

Features

- Serial Peripheral Interface (SPI) Compatible
- Supports SPI Modes 0 (0,0) and 3 (1,1)
 - Data Sheet Describes Mode 0 Operation
- Low-voltage and Standard-voltage Operation
 - $V_{CC} = 1.8V$ to 5.5V
- 20MHz Clock Rate (5V)
- 8-byte Page Mode
- Block Write Protection
 - Protect 1/4, 1/2, or Entire Array
- Write Protect (\overline{WP}) Pin and Write Disable Instructions for Both Hardware and Software Data Protection
- Self-timed Write Cycle (5ms max)
- High Reliability
 - Endurance: 1,000,000 Write Cycles
 - Data Retention: 100 Years
- Green (Pb/Halogen-free/RoHS Compliant) Packaging Options
- Die Sales: Wafer Form, Waffle Pack, and Bumped Wafers

Description

The Atmel® AT25010B/020B/040B provides 1,024/2,048/4,096 bits of Serial Electrically Erasable Programmable Read-Only Memory (EEPROM) organized as 128/256/512 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operation are essential. The AT25010B/020B/040B is available in space saving, JEDEC SOIC, UDFN, TSSOP, XDFN, and VFBGA packages.

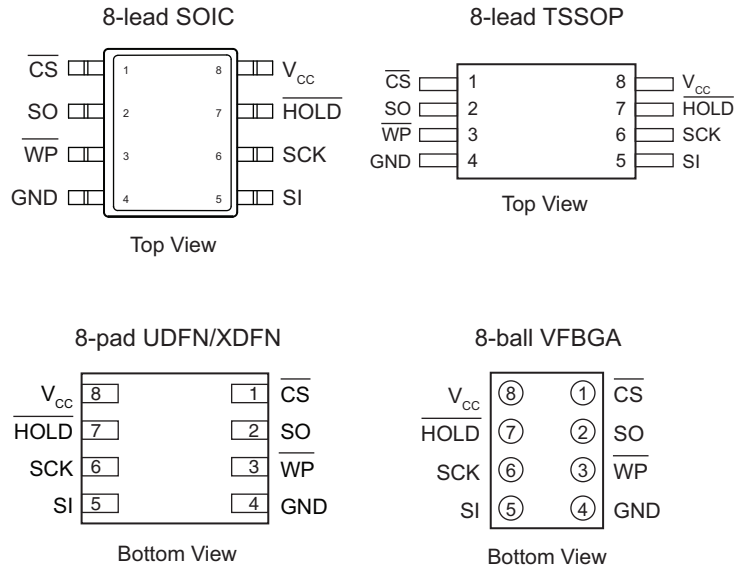
The AT25010B/020B/040B is enabled through the Chip Select pin (\overline{CS}) and accessed via a 3-Wire interface consisting of Serial Data Input (SI), Serial Data Output (SO), and Serial Clock (SCK). All programming cycles are completely self-timed, and no separate erase cycle is required before write.

Block Write protection is enabled by programming the status register with one of four blocks of Write Protection. Separate Program Enable and Program Disable instructions are provided for additional data protection. Hardware Data Protection is provided via the \overline{WP} pin to protect against inadvertent write attempts. The \overline{HOLD} pin may be used to suspend any serial communication without resetting the serial sequence.

1. Pin Configurations

Table 1-1. Pin Configurations

| Pin Name | Function |
|--------------------------|-----------------------|
| $\overline{\text{CS}}$ | Chip Select |
| SCK | Serial Data Clock |
| SI | Serial Data Input |
| SO | Serial Data Output |
| GND | Ground |
| V_{CC} | Power Supply |
| $\overline{\text{WP}}$ | Write Protect |
| $\overline{\text{HOLD}}$ | Suspends Serial Input |



Note: Drawings are not to scale.

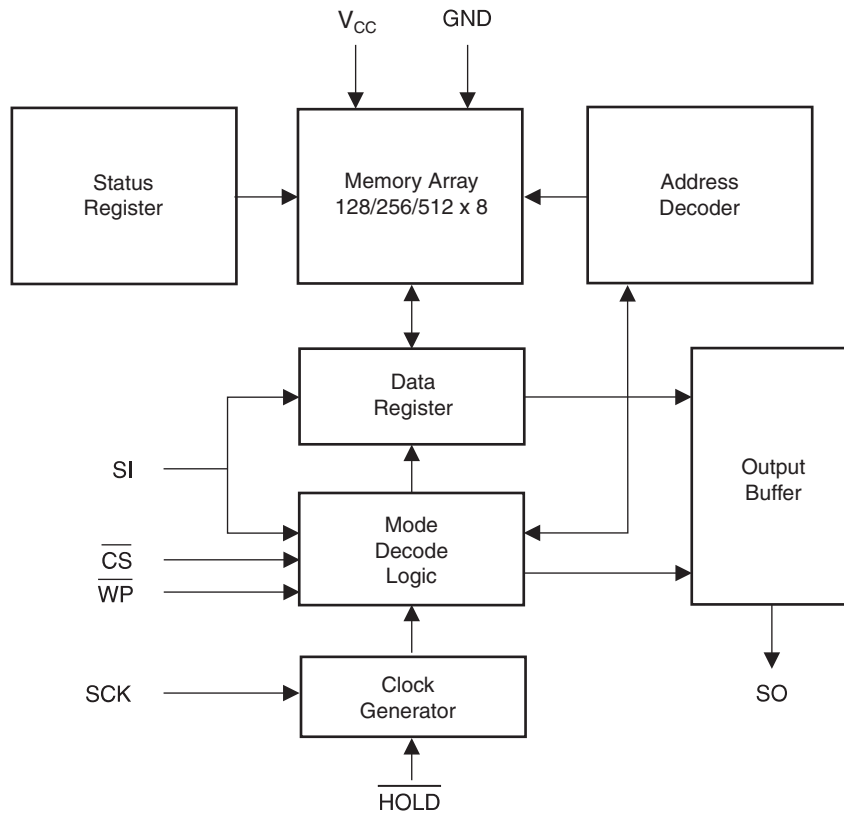
2. Absolute Maximum Ratings*

Operating Temperature -40°C to + 125°C
 Storage Temperature -65°C to + 150°C
 Voltage on any pin
 with respect to ground -1V to + 7V
 Maximum Operating Voltage 6.25V
 DC Output Current 5mA

*Notice: 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.

3. Block Diagram

Figure 3-1. Block Diagram



4. Electrical Characteristics

4.1 Pin Capacitance

Table 4-1. Pin Capacitance⁽¹⁾

Applicable over recommended operating range from $T_A = 25^\circ\text{C}$, $f = 1\text{MHz}$, $V_{CC} = +5\text{V}$ (unless otherwise noted).

| Symbol | Test Conditions | Max | Units | Conditions |
|-----------|--|-----|-------|-----------------------|
| C_{OUT} | Output Capacitance (SO) | 8 | pF | $V_{OUT} = 0\text{V}$ |
| C_{IN} | Input Capacitance (\overline{CS} , SCK, SI, \overline{WP} , HOLD) | 6 | pF | $V_{IN} = 0\text{V}$ |

Note: 1. This parameter is characterized and is not 100% tested.

4.2 DC Characteristics

Table 4-2. DC Characteristics

Applicable over recommended operating range from: $T_{AI} = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = +1.8\text{V}$ to $+5.5\text{V}$, (unless otherwise noted).

| Symbol | Parameter | Test Condition | Min | Typ | Max | Units |
|----------------|---------------------|--|---------------------|-----|---------------------|---------------|
| V_{CC1} | Supply Voltage | | 1.8 | | 5.5 | V |
| V_{CC2} | Supply Voltage | | 2.5 | | 5.5 | V |
| V_{CC3} | Supply Voltage | | 4.5 | | 5.5 | V |
| I_{CC1} | Supply Current | $V_{CC} = 5\text{V}$ at 20MHz SO = Open, Read | | 8.5 | 10 | mA |
| I_{CC2} | Supply Current | $V_{CC} = 5\text{V}$ at 10MHz SO = Open, Read, Write | | 4.5 | 5 | mA |
| I_{CC3} | Supply Current | $V_{CC} = 5\text{V}$ at 1MHz SO = Open, Read, Write | | 2 | 3 | mA |
| I_{SB1} | Standby Current | $V_{CC} = 1.8\text{V}$, $\overline{CS} = V_{CC}$ | | 0.1 | 0.5 | μA |
| I_{SB2} | Standby Current | $V_{CC} = 2.5\text{V}$, $\overline{CS} = V_{CC}$ | | 0.2 | 1 | μA |
| I_{SB3} | Standby Current | $V_{CC} = 5\text{V}$, $\overline{CS} = V_{CC}$ | | 2 | 3.5 | μA |
| I_{IL} | Input Leakage | $V_{IN} = 0\text{V}$ to V_{CC} | -3 | | | μA |
| I_{OL} | Output Leakage | $V_{IN} = 0\text{V}$ to V_{CC} $T_{AC} = 0^\circ\text{C}$ to 70°C | -3 | | 3 | μA |
| $V_{IL}^{(1)}$ | Input Low-voltage | | -0.6 | | $V_{CC} \times 0.3$ | V |
| $V_{IH}^{(1)}$ | Input High-voltage | | $V_{CC} \times 0.7$ | | $V_{CC} + 0.5$ | V |
| V_{OL1} | Output Low-voltage | $3.6\text{V} \leq V_{CC} \leq 5.5\text{V}$ $I_{OL} = 3\text{mA}$ | | | 0.4 | V |
| V_{OH1} | Output High-voltage | $3.6\text{V} \leq V_{CC} \leq 5.5\text{V}$ $I_{OH} = -1.60\text{mA}$ | $V_{CC} - 0.8$ | | | V |
| V_{OL2} | Output Low-voltage | $1.8\text{V} \leq V_{CC} \leq 3.6\text{V}$ $I_{OL} = 0.15\text{mA}$ | | | 0.2 | V |
| V_{OH2} | Output High-voltage | $1.8\text{V} \leq V_{CC} \leq 3.6\text{V}$ $I_{OH} = -100\mu\text{A}$ | $V_{CC} - 0.2$ | | | V |

Note: 1. V_{IL} min and V_{IH} max are reference only and are not tested.

4.3 AC Characteristics

Table 4-3. AC Characteristics

Applicable over recommended operating range from $T_{AI} = -40$ to $+85^{\circ}\text{C}$, $V_{CC} = \text{As Specified}$, $CL = 1$ TTL Gate and 30pF (unless otherwise noted).

| Symbol | Parameter | Voltage | Min | Max | Units |
|-----------|------------------------------|-----------|-----|-----|---------------|
| f_{SCK} | SCK Clock Frequency | 4.5 – 5.5 | 0 | 20 | MHz |
| | | 2.5 – 5.5 | 0 | 10 | |
| | | 1.8 – 5.5 | 0 | 5 | |
| t_{RI} | Input Rise Time | 4.5 – 5.5 | | 2 | μs |
| | | 2.5 – 5.5 | | 2 | |
| | | 1.8 – 5.5 | | 2 | |
| t_{FI} | Input Fall Time | 4.5 – 5.5 | | 2 | μs |
| | | 2.5 – 5.5 | | 2 | |
| | | 1.8 – 5.5 | | 2 | |
| t_{WH} | SCK High Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_{WL} | SCK Low Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_{CS} | \overline{CS} High Time | 4.5 – 5.5 | 100 | | ns |
| | | 2.5 – 5.5 | 100 | | |
| | | 1.8 – 5.5 | 200 | | |
| t_{CSS} | \overline{CS} Setup Time | 4.5 – 5.5 | 100 | | ns |
| | | 2.5 – 5.5 | 100 | | |
| | | 1.8 – 5.5 | 200 | | |
| t_{CSH} | \overline{CS} Hold Time | 4.5 – 5.5 | 100 | | ns |
| | | 2.5 – 5.5 | 100 | | |
| | | 1.8 – 5.5 | 200 | | |
| t_{SU} | Data In Setup Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_H | Data In Hold Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_{HD} | \overline{Hold} Setup Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_{CD} | \overline{Hold} Hold Time | 4.5 – 5.5 | 20 | | ns |
| | | 2.5 – 5.5 | 40 | | |
| | | 1.8 – 5.5 | 80 | | |
| t_V | Output Valid | 4.5 – 5.5 | 0 | 20 | ns |
| | | 2.5 – 5.5 | 0 | 40 | |
| | | 1.8 – 5.5 | 0 | 80 | |
| t_{HO} | Output Hold Time | 4.5 – 5.5 | 0 | | ns |
| | | 2.5 – 5.5 | 0 | | |
| | | 1.8 – 5.5 | 0 | | |

Table 4-3. AC Characteristics (Continued)

Applicable over recommended operating range from $T_{AI} = -40$ to $+85^{\circ}\text{C}$, $V_{CC} = \text{As Specified}$, $CL = 1$ TTL Gate and 30pF (unless otherwise noted).

| Symbol | Parameter | Voltage | Min | Max | Units |
|--------------------------|---|-----------|-----------|-----|--------------|
| t_{LZ} | $\overline{\text{Hold}}$ to Output Low Z | 4.5 – 5.5 | 0 | 25 | ns |
| | | 2.5 – 5.5 | 0 | 50 | |
| | | 1.8 – 5.5 | 0 | 100 | |
| t_{HZ} | $\overline{\text{Hold}}$ to Output High Z | 4.5 – 5.5 | | 25 | ns |
| | | 2.5 – 5.5 | | 50 | |
| | | 1.8 – 5.5 | | 100 | |
| t_{DIS} | Output Disable Time | 4.5 – 5.5 | | 25 | ns |
| | | 2.5 – 5.5 | | 50 | |
| | | 1.8 – 5.5 | | 100 | |
| t_{WC} | Write Cycle Time | 4.5 – 5.5 | | 5 | ms |
| | | 2.5 – 5.5 | | 5 | |
| | | 1.8 – 5.5 | | 5 | |
| Endurance ⁽¹⁾ | 5V, 25°C , Page Mode | | 1,000,000 | | Write Cycles |

Note: 1. This parameter is characterized and is not 100% tested.

5. Serial Interface Description

Master: The device that generates the serial clock.

Slave: Because the Serial Clock pin (SCK) is always an input, the AT25010B/020B/040B always operates as a slave.

Transmitter/Receiver: The AT25010B/020B/040B has separate pins designated for data transmission (SO) and reception (SI).

MSB: The Most Significant Bit (MSB) is the first bit transmitted and received.

Serial Opcode: After the device is selected with $\overline{\text{CS}}$ going low, the first byte will be received. This byte contains the opcode which defines the operations to be performed. The opcode also contains address bit A8 in both the read and write instructions for the AT25040B.

Invalid Opcode: If an invalid opcode is received, no data will be shifted into the AT25010B/020B/040B, and the serial output pin (SO) will remain in a high-impedance state until the falling edge of $\overline{\text{CS}}$ is detected again. This will reinitialize the serial communication.

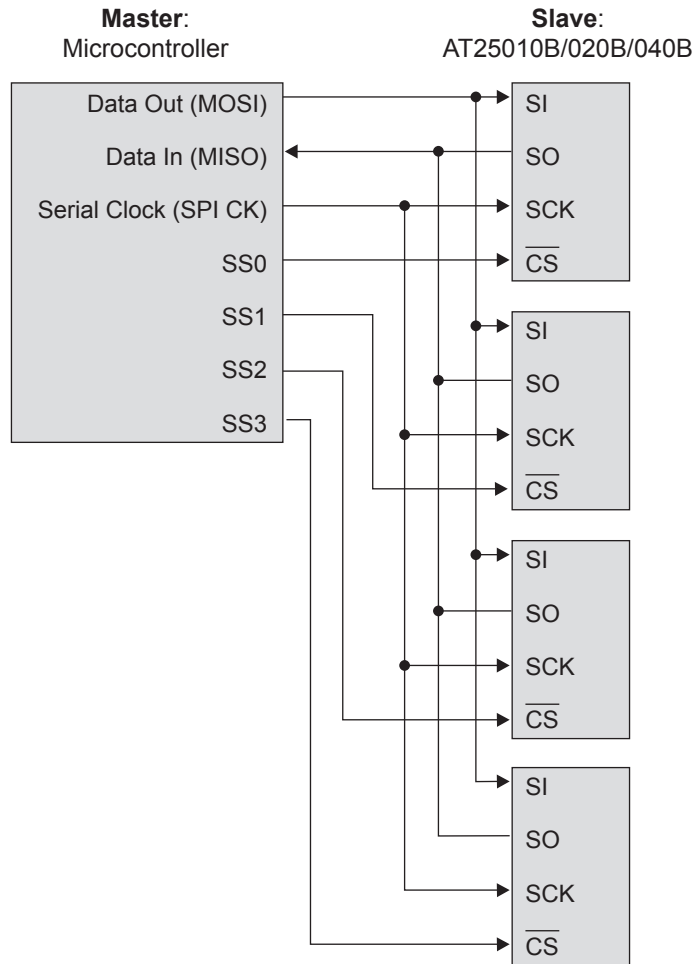
Chip Select: The AT25010B/020B/040B is selected when the $\overline{\text{CS}}$ pin is low. When the device is not selected, data will not be accepted via the SI pin, and the SO pin will remain in a high impedance state.

Hold: The $\overline{\text{HOLD}}$ pin is used in conjunction with the $\overline{\text{CS}}$ pin to select the AT25010B/020B/040B. When the device is selected and a serial sequence is underway, $\overline{\text{HOLD}}$ can be used to pause the serial communication with the master device without resetting the serial sequence. To pause, the $\overline{\text{HOLD}}$ pin must be brought low while the SCK pin is low. To resume serial communication, the $\overline{\text{HOLD}}$ pin is brought high while the SCK pin is low (SCK may still toggle during $\overline{\text{HOLD}}$). Inputs to the SI pin will be ignored while the SO pin is in the high impedance state.

Write Protect: The write protect pin ($\overline{\text{WP}}$) will allow normal read/write operations when held high. When the $\overline{\text{WP}}$ pin is brought low, all write operations are inhibited.

$\overline{\text{WP}}$ going low while $\overline{\text{CS}}$ is still low will interrupt a write to the AT25010B/020B/040B. If the internal write cycle has already been initiated, $\overline{\text{WP}}$ going low will have no effect on any write operation.

Figure 5-1. SPI Serial Interface



6. Functional Description

The AT25010B/020B/040B is designed to interface directly with the synchronous Serial Peripheral Interface (SPI) of the 6805 and 68HC11 series of microcontrollers.

The AT25010B/020B/040B utilizes an 8-bit instruction register. The list of instructions and their operation codes are contained in [Figure 6-1](#). All instructions, addresses, and data are transferred with the MSB first and start with a high-to-low \overline{CS} transition.

Table 6-1. Instruction Set for the AT25010B/020B/040B

| Instruction Name | Instruction Format | Operation |
|------------------|--------------------|-----------------------------|
| WREN | 0000 X110 | Set Write Enable Latch |
| WRDI | 0000 X100 | Reset Write Enable Latch |
| RDSR | 0000 X101 | Read Status Register |
| WRSR | 0000 X001 | Write Status Register |
| READ | 0000 A011 | Read Data from Memory Array |
| WRITE | 0000 A010 | Write Data to Memory Array |

Note: 1. "A" represents MSB address bit A8 for the AT25040B.

Write Enable (WREN): The device will power-up in the Write Disable state when V_{CC} is applied. All programming instructions must therefore be preceded by a Write Enable instruction. The \overline{WP} pin must be held high during a WREN instruction.

Write Disable (WRDI): To protect the device against inadvertent writes, the Write Disable instruction disables all programming modes. The WRDI instruction is independent of the status of the \overline{WP} pin.

Read Status Register (RDSR): The Read Status Register instruction provides access to the status register. The Read/Busy and Write Enable status of the device can be determined by the RDSR instruction. Similarly, the Block Write Protection bits indicate the extent of protection employed. These bits are set by using the WRSR instruction.

Table 6-2. Status Register Format

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|-------|-------|-------|-------|-------|-------|-------|------------------|
| X | X | X | X | BP1 | BP0 | WEN | \overline{RDY} |

Table 6-3. Read Status Register Bit Definition

| Bit | Definition |
|---|--|
| Bit 0 (\overline{RDY}) | Bit 0 = 0 (\overline{RDY}) indicates the device is ready. Bit 0 = 1 indicates the write cycle is in progress. |
| Bit 1 (WEN) | Bit 1 = 0 indicates the device <i>is not</i> write enabled. Bit 1 = 1 indicates the device is write enabled. |
| Bit 2 (BP0) | See Table 6-4 . |
| Bit 3 (BP1) | See Table 6-4 . |
| Bits 4 – 7 are zeros when device is not in an internal write cycle. | |
| Bits 0 – 7 are ones during an internal write cycle. | |

Write Status Register (WRSR): The WRSR instruction allows the user to select one of four levels of protection. The AT25010B/020B/040B is divided into four array segments. None, one-quarter ($\frac{1}{4}$), one-half ($\frac{1}{2}$), or all of the memory segments can be protected. Any of the data within any selected segment will therefore be read-only. The block write protection levels and corresponding status register control bits are shown in [Table 6-4](#).

Bits BP1 and BP0 are nonvolatile cells that have the same properties and functions as the regular memory cells (e.g., WREN, t_{WC} , RDSR).

Table 6-4. Block Write Protect Bits

| Level | Status Register Bits | | Array Addresses Protected | | |
|---------------------|----------------------|-----|---------------------------|----------|-----------|
| | BP1 | BP0 | AT25010B | AT25020B | AT25040B |
| 0 | 0 | 0 | None | None | None |
| 1 ($\frac{1}{4}$) | 0 | 1 | 60 – 7F | C0 – FF | 180 – 1FF |
| 2 ($\frac{1}{2}$) | 1 | 0 | 40 – 7F | 80 – FF | 100 – 1FF |
| 3 (All) | 1 | 1 | 00 – 7F | 00 – FF | 000 – 1FF |

Read Sequence (READ): Reading the AT25010B/020B/040B via the SO pin requires the following sequence. After the \overline{CS} line is pulled low to select a device, the Read opcode (including A8 for the AT25040B) is transmitted via the SI line followed by the byte address to be read (A7 – A0). Upon completion, any data on the SI line will be ignored. The data (D7 – D0) at the specified address is then shifted out onto the SO line. If only one byte is to be read, the \overline{CS} line should be driven high after the data comes out. The Read Sequence can be continued since the byte address is automatically incremented and data will continue to be shifted out. When the highest address is reached, the address counter will roll-over to the lowest address allowing the entire memory to be read in one continuous read cycle.

Write Sequence (WRITE): In order to program the AT25010B/020B/040B, the Write Protect pin (\overline{WP}) must be held high and two separate instructions must be executed. First, the device *must be write enabled* via the WREN instruction. Then a Write (WRITE) instruction may be executed. Also, the address of the memory location(s) to be programmed must be outside the protected address field location selected by the Block Write Protection level. During an internal write cycle, all commands will be ignored except the RDSR instruction.

A Write instruction requires the following sequence. After the \overline{CS} line is pulled low to select the device, the Write opcode (including A8 for the AT25040B) is transmitted via the SI line followed by the byte address (A7 – A0) and the data (D7 – D0) to be programmed. Programming will start after the \overline{CS} pin is brought high. The low-to-high transition of the \overline{CS} pin must occur during the SCK low time immediately after clocking in the D0 (LSB) data bit.

The Ready/Busy status of the device can be determined by initiating a Read Status Register (RDSR) instruction. If Bit 0 = 1, the write cycle is still in progress. If Bit 0 = 0, the write cycle has ended. Only the RDSR instruction is enabled during the write programming cycle.

The AT25010B/020B/040B is capable of an 8-byte Page Write operation. After each byte of data is received, the three low-order address bits are internally incremented by one; the six high-order bits of the address will remain constant. If more than eight bytes of data are transmitted, the address counter will roll-over and the previously written data will be overwritten. The AT25010B/020B/040B is automatically returned to the Write Disable state at the completion of a write cycle.

Note: If the \overline{WP} pin is brought low or if the device is not Write Enabled (WREN), the device will ignore the Write instruction and will return to the standby state, when \overline{CS} is brought high. A new CS falling edge is required to reinitiate the serial communication.

7. Timing Diagrams

Figure 7-1. Synchronous Data Timing (for Mode 0)

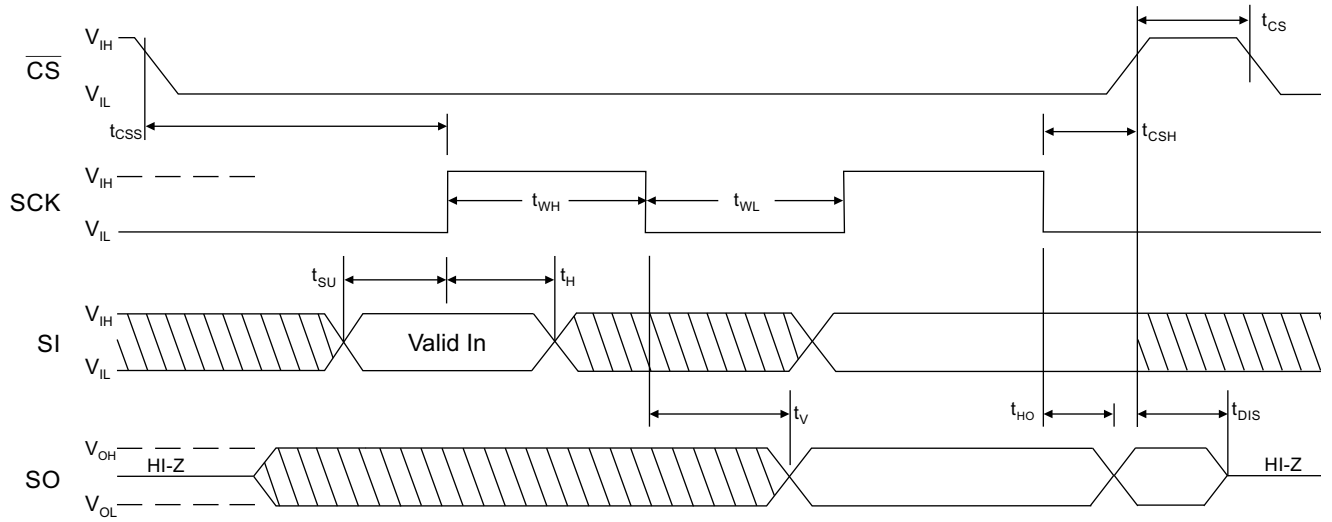


Figure 7-2. WREN Timing

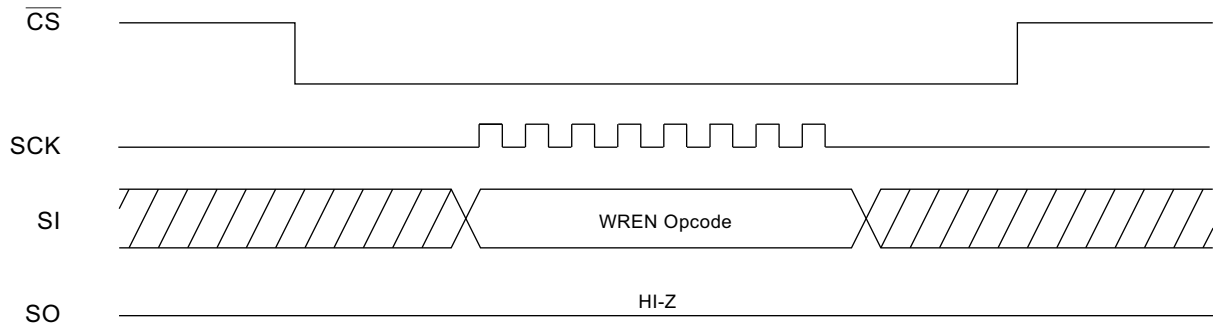


Figure 7-3. WRDI Timing

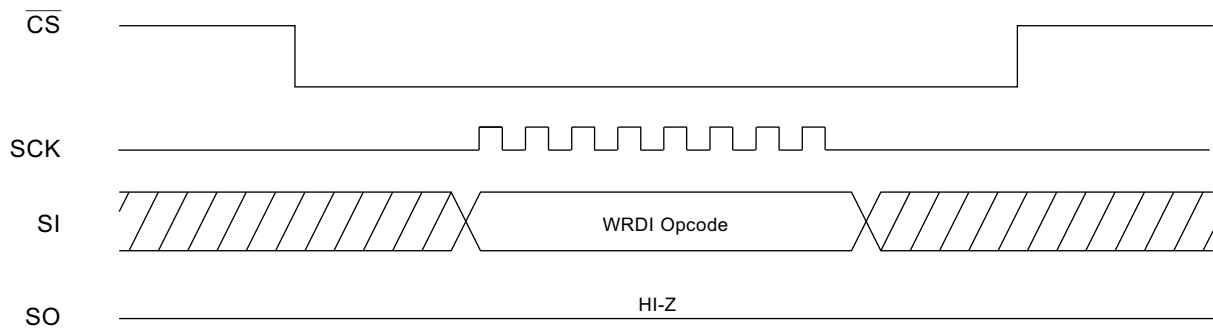


Figure 7-4. RDSR Timing

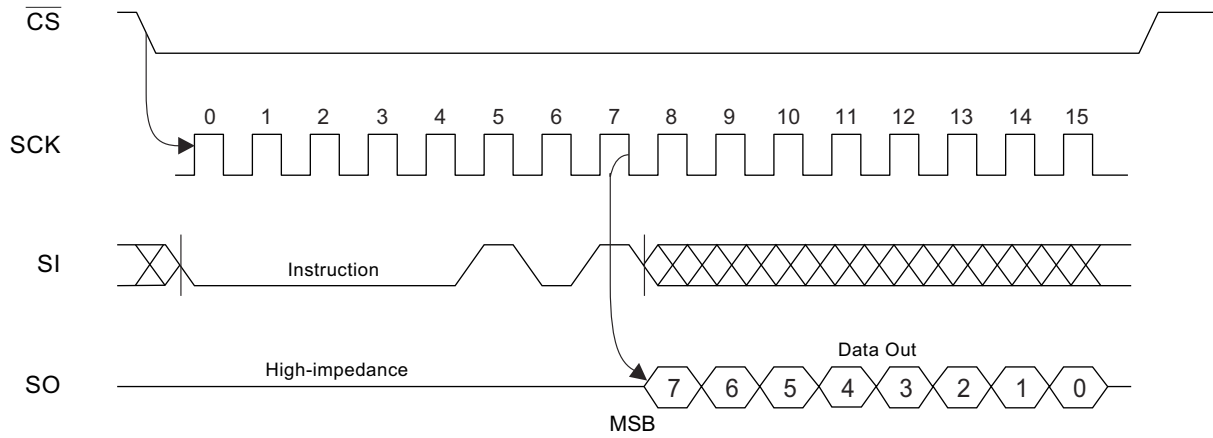


Figure 7-5. WRSR Timing

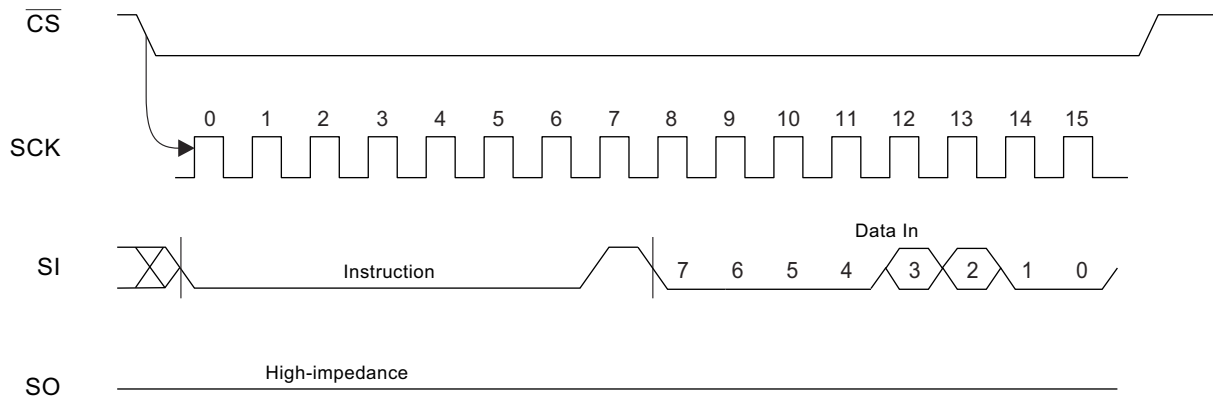


Figure 7-6. READ Timing

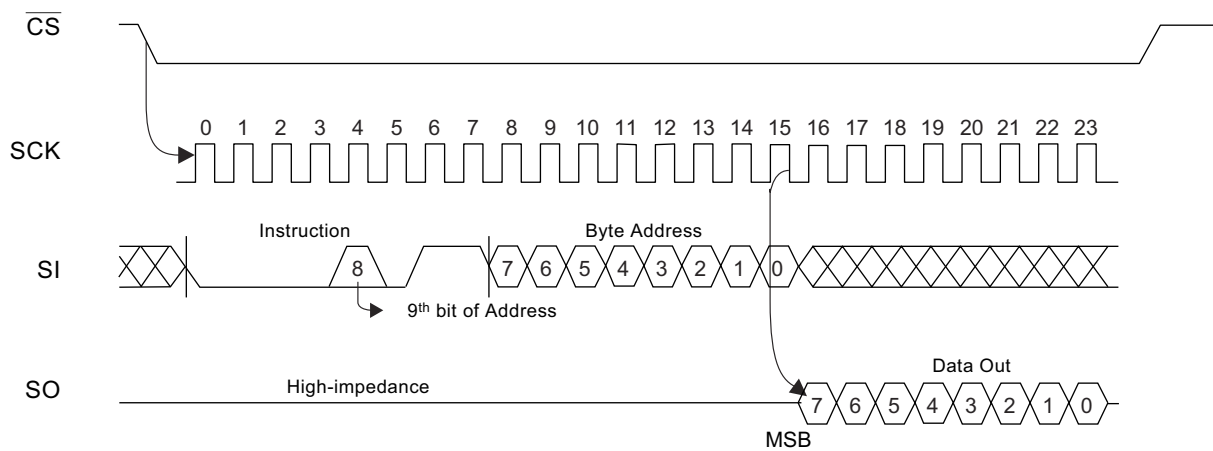


Figure 7-7. WRITE Timing

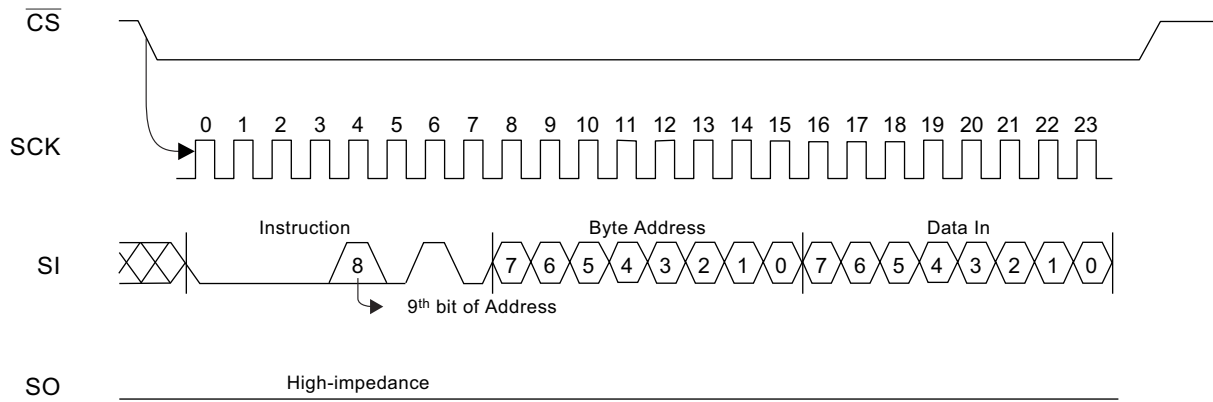
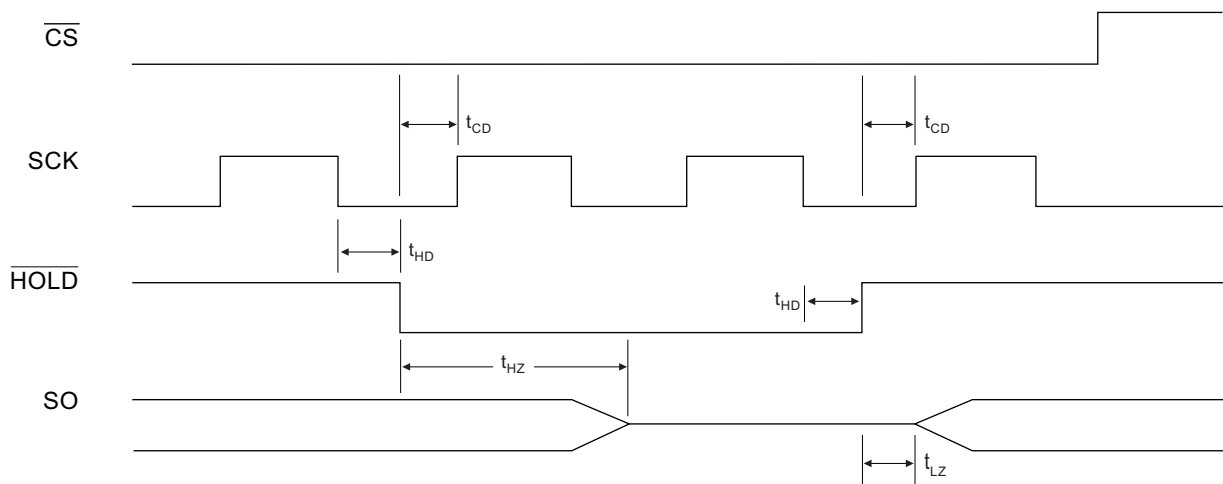
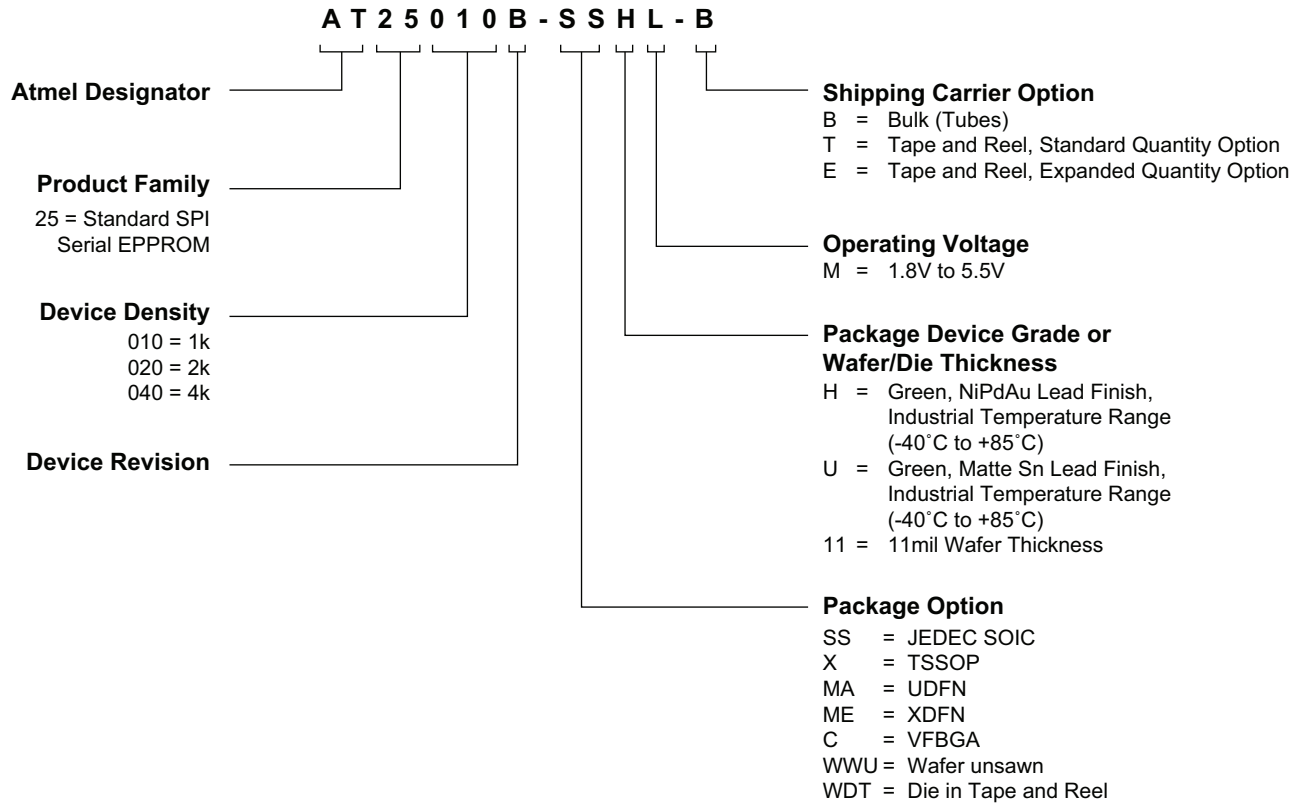


Figure 7-8. HOLD Timing

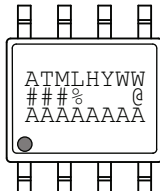
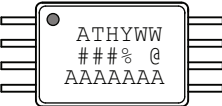
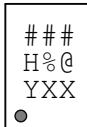
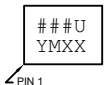



8. Ordering Code Detail



9. Part Markings


AT25010B, AT25020B and AT25040B: Package Marking Information

| | | |
|---|---|---|
| 8-lead SOIC  | 8-lead TSSOP  | 8-pad UDFN 2.0 x 3.0 mm Body  |
| 8-ball VFBGA 1.5 x 2.0 mm Body  | 8-pad XDFN 1.8 x 2.2 mm Body  | |

Note 1: ● designates pin 1
 Note 2: Package drawings are not to scale

| Catalog Number Truncation | | | |
|--|-------------|----------------------------------|--|
| AT25010B | | Truncation Code ###: 51B | |
| AT25020B | | Truncation Code ###: 52B | |
| AT25040B | | Truncation Code ###: 54B | |
| Date Codes | | | Voltages |
| Y = Year | M = Month | WW = Work Week of Assembly | % = Minimum Voltage |
| 4: 2014 8: 2018 | A: January | 02: Week 2 | L: 1.8V min |
| 5: 2015 9: 2019 | B: February | 04: Week 4 | |
| 6: 2016 0: 2020 | ... | ... | |
| 7: 2017 1: 2021 | L: December | 52: Week 52 | |
| Country of Assembly | | Lot Number | Grade/Lead Finish Material |
| @ = Country of Assembly | | AAA...A = Atmel Wafer Lot Number | H: Industrial/NiPdAu U: Industrial/Matte Tin/SnAgCu |
| Trace Code | | | Atmel Truncation |
| XX = Trace Code (Atmel Lot Numbers Correspond to Code) Example: AA, AB.... YZ, ZZ | | | AT: Atmel ATM: Atmel ATML: Atmel |

1/15/14

| | | | |
|---|--|--------------------------------------|------------------|
|  Package Mark Contact: DL-CSO-Assy_eng@atmel.com | TITLE 25010-02-04BSM , AT25010B, AT25020B and AT25040B Package Marking Information | DRAWING NO. 25010-02-04BSM | REV. B |
| | | | |

10. Ordering Information

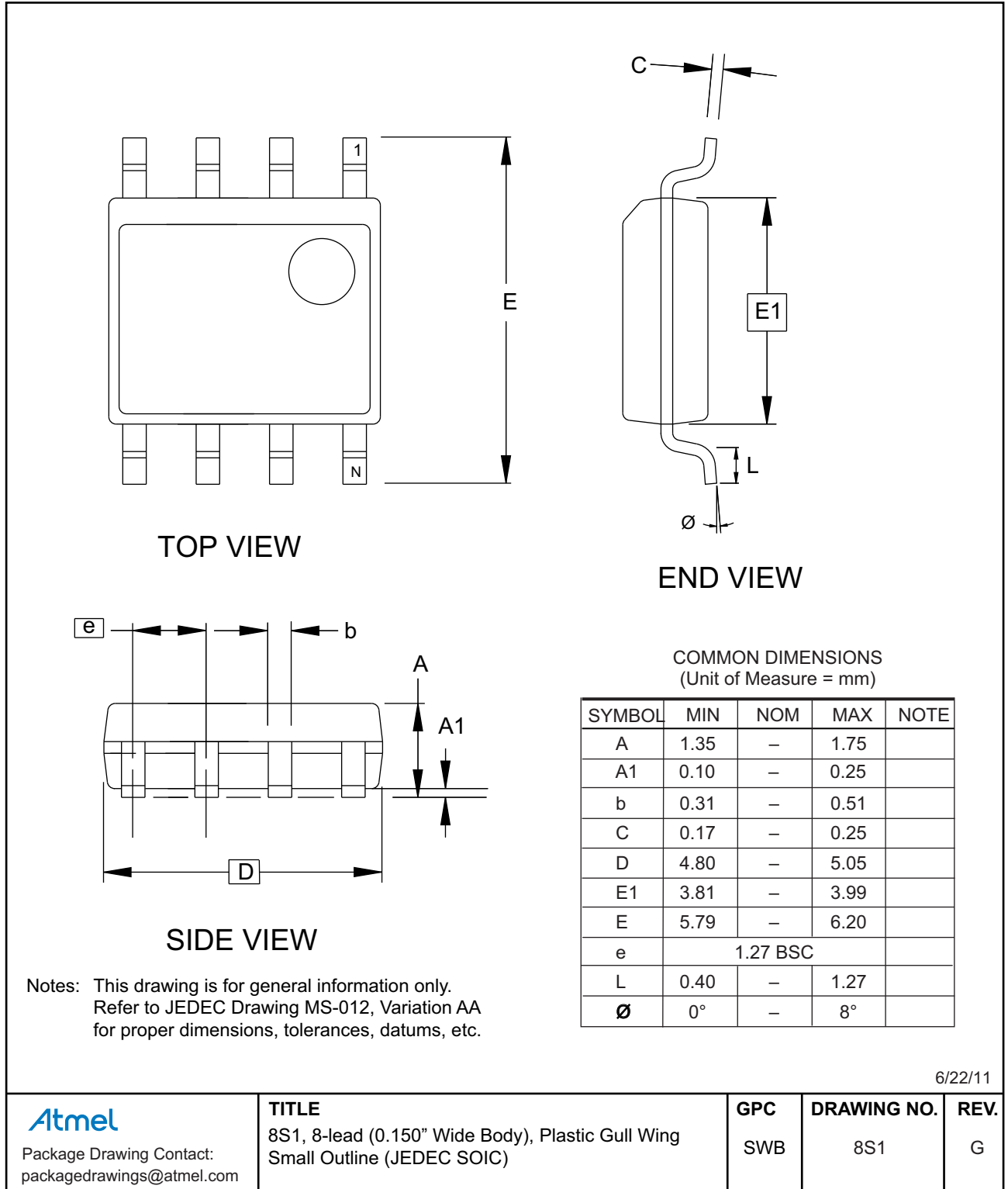
| Atmel Ordering Code | Lead Finish | Package | Delivery Information | | Operation Range | |
|--------------------------------|------------------------------------|------------------------------------|----------------------|-----------------|--|----------------|
| | | | Form | Quantity | | |
| AT25010B-SSHL-B | NiPdAu (Lead-free/Halogen-free) | 8S1 | Bulk (Tubes) | 100 per Tube | Industrial Temperature (-40 to 85°C) | |
| AT25010B-SSHL-T | | | Tape and Reel | 4,000 per Reel | | |
| AT25010B-XHL-B | | 8X | Bulk (Tubes) | 100 per Tube | | |
| AT25010B-XHL-T | | | Tape and Reel | 5,000 per Reel | | |
| AT25010B-MAHL-T | | 8MA2 | Tape and Reel | 5,000 per Reel | | |
| AT25010B-MAHL-E | | | Tape and Reel | 15,000 per Reel | | |
| AT25010B-MEHL-T | | 8ME1 | Tape and Reel | 5,000 per Reel | | |
| AT25010B-CUL-T | | SnAgCu (Lead-free/Halogen-free) | 8U3-1 | Tape and Reel | | 5,000 per Reel |
| AT25010B-WWU11L ⁽¹⁾ | | N/A | Wafer | Note 1 | | |
| AT25020B-SSHL-B | NiPdAu (Lead-free/Halogen-free) | 8S1 | Bulk (Tubes) | 100 per Tube | Industrial Temperature (-40 to 85°C) | |
| AT25020B-SSHL-T | | | Tape and Reel | 4,000 per Reel | | |
| AT25020B-XHL-B | | 8X | Bulk (Tubes) | 100 per Tube | | |
| AT25020B-XHL-T | | | Tape and Reel | 5,000 per Reel | | |
| AT25020B-MAHL-T | | 8MA2 | Tape and Reel | 5,000 per Reel | | |
| AT25020B-MAHL-E | | | Tape and Reel | 15,000 per Reel | | |
| AT25020B-MEHL-T | | 8ME1 | Tape and Reel | 5,000 per Reel | | |
| AT25020B-CUL-T | | SnAgCu (Lead-free/Halogen-free) | 8U3-1 | Tape and Reel | | 5,000 per Reel |
| AT25020B-WWU11L ⁽¹⁾ | | N/A | Wafer | Note 1 | | |
| AT25040B-SSHL-B | NiPdAu (Lead-free/Halogen-free) | 8S1 | Bulk (Tubes) | 100 per Tube | Industrial Temperature (-40 to 85°C) | |
| AT25040B-SSHL-T | | | Tape and Reel | 4,000 per Reel | | |
| AT25040B-XHL-B | | 8X | Bulk (Tubes) | 100 per Tube | | |
| AT25040B-XHL-T | | | Tape and Reel | 5,000 per Reel | | |
| AT25040B-MAHL-T | | 8MA2 | Tape and Reel | 5,000 per Reel | | |
| AT25040B-MAHL-E | | | Tape and Reel | 15,000 per Reel | | |
| AT25040B-MEHL-T | | 8ME1 | Tape and Reel | 5,000 per Reel | | |
| AT25040B-CUL-T | | SnAgCu (Lead-free/Halogen-free) | 8U3-1 | Tape and Reel | | 5,000 per Reel |
| AT25040B-WWU11L ⁽¹⁾ | | N/A | Wafer | Note 1 | | |

Note: 1. Contact Atmel Sales for Wafer sales.

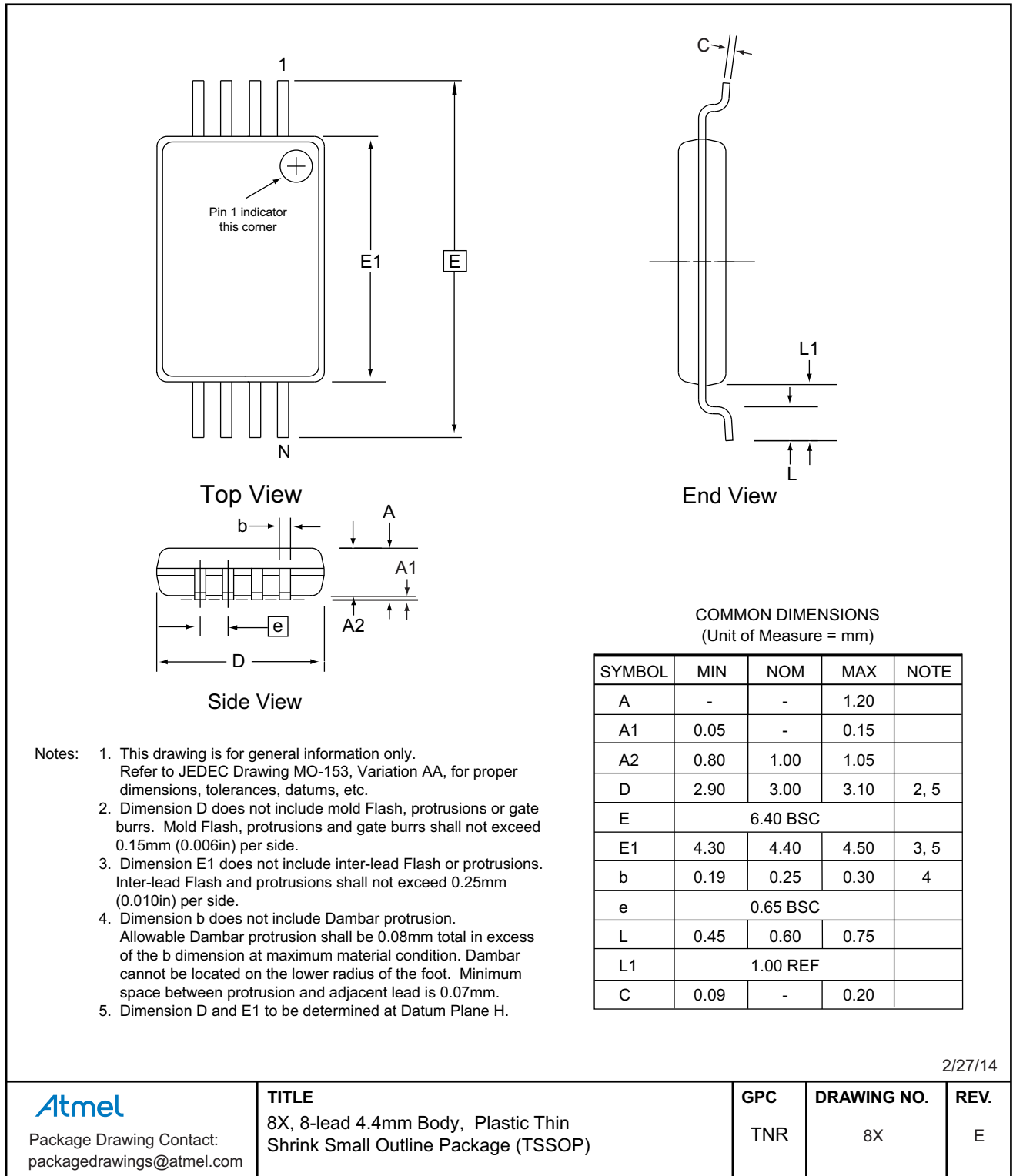
| Package Type | |
|--------------|--|
| 8S1 | 8-lead, 0.15" wide, Plastic Gull Wing Small Outline (JEDEC SOIC) |
| 8X | 8-lead, 4.40mm body, Plastic Thin Shrink Small Outline Package (TSSOP) |
| 8MA2 | 8-pad, 2.00mm x 3.00mm body, 0.50mm pitch, Plastic Ultra Thin Dual Flat No Lead (UDFN) |
| 8ME1 | 8-pad, 1.80mm x 2.20mm body, 0.40mm pitch, Extra Thin Dual Flat No Lead (XDFN) |
| 8U3-1 | 8-ball, 1.50mm x 2.00mm body, 0.50mm pitch, Die Ball Grid Array (VFBGA) |

11. Packaging Information

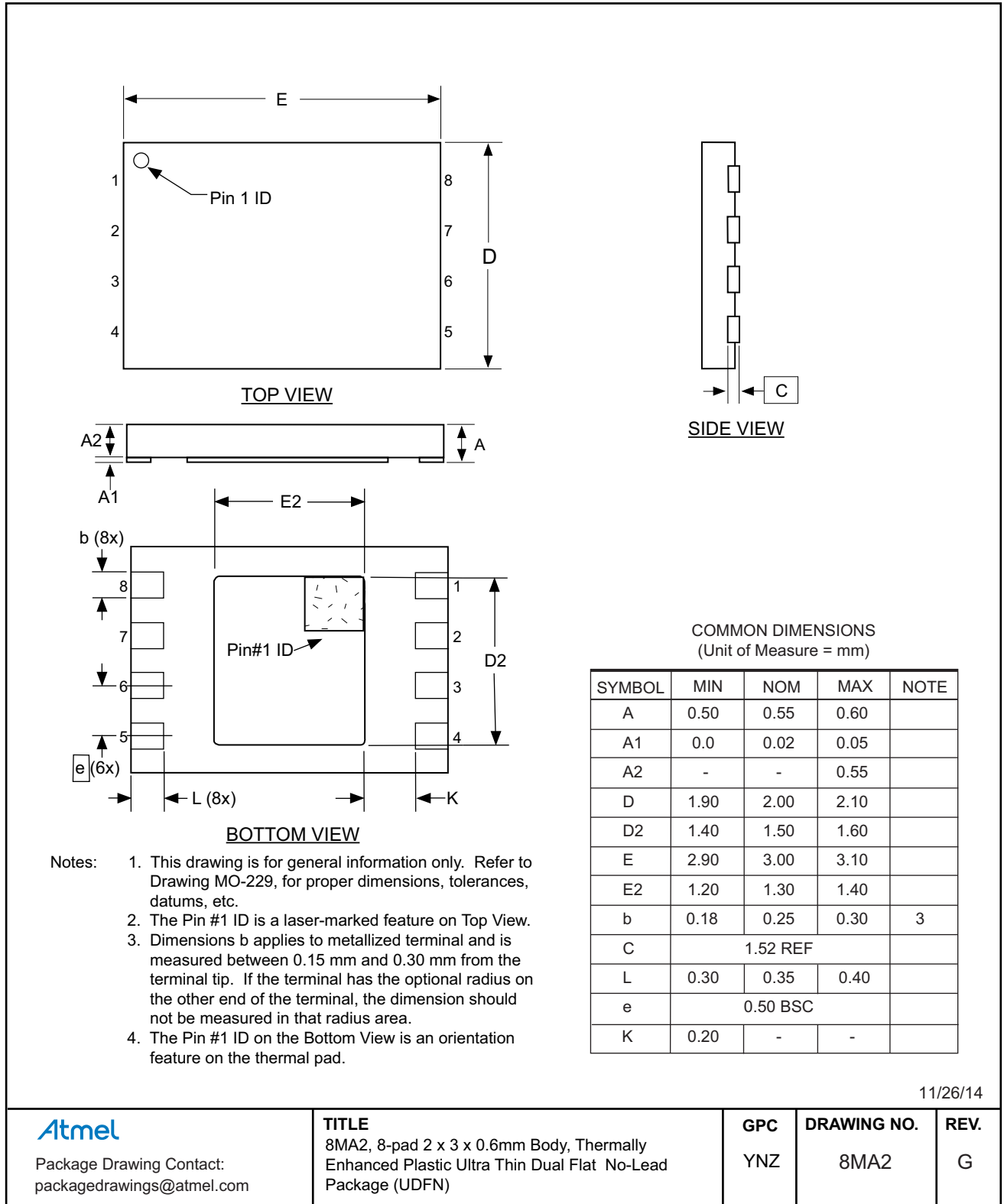
11.1 8S1 — 8-lead JEDEC SOIC



11.2 8X — 8-lead TSSOP



11.3 8MA2 — 8-pad UDFN



11/26/14

Atmel

Package Drawing Contact:
packagedrawings@atmel.com

TITLE

8MA2, 8-pad 2 x 3 x 0.6mm Body, Thermally Enhanced Plastic Ultra Thin Dual Flat No-Lead Package (UDFN)

GPC

YNZ

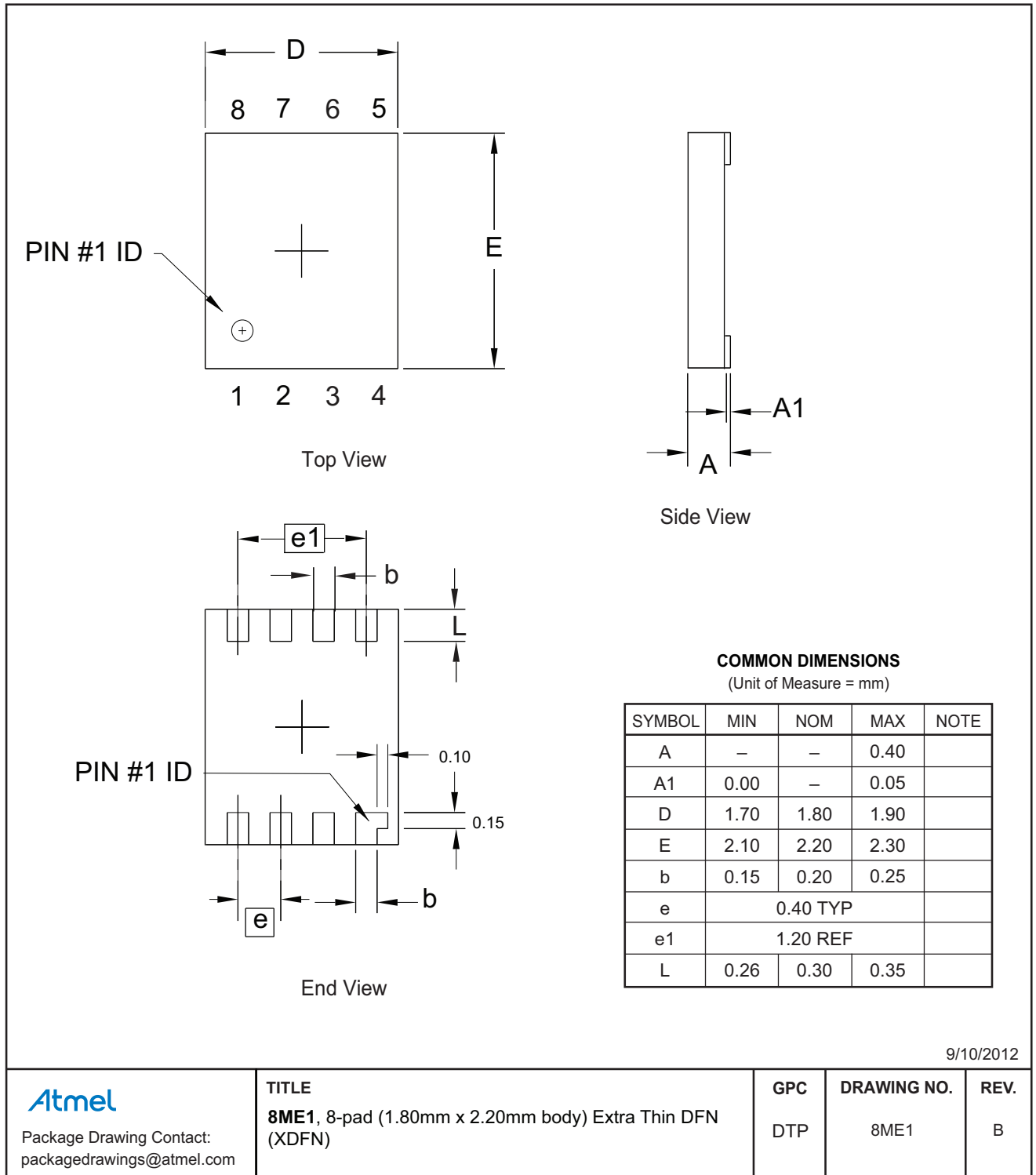
DRAWING NO.

8MA2

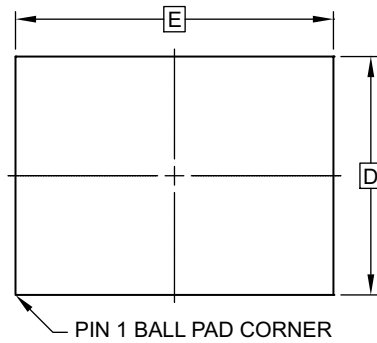
REV.

G

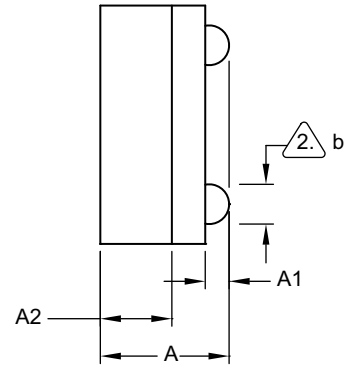
11.4 8ME1 — 8-pad XDFN



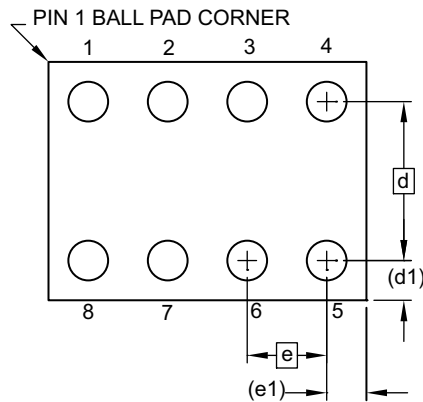
11.5 8U3-1 — 8-ball VFBGA



TOP VIEW



SIDE VIEW



BOTTOM VIEW
8 SOLDER BALLS


Notes:

1. This drawing is for general information only.
2. Dimension 'b' is measured at maximum solder ball diameter.
3. Solder ball composition shall be 95.5Sn-4.0Ag-.5Cu.

COMMON DIMENSIONS
(Unit of Measure - mm)

| SYMBOL | MIN | NOM | MAX | NOTE |
|--------|----------|------|------|------|
| A | 0.73 | 0.79 | 0.85 | |
| A1 | 0.09 | 0.14 | 0.19 | |
| A2 | 0.40 | 0.45 | 0.50 | |
| b | 0.20 | 0.25 | 0.30 | 2 |
| D | 1.50 BSC | | | |
| E | 2.0 BSC | | | |
| e | 0.50 BSC | | | |
| e1 | 0.25 REF | | | |
| d | 1.00 BSC | | | |
| d1 | 0.25 REF | | | |

6/11/13

| | | | | |
|--|---|-----|-------------|------|
|  Package Drawing Contact: packagedrawings@atmel.com | TITLE | GPC | DRAWING NO. | REV. |
| | 8U3-1, 8-ball, 1.50mm x 2.00mm body, 0.50mm pitch, Very Thin, Fine-Pitch Ball Grid Array Package (VFBGA) | GXU | 8U3-1 | F |

12. Revision History

| Doc. Rev. | Date | Comments |
|-----------|---------|---|
| 8707F | 01/2015 | Add the UDFN Expanded Quantity Option. Update the 8MA2 package outline drawing and the ordering information section. |
| 8707E | 05/2014 | Update part markings, package drawings, package 8A2 to 8X, template, logos, and disclaimer page. No change to functional specification. |
| 8707D | 04/2013 | Correct WRSR waveform figure 4-5, bit 7 is not writable. Update Atmel logos and disclaimer page. |
| 8707C | 06/2011 | Correct AT25040B-SSHL marking detail. Replace 8A2 package drawing with version E. |
| 8707B | 10/2010 | Remove Preliminary. |
| 8707B | 03/2010 | Replace 8Y6 with 8MA2. |
| 8707A | 02/2010 | Initial document release. |

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