

# ATmega16M1/32M1/32C1/64M1/64C1

Appendix A - Atmel ATmega16M1/ATmega32M1/ ATmega32C1/ATmega64M1/ATmega64C1 Automotive Specification at 150°C

**DATASHEET** 

### **Description**

This document contains information specific to devices operating at temperatures up to 150°C. Only deviations are covered in this appendix, all other information can be found in the complete Automotive datasheet. The complete Automotive datasheet can be found on <a href="http://www.atmel.com">http://www.atmel.com</a>

#### 1. Electrical Characteristics

#### 1.1 Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

| Parameters  | Test Conditions              | Unit |
|---|------------------------------|------|
| Operating temperature                                     | -55 to +150                  | °C   |
| Storage temperature                                       | -65 to +175                  | °C   |
| Voltage on any pin except RESET with respect to ground    | -0.5 to V <sub>CC</sub> +0.5 | V    |
| Voltage on RESET with respect to ground                   | -0.5 to +13.0                | V    |
| Maximum operating voltage                                 | 6.0                          | V    |
| DC current per I/O pin DC current V <sub>CC</sub> and GND | 30<br>200.0                  | mA   |

#### 1.2 DC Characteristics

 $T_A = -40$ °C to +150°C,  $V_{CC} = 4.5$ V to 5.5V (unless otherwise noted)

| Parameters  | Test Conditions                | Symbol           | Min.                              | Тур. | Max.                               | Unit |
|---|--------------------------------|------------------|-----------------------------------|------|------------------------------------|------|
| Input low voltage,<br>except XTAL1 and<br>RESET pin   | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IL</sub>  | -0.5                              |      | +0.2V <sub>CC</sub> <sup>(1)</sup> | V    |
| Input high voltage,<br>except XTAL1 and<br>RESET pins | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IH</sub>  | 0.6V <sub>CC</sub> <sup>(2)</sup> |      | V <sub>CC</sub> + 0.5              | V    |
| Input low voltage,<br>XTAL1 pin                       | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IL1</sub> | -0.5                              |      | +0.1V <sub>CC</sub> <sup>(1)</sup> | V    |
| Input high voltage,<br>XTAL1 pin                      | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IH1</sub> | 0.8V <sub>CC</sub> <sup>(2)</sup> |      | V <sub>CC</sub> + 0.5              | V    |
| Input low voltage, RESET pin                          | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IL2</sub> | -0.5                              |      | +0.2V <sub>CC</sub> <sup>(1)</sup> | V    |
| Input high voltage, RESET pin                         | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IH2</sub> | 0.9V <sub>CC</sub> <sup>(2)</sup> |      | V <sub>CC</sub> + 0.5              | V    |
| Input low voltage, RESET pin as I/O                   | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IL3</sub> | -0.5                              |      | +0.2V <sub>CC</sub> <sup>(1)</sup> | V    |
| Input high voltage, RESET pin as I/O                  | V <sub>CC</sub> = 4.5V to 5.5V | V <sub>IH3</sub> | 0.8V <sub>CC</sub> <sup>(2)</sup> |      | V <sub>CC</sub> + 0.5              | V    |

Notes: 1. "Max" means the highest value where the pin is guaranteed to be read as low

- 2. "Min" means the lowest value where the pin is guaranteed to be read as high
- 3. Although each I/O port can sink more than the test conditions (20mA at V<sub>CC</sub> = 5V) under steady state conditions (non-transient), the following must be observed:
  - 1] The sum of all IOL, for all ports, should not exceed 400mA.
  - 2] The sum of all IOL, for ports C0 C5, should not exceed 200mA.
  - 3] The sum of all IOL, for ports C6, D0 D4, should not exceed 300mA.
  - 4] The sum of all IOL, for ports B0 B7, D5 D7, should not exceed 300mA.
  - If IOL exceeds the test condition, VOL may exceed the related specification. Pins are not guaranteed to sink current greater than the listed test condition.
- 4. For temperature range +125°C to +150°C only. For -40°C to +125°C, refer to ATmega16M1/ATmega16M1/32M1/32C1/64M1/64C1/ATA8888/ATmega64M1/ATmega64C1 Automotive datasheet.



#### 1.2 **DC Characteristics (Continued)**

 $T_A = -40$ °C to +150°C,  $V_{CC} = 4.5$ V to 5.5V (unless otherwise noted)

| Parameters  | Test Conditions  | Symbol               | Min. | Тур. | Max. | Unit |
|---|--|----------------------|------|------|------|------|
| Output low voltage <sup>(3)</sup> , I/O pin except RESET  | I <sub>OL</sub> = 10mA, V <sub>CC</sub> = 5V                       | V <sub>OL</sub>      |      |      | 0.8  | V    |
| Output high voltage <sup>(4)</sup> , I/O pin except RESET | $I_{OH} = -10 \text{mA}, \ V_{CC} = 5 \text{V}$                    | V <sub>OH</sub>      | 4.1  |      |      | V    |
| Output high voltage (reset pin)                           | $I_{OH} = 0.6 \text{mA}, V_{CC} = 5 \text{V}$                      | V <sub>OH3</sub>     | 3    |      |      | V    |
| Input leakage current I/O pin                             | V <sub>CC</sub> = 5.5V, pin low (absolute value)                   | I <sub>IL</sub>      |      |      | 1    | μΑ   |
| Input leakage current I/O pin                             | V <sub>CC</sub> = 5.5V, pin high (absolute value)                  | I <sub>IH</sub>      |      |      | 1    | μΑ   |
| Reset pull-up resistor                                    |  | R <sub>RST</sub>     | 30   |      | 200  | kΩ   |
| I/O pin pull-up resistor                                  |  | R <sub>PU</sub>      | 20   |      | 50   | kΩ   |
| Power supply current <sup>(4)</sup>                       | Active 16MHz, V <sub>CC</sub> = 5V,<br>External clock, PRR = 0xFF, | I <sub>cc</sub>      |      | 14   | 30   | mA   |
| rower supply current                                      | Idle 16MHz, V <sub>CC</sub> = 5V,<br>External clock                | I <sub>CC IDLE</sub> |      | 5.5  | 15   | mA   |
| Power-down mode   | WDT enabled, V <sub>CC</sub> = 5V                                  |                      |      | 80   | 330  | μΑ   |
| Fower-down mode   | WDT disabled, V <sub>CC</sub> = 5V                                 | I <sub>CC PWD</sub>  |      | 70   | 310  | μΑ   |
| Analog comparator<br>Input leakage current                | $V_{CC} = 5V$ $V_{in} = V_{CC}/2$                                  | I <sub>ACLK</sub>    | -200 |      | +200 | nA   |

Notes: 1. "Max" means the highest value where the pin is guaranteed to be read as low

- 2. "Min" means the lowest value where the pin is guaranteed to be read as high
- 3. Although each I/O port can sink more than the test conditions (20mA at  $V_{CC} = 5V$ ) under steady state conditions (nontransient), the following must be observed:
  - 1] The sum of all IOL, for all ports, should not exceed 400mA.
  - 2] The sum of all IOL, for ports C0 C5, should not exceed 200mA.
  - 3] The sum of all IOL, for ports C6, D0 D4, should not exceed 300mA.
  - 4] The sum of all IOL, for ports B0 B7, D5 D7, should not exceed 300mA.
  - If IOL exceeds the test condition, VOL may exceed the related specification. Pins are not guaranteed to sink current greater than the listed test condition.
- 4. For temperature range +125°C to +150°C only. For -40°C to +125°C, refer to ATmega16M1/ATmega16M1/32M1/32C1/64M1/64C1/ATA8888/ATmega64M1/ATmega64C1 Automotive datasheet.



### 1.3 ADC Characteristics in Single-ended Mode

 $T_A = -40$ °C to +150°C,  $V_{CC} = 4.5$ V to 5.5V (unless otherwise noted)

| Parameters                   | Test Conditions   | Symbol           | Min   | Тур  | Max  | Unit |
|------------------------------|---|------------------|-------|------|------|------|
| Resolution                   | Single ended,<br>Temp = -40°C to 150°C                  |                  |       | 10   |      | Bit  |
| Absolute accuracy            | $V_{CC} = 5V$ , $V_{Ref} = 2.56V$ ,<br>ADC clock = 1MHz | TUE              |       | 3.2  | 6.0  | LSB  |
| Absolute accuracy            | $V_{CC} = 5V$ , $V_{Ref} = 2.56V$ ,<br>ADC clock = 2MHz | TOL              |       | 3.2  | 6.0  |      |
| Integral Non Linearity       | $V_{CC}$ = 5V, $V_{Ref}$ = 2.56V,<br>ADC clock = 1MHz   | INL              |       | 0.7  | 3.0  | LSB  |
| integral Non Lineanty        | $V_{CC}$ = 5V, $V_{Ref}$ = 2.56V,<br>ADC clock = 2MHz   | IIVL             |       | 0.8  | 3.0  |      |
| Differential Non Linearity   | $V_{CC}$ = 5V, $V_{Ref}$ = 2.56V,<br>ADC clock = 1MHz   | DNL              |       | 0.5  | 1.5  | LSB  |
| Differential (Not) Effically | $V_{CC} = 5V$ , $V_{Ref} = 2.56V$ ,<br>ADC clock = 2MHz | DIVL             |       | 0.6  | 1.5  |      |
| Gain error                   | $V_{CC}$ = 5V, $V_{Ref}$ = 2.56V,<br>ADC clock = 1MHz   |                  | -10.0 | -5.0 | +0.0 | LSB  |
| Cam ono                      | $V_{CC} = 5V$ , $V_{Ref} = 2.56V$ ,<br>ADC clock = 2MHz |                  | -10.0 | -5.0 | +0.0 | 200  |
| Offset error                 | $V_{CC}$ = 5V, $V_{Ref}$ = 2.56V,<br>ADC clock = 1MHz   |                  | -2.0  | +2.5 | +6.0 | LSB  |
|                              | $V_{CC} = 5V$ , $V_{Ref} = 2.56V$ ,<br>ADC clock = 2MHz |                  | -2.0  | +2.5 | +6.0 | 203  |
| Reference voltage            |   | V <sub>REF</sub> | 2.56  |      | AVCC | V    |

### 1.4 ADC Characteristics in Differential Mode

 $T_A = -40$  °C to +150 °C,  $V_{CC} = 4.5 V$  to 5.5 V (unless otherwise noted)

| Parameters   | Test Conditions   | Symbol | Min | Тур | Max | Unit |
|--|---|--------|-----|-----|-----|------|
| Resolution   | Differential conversion,<br>gain = 5x,<br>Temp = -40°C to 150°C           |        |     | 8   |     |      |
|  | Differential conversion,<br>gain = $10x$ ,<br>Temp = $-40$ °C to $150$ °C |        |     | 8   |     | Bit  |
|  | Differential conversion,<br>gain = 20x,<br>Temp = -40°C to 150°C          |        |     | 8   |     | Dit  |
| Differential conversion gain = 40x,<br>Temp = -40°C to 150°C |   |        |     | 8   |     |      |

### 1.4 ADC Characteristics in Differential Mode (Continued)

 $T_A = -40$ °C to +150°C,  $V_{CC} = 4.5$ V to 5.5V (unless otherwise noted)

| Parameters                 | Test Conditions  | Symbol    | Min  | Тур | Max        | Unit |
|----------------------------|--|-----------|------|-----|------------|------|
|                            | $\begin{aligned} &\text{Gain} = 5\text{x}, \ 10\text{x}, \ \text{V}_{\text{CC}} = 5\text{V}, \\ &\text{V}_{\text{Ref}} = 2.56\text{V}, \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$ |           |      | 1.5 | 3.5        |      |
| Absolute accuracy          | $\begin{aligned} &\text{Gain} = 20\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       | TUE       |      | 1.5 | 4.0        | LSB  |
|                            | $\begin{aligned} &\text{Gain} = 40\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       |           |      | 1.5 | 6.0        |      |
|                            | $\begin{aligned} &\text{Gain} = 5\text{x, } 10\text{x, } \text{V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$   |           |      | 0.1 | 1.5        |      |
| Integral non linearity     | $\begin{aligned} &\text{Gain} = 20\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       | INL       |      | 0.2 | 2.5        | LSB  |
|                            | $\begin{aligned} &\text{Gain} = 40\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       |           |      | 0.7 | 4.5        |      |
|                            | $\begin{aligned} &\text{Gain} = 5\text{x},  10\text{x},  \text{V}_{\text{CC}} = 5\text{V}, \\ &\text{V}_{\text{Ref}} = 2.56\text{V}, \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$   |           |      | 0.1 | 1.5        |      |
| Differential non linearity | $\begin{aligned} &\text{Gain} = 20\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       | DNL       |      | 0.2 | 2.0        | LSB  |
|                            | $\begin{aligned} &\text{Gain} = 40\text{x, V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$                       |           |      | 0.3 | 4.0        |      |
| Gain error                 | $\begin{aligned} &\text{Gain} = 5\text{x, } 10\text{x, } \text{V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$   |           | -3.0 |     | +3.0       | LSB  |
| Gain entiti                | Gain = 20x, 40x,<br>V <sub>CC</sub> = 5V, V <sub>Ref</sub> = 2.56V,<br>ADC clock = 2MHz  |           | -3.0 |     | +3.0       | LOD  |
| Offset error               | $\begin{aligned} &\text{Gain} = 5\text{x, } 10\text{x, } \text{V}_{\text{CC}} = 5\text{V,} \\ &\text{V}_{\text{Ref}} = 2.56\text{V,} \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$   |           | -3.0 |     | +3.0       | LSB  |
| Chisel Giloi               | $\begin{aligned} &\text{Gain} = 20\text{x},  40\text{x}, \\ &\text{V}_{\text{CC}} = 5\text{V},  \text{V}_{\text{Ref}} = 2.56\text{V}, \\ &\text{ADC clock} = 2\text{MHz} \end{aligned}$  |           | -4.0 |     | +4.0       | LOB  |
| Reference voltage          |  | $V_{REF}$ | 2.56 |     | AVCC - 0.5 | V    |

### 1.5 Memory Endurance

EEPROM endurance: 50,000 Write/Erase cycles. Flash endurance: 10,000 Write/Erase cycles.



#### 2. Grade 0 Qualification

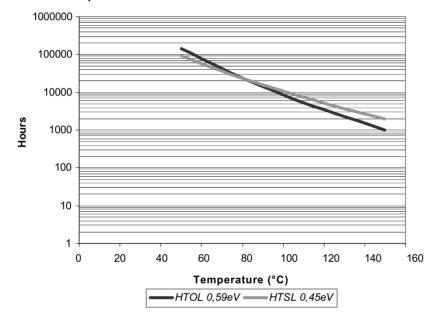
The ATmega16M1/ATmega16M1/32M1/32C1/64M1/64C1/ATA8888/ATmega64M1/ATmega64C1 has been developed and manufactured according to the most stringent quality assurance requirements of ISO-TS-16949 and verified during product qualification as per AEC-Q100 grade 0.

AEC-Q100 qualification relies on temperature accelerated stress testing. High temperature field usage however may result in less significant stress test acceleration. In order to prevent the risk that

ATmega16M1/ATmega16M1/32M1/32C1/64M1/64C1/ATA8888/ATmega64M1/ATmega64C1 lifetime would not satisfy the application end-of-life reliability requirements, Atmel<sup>®</sup> has extended the testing, whenever applicable (high temperature operating life test, high temperature storage life, data retention, thermal cycles), far beyond the AEC-Q100 requirements. Thereby, Atmel verified the ATmega16M1/ATmega16M1/32M1/32C1/64M1/64C1/ATA8888/ATmega64M1/ATmega64C1 has a long safe lifetime period after the grade 0 qualification acceptance limits.

The valid domain calculation depends on the activation energy of the potential failure mechanism that is considered. Therefore any temperature mission profile which could exceed the AEC-Q100 equivalence domain shall be submitted to Atmel for a thorough reliability analysis







## 3. Ordering Information

Table 3-1. ATmega16/32/64/M1/C1 Ordering Code

Speed is 16MHz and Power Supply is 4.5V to 5.5V for all devices. Operating range is the same for all devices too Extended  $(-40^{\circ}\text{C to } +150^{\circ}\text{C})$ .

| Speed (MHz)       | Power Supply | Ordering Code                           | Package <sup>(1)</sup> | Operation Range               |
|-------------------|--------------|---|------------------------|-------------------------------|
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1-15MD                         | PV                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1-15AD                         | MA                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1/32M1/32C1/64M<br>1/64C1-ESMD | PV                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1/32M1/32C1/64M<br>1/64C1-ESAD | MA                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1/32M1/32C1/64M<br>1/64C1-15MD | PV                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega16M1/32M1/32C1/64M<br>1/64C1-15AD | MA                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATA8888-15MD                            | PV                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATA8888-15AD                            | MA                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64M1-ESMD                         | PV                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64M1-ESAD                         | MA                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64C1-ESMD                         | PV                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64C1-ESAD                         | MA                     | Engineering samples           |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64M1-15MD                         | PV                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64M1-15AD                         | MA                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64C1-15MD                         | PV                     | Extended<br>(-40°C to +150°C) |
| 16 <sup>(2)</sup> | 4.5V to 5.5V | ATmega64C1-15AD                         | MA                     | Extended<br>(-40°C to +150°C) |

Notes: 1.



Pb-free packaging, complies to the European Directive for Restriction of Hazardous Substances (RoHS directive). Also halide free and fully green.

<sup>2.</sup> For speed versus V<sub>cc</sub>, see complete datasheet.

# 4. Package Information

Table 4-1. Package Types

|    | Package Type  |
|----|---|
| PV | 32-lead, 7.0mm × 7.0mm body, 0.65mm pitch, quad flat no lead package (QFN)  |
| MA | MA, $32$ - lead, $7mm \times 7mm$ body size, $1.0mm$ body thickness $0.8mm$ lead pitch, thin profile plastic quad flat package (TQFP) |



Figure 4-1. PV

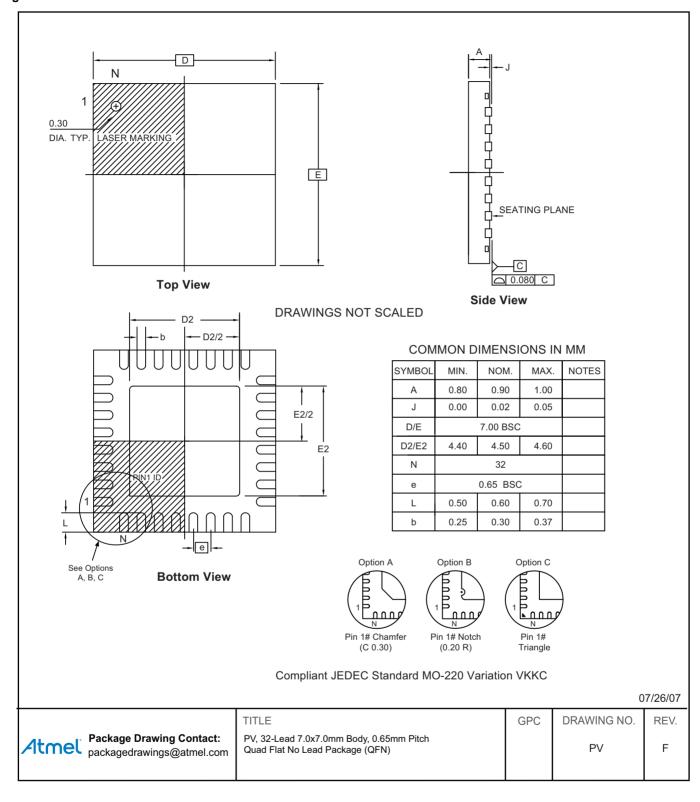
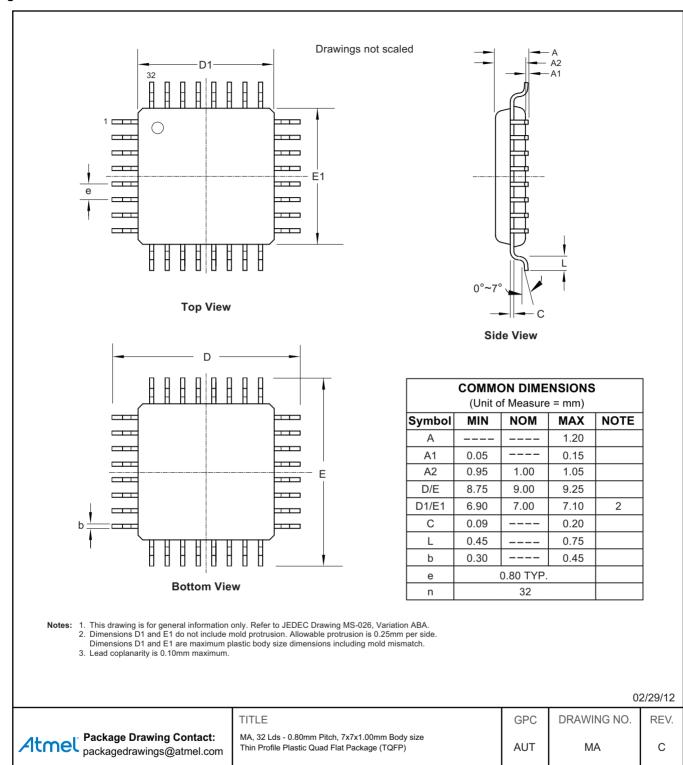




Figure 4-2. MA





# 5. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

| Revision No.  | History  |
|---|--|
| 7781F-AVR-07/14   | Put datasheet in the latest template               |
| 7781E-AVR-03/12   | Package MA updated                                 |
| 7781D-AVR-01/10   | Section 1.2 "DC Characteristics" on page 3 changed |
|   | DC characteristics updated                         |
| 7781C-AVR-04/09   | ADC characteristics updated                        |
| 7761C-AVK-04/09   | Memory endurance added                             |
|   | Ordering code added                                |
| 7781B-AVR-05/08 • Added AEC-Q100 lifetime equivalence graph, page 4 |  |
| 7781A-AVR-03/08   | Document creation                                  |















**Atmel Corporation** 

1600 Technology Drive, San Jose, CA 95110 USA

T: (+1)(408) 441.0311

F: (+1)(408) 436.4200

www.atmel.com

© 2014 Atmel Corporation. / Rev.: 7781F-AVR-07/14

Atmel®, Atmel logo and combinations thereof, Enabling Unlimited Possibilities®, AVR®, and others are registered trademarks or trademarks of Atmel Corporation in U.S. and other countries. Other terms and product names may be trademarks of others.

DISCLAIMER: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and products descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

SAFETY-CRITICAL, MILITARY, AND AUTOMOTIVE APPLICATIONS DISCLAIMER: Atmel products are not designed for and will not be used in connection with any applications where the failure of such products would reasonably be expected to result in significant personal injury or death ("Safety-Critical Applications") without an Atmel officer's specific written consent. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Atmel products are not designed nor intended for use in military or aerospace applications or environments unless specifically designated by Atmel as military-grade. Atmel products are not designed nor intended for use in automotive applications unless specifically designated by Atmel as automotive-grade.

# **Mouser Electronics**

**Authorized Distributor** 

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

# Microchip:

ATMEGA32C1-15AD ATMEGA32C1-15MD ATMEGA64C1-15AD ATMEGA64C1-15MD