kHz |
| Factory calibration accuracy | Vcc = 3.0V, T= 85°C | na | | na | -12 | | 12 | % |
| Accuracy | | na | | na | -30 | | 30 | |

Removed registers

The below register bits have been removed as they are unused.

| Register Name | Register Bit | Function |
|---------------|--------------|-------------------------------|
| COMP0 | COMP[7:0] | Oscillator Compare Register 0 |

Appendix 2: Added Functions

Clock System

- Alternate pin location for TOSC1 and TOSC2 pins for 32.768 kHz crystal connection on devices with shared TOSC and XTAL location today.
- A divide by two option for the PLL output.
- PLL lock failure detection with optional non maskable interrupt for improved safety and robustness.
- Non-prescaled Real Time Counter clock source options: External clock from TOSC1, 32.768 kHz from TOSC, and the 32.768 kHz from the 32.768 kHz Internal Oscillator.
- Higher drive option for external crystal oscillator to support higher load crystals.
- The 32 MHz internal oscillator can be tuned to run at any frequency between 30 MHz and 55 MHz.

I/O Ports

- Alternate pin locations for Timer/Counter 0 Compare Channels, USART0 and SPI.
- Alternate pin locations for the Peripheral Clock and Event output functions.
- The Real Time Counter clock can be output to a port pin.
- Any Event Channel can be output to a port pin.

Two Wire Interface

- The SDA Hold time can be increased and configured in order to be SMBus compliant.

Analog to Digital Converter

- Automatic input channel scan.
- VCC/2 voltage reference option.
- 1/2x (divide by two) gain stage setting.
- Internal Ground can be used as negative input in differential mode with and without gain.
- Sample time is configurable

Analog Comparator

- Analog Comparator 1 can be output on a port pin.
- Added constant current source.

CRC16/CRC32 Generator

- A CRC16/CRC32 Module that supports CRC16 (RC-CCITT) and CRC-32 (IEEE 802.3).

16-bit Timer / Counter 0

- Split mode that enable a system of two 8-bit Timer/Counters with 4 PWM channels each.

AWeX

- Hi-Res+ option to allow PWM resolution to be increased with 8x (3-bit)

Power Management

- Possibility to enable sequential start of the internal modules used for ADC and Analog Comparator in order to reduce the peak start-up current.

The updated datasheet and user manual will describe functions as they are in the new revision.