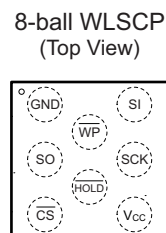
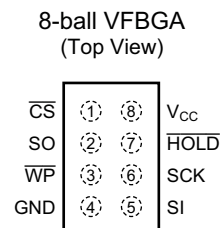
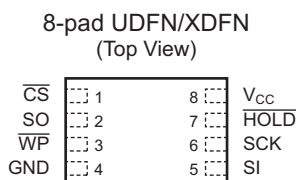
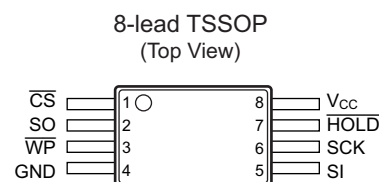
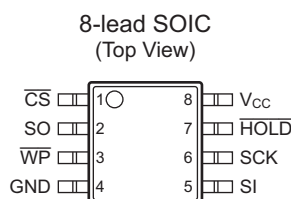


# 1. Pin Configurations and Pinouts

**Table 1. Pin Configurations**

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



Note: Drawings are not to scale.

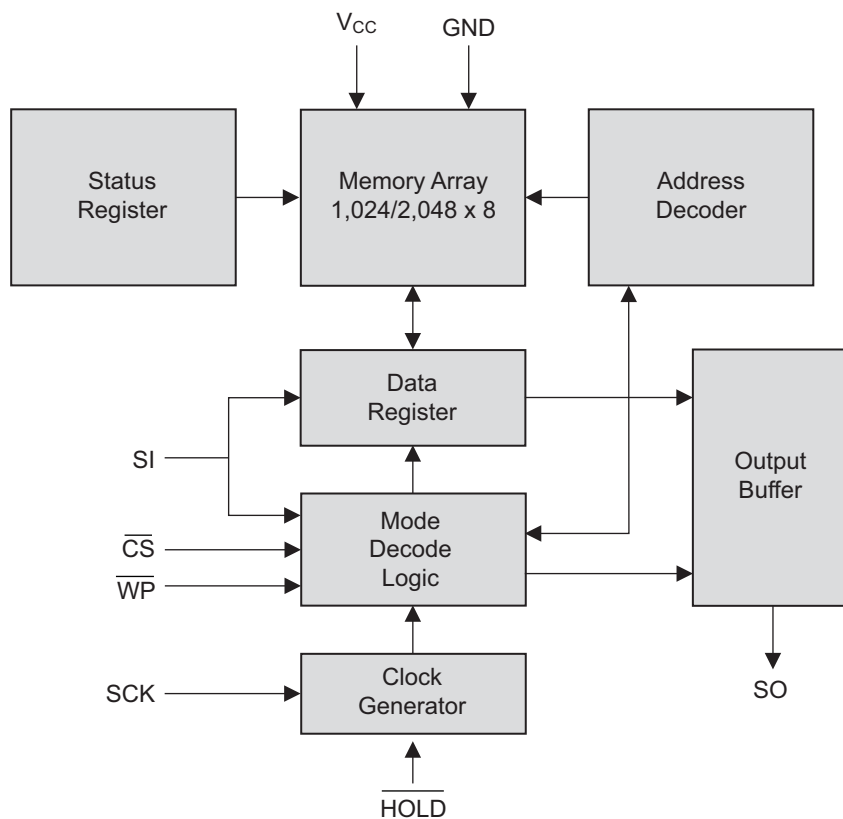
# 2. Absolute Maximum Ratings\*

|                                              |                      |
|----------------------------------------------|----------------------|
| Operating Temperature                        | .....-55°C to +125°C |
| Storage Temperature                          | .....-65°C to +150°C |
| Voltage on Any Pin<br>with Respect to Ground | ..... -1.0V to +7.0V |
| Maximum Operating Voltage                    | ..... 6.25V          |
| DC Output Current                            | ..... .5.0mA         |

\*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. Memory Organization

### 4.1 Pin Capacitance

**Table 4-1. Pin Capacitance<sup>(1)</sup>**

Applicable over recommended operating range from  $T_A = 25^\circ\text{C}$ ,  $f = 1.0\text{MHz}$ ,  $V_{CC} = +5.0\text{V}$  (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, $\overline{WP}$ , $\overline{HOLD}$ ) | 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  $+85^\circ\text{C}$ ,  $V_{CC} = 1.7\text{V}$  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      | $V_{CC} = 5.0\text{V}$ at 20MHz,<br>SO = Open and Read                              |                            | 7.5            | 10.0                | mA            |
| $I_{CC2}$      | Supply Current      | $V_{CC} = 5.0\text{V}$ at 20MHz,<br>SO = Open, Read, and Write                      |                            | 4.0            | 10.0                | mA            |
| $I_{CC3}$      | Supply Current      | $V_{CC} = 5.0\text{V}$ at 5MHz,<br>SO = Open, Read, and Write                       |                            | 4.0            | 6.0                 | mA            |
| $I_{SB1}$      | Standby Current     | $V_{CC} = 1.8\text{V}$ , $\overline{CS} = V_{CC}$                                   |                            | < 0.1          | 6.0 <sup>(2)</sup>  | $\mu\text{A}$ |
| $I_{SB2}$      | Standby Current     | $V_{CC} = 2.5\text{V}$ , $\overline{CS} = V_{CC}$                                   |                            | 0.3            | 7.0 <sup>(2)</sup>  | $\mu\text{A}$ |
| $I_{SB3}$      | Standby Current     | $V_{CC} = 5.0\text{V}$ , $\overline{CS} = V_{CC}$                                   |                            | 2.0            | 10.0 <sup>(2)</sup> | $\mu\text{A}$ |
| $I_{IL}$       | Input Leakage       | $V_{IN} = 0\text{V}$ to $V_{CC}$                                                    | -3.0                       |                | 3.0                 | $\mu\text{A}$ |
| $I_{OL}$       | Output Leakage      | $V_{IN} = 0\text{V}$ to $V_{CC}$ , $T_{AC} = 0^\circ\text{C}$ to $70^\circ\text{C}$ | -3.0                       |                | 3.0                 | $\mu\text{A}$ |
| $V_{IL}^{(1)}$ | 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  | $3.6\text{V} \leq V_{CC} \leq 5.5\text{V}$                                          | $I_{OL} = 3.0\text{mA}$    |                | 0.4                 | V             |
| $V_{OH1}$      | Output High-voltage |                                                                                     | $I_{OH} = -1.6\text{mA}$   | $V_{CC} - 0.8$ |                     | 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 |                                                                                     | $I_{OH} = -100\mu\text{A}$ | $V_{CC} - 0.2$ |                     | V             |

Notes: 1.  $V_{IL}$  min and  $V_{IH}$  max are reference only and are not tested.  
2. Worst case measured at  $85^\circ\text{C}$ .

## 4.3 AC Characteristics

**Table 4-3. AC Characteristics**

Applicable over recommended operating range from  $T_{AI} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} =$  as specified,  $CL = 1$  TTL gate and 100pF (unless otherwise noted).

| Symbol    | Parameter                    | Voltage                                | Min             | Max            | Units         |
|-----------|------------------------------|----------------------------------------|-----------------|----------------|---------------|
| $f_{SCK}$ | SCK Clock Frequency          | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 0<br>0<br>0     | 20<br>10<br>5  | MHz           |
| $t_{RI}$  | Input Rise Time              | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 |                 | 2<br>2<br>2    | $\mu\text{s}$ |
| $t_{FI}$  | Input Fall Time              | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 |                 | 2<br>2<br>2    | $\mu\text{s}$ |
| $t_{WH}$  | SCK High Time                | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 20<br>40<br>80  |                | ns            |
| $t_{WL}$  | SCK Low Time                 | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 20<br>40<br>80  |                | ns            |
| $t_{CS}$  | $\overline{CS}$ High Time    | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 25<br>50<br>100 |                | ns            |
| $t_{CSS}$ | $\overline{CS}$ Setup Time   | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 25<br>50<br>100 |                | ns            |
| $t_{CSH}$ | $\overline{CS}$ Hold Time    | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 25<br>50<br>100 |                | ns            |
| $t_{SU}$  | Data In Setup Time           | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 5<br>10<br>20   |                | ns            |
| $t_H$     | Data In Hold Time            | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 5<br>10<br>20   |                | ns            |
| $t_{HD}$  | $\overline{HOLD}$ Setup Time | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 5<br>10<br>20   |                |               |
| $t_{CD}$  | $\overline{HOLD}$ Hold Time  | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 5<br>10<br>20   |                | ns            |
| $t_V$     | Output Valid                 | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 0<br>0<br>0     | 20<br>40<br>80 | ns            |

**Table 4-3. AC Characteristics (Continued)**

Applicable over recommended operating range from  $T_{AI} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} =$  as specified,  $CL = 1$  TTL gate and 100pF (unless otherwise noted).

| Symbol                   | Parameter                          | Voltage                                | Min         | Max             | Units        |
|--------------------------|------------------------------------|----------------------------------------|-------------|-----------------|--------------|
| $t_{HO}$                 | Output Hold Time                   | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 0<br>0<br>0 |                 | ns           |
| $t_{LZ}$                 | $\overline{HOLD}$ to Output Low Z  | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 | 0<br>0<br>0 | 25<br>50<br>100 | ns           |
| $t_{HZ}$                 | $\overline{HOLD}$ to Output High Z | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 |             | 40<br>80<br>200 | ns           |
| $t_{DIS}$                | Output Disable Time                | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 |             | 40<br>80<br>200 | ns           |
| $t_{WC}$                 | Write Cycle Time                   | 4.5 to 5.5<br>2.5 to 5.5<br>1.8 to 5.5 |             | 5<br>5<br>5     | ms           |
| Endurance <sup>(1)</sup> | 3.3V, 25°C, Page Mode              |                                        | 1M          |                 | Write Cycles |

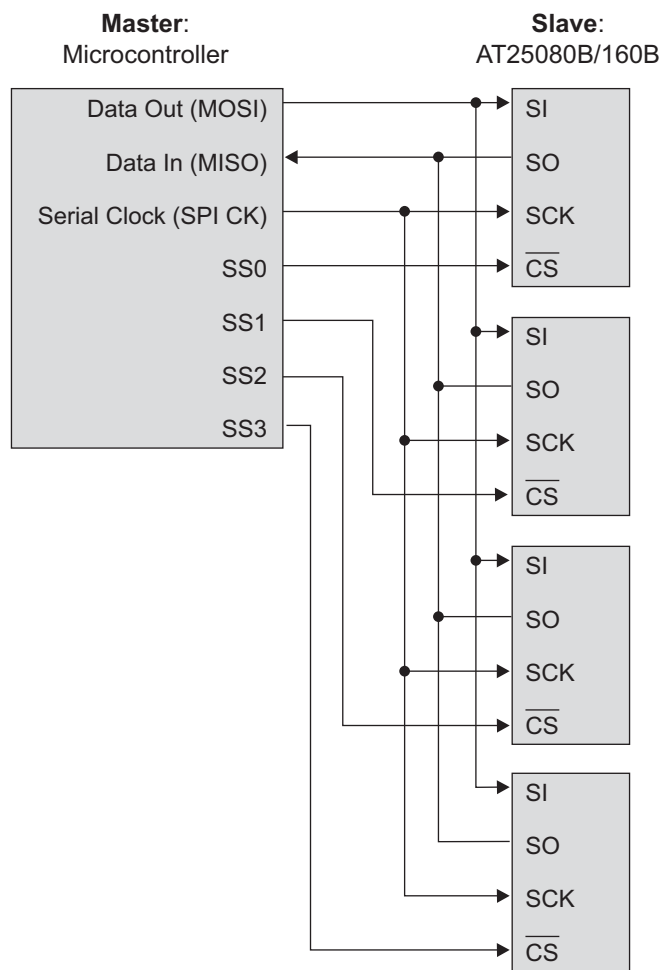
Note: 1. This parameter is characterized and is not 100% tested.

## 5. Serial Interface Description

Table 5-1. Serial Interface Description

| Interface                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Master</b>               | The device that generates the Serial Clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Slave</b>                | Because the Serial Clock pin (SCK) is always an input, the AT25080B/160B always operates as a slave.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Transmitter/Receiver</b> | The AT25080B/160B has separate pins designated for data transmission (SO) and reception (SI).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>MSB</b>                  | The Most Significant Bit (MSB) is the first bit transmitted and received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Serial Opcode</b>        | After the device is selected with $\overline{CS}$ going low, the first byte will be received. This byte contains the opcode that defines the operations to be performed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Invalid Opcode</b>       | If an invalid opcode is received, no data will be shifted into the AT25080B/160B, and the serial output pin (SO) will remain in a high-impedance state until the falling edge of $\overline{CS}$ is detected. This will reinitialize the serial communication.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Chip Select</b>          | The AT25080B/160B is selected when the $\overline{CS}$ pin is low. When the device is not selected, data will not be accepted via the SI pin, and the Serial Output pin (SO) will remain in a high-impedance state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hold</b>                 | The $\overline{HOLD}$ pin is used in conjunction with the $\overline{CS}$ pin to select the AT25080B/160B. When the device is selected and a serial sequence is underway, Hold can be used to pause the serial communication with the master device without resetting the serial sequence. To pause, the $\overline{HOLD}$ pin must be brought low while the SCK pin is low. To resume serial communication, the $\overline{HOLD}$ pin is brought high while the SCK pin is low (SCK may still toggle during Hold). Inputs to the SI pin will be ignored while the SO pin is in the high impedance state.                                                                                                                                                                                                                              |
| <b>Write Protect</b>        | The Write Protect pin ( $\overline{WP}$ ) allows normal Read and Write operations when held high. When the WP pin is brought low and WPEN bit is one, all write operations to the status register are inhibited. When the $\overline{WP}$ is low while $\overline{CS}$ is low, it will interrupt a Write to the status register. If the internal write cycle has already been initiated, $\overline{WP}$ going low will have no effect on any Write operation to the status register. The $\overline{WP}$ pin function is blocked when the WPEN bit in the status register is zero. This will allow the user to install the AT25080B/160B in a system with the $\overline{WP}$ pin tied to ground, and it will be able to write to the status register. All $\overline{WP}$ pin functions are enabled when the WPEN bit is set to one. |

**Figure 5-1. SPI Serial Interface**



## 6. Functional Description

The AT25080B/160B is designed to interface directly with the synchronous Serial Peripheral Interface (SPI) of the 6805 and 68HC11 microcontroller series.

The AT25080B/160B utilizes an 8-bit instruction register. The list of instructions and their operation codes are contained in the table below. All instructions, addresses, and data are transferred with the MSB first and starts with a high-to-low CS transition.

**Table 6-1. Instruction Set for the AT25080B/160B**

| 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 X011          | Read Data from Memory Array |
| Write            | 0000 X010          | Write Data to Memory Array  |

**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.

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

**Read Status Register (RDSR):** The RDSR instruction provides access to the status register. The Ready/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                   |
|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| WPEN  | X     | X     | X     | BP1   | BP0   | WEN   | $\overline{\text{RDY}}$ |

**Table 6-3. Read Status Register Bit Definition**

| Bit                               | Definition                                                                                                         |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Bit 0 ( $\overline{\text{RDY}}$ ) | If zero, it indicates the device is ready.<br>If one, it indicates the write cycle is in progress.                 |
| Bit 1 (WEN)                       | If zero, it indicates the device is <i>not</i> write enabled.<br>If one, it indicates the device is write enabled. |
| Bit 2 (BP0)                       | See <a href="#">Table 6-4 on page 10</a> .                                                                         |
| Bit 3 (BP1)                       | See <a href="#">Table 6-4</a> .                                                                                    |
| Bits 4 to 6                       | These are zeros when device is not in an internal write cycle.                                                     |
| Bit 7 (WPEN)                      | See <a href="#">Table 6-5 on page 10</a>                                                                           |
| Bits 0 to 7                       | These 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 AT25080B/160B is divided into four array segments. One-quarter (1/4), one-half (1/2), or all of the memory segments can be protected. Any of the data within any selected segment will be read-only. The block write protection levels and corresponding status register control bits are shown in Table 6-4.

The three bits BP0, BP1, and WPEN 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 | AT25080B                  | AT25160B    |
| 0      | 0                    | 0   | None                      | None        |
| 1(1/4) | 0                    | 1   | 0300 – 03FF               | 0600 – 07FF |
| 2(1/2) | 1                    | 0   | 0200 – 03FF               | 0400 – 07FF |
| 3(All) | 1                    | 1   | 0000 – 03FF               | 0000 – 07FF |

The WRSR instruction allows the user to enable or disable the Write Protect ( $\overline{WP}$ ) pin through the use of the Write Protect Enable (WPEN) bit. Hardware Write protection is enabled when the  $\overline{WP}$  pin is low and the WPEN bit is one. Hardware Write protection is disabled when either the  $\overline{WP}$  pin is high or the WPEN bit is zero. When the device is hardware write protected, writes to the status register, including the block protect bits and the WPEN bit, and the block-protected sections in the memory array are disabled. Writes are only allowed to sections of the memory that are not block-protected.

Note: When the WPEN bit is Hardware Write protected, it cannot be changed back to zero as long as the  $\overline{WP}$  pin is held low.

**Table 6-5. WPEN Operation**

| WPEN | $\overline{WP}$ | WEN | Protected Blocks | Unprotected Blocks | Status Register |
|------|-----------------|-----|------------------|--------------------|-----------------|
| 0    | X               | 0   | Protected        | Protected          | Protected       |
| 0    | X               | 1   | Protected        | Writeable          | Writeable       |
| 1    | Low             | 0   | Protected        | Protected          | Protected       |
| 1    | Low             | 1   | Protected        | Writeable          | Protected       |
| X    | High            | 0   | Protected        | Protected          | Protected       |
| X    | High            | 1   | Protected        | Writeable          | Writeable       |

**Read Sequence (Read):** Reading the AT25080B/160B via the Serial Output (SO) pin requires the following sequence. After the  $\overline{CS}$  line is pulled low to select a device, the read opcode is transmitted via the SI line followed by the byte address to be read (A15 to A0, see Table 6-6). Upon completion, any data on the SI line will be ignored. The data (D7 to 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 AT25080B/160B, two separate instructions must be executed. First, the device **must be write enabled** via the WREN instruction, and then a Write instruction can be executed. 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 is transmitted via the SI line followed by the byte address (A15 to A0) and the data (D7 to D0) to be programmed (see Table 6-6). 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 RDSR instruction. If Bit 0 is one, the write cycle is still in progress. If Bit 0 is zero, the write cycle has ended. Only the RDSR instruction is enabled during the write programming cycle.

The AT25080B/160B is capable of a 32-byte Page Write operation. After each byte of data is received, the five low-order address bits are internally incremented by one; the high-order bits of the address will remain constant. If more than 32 bytes of data are transmitted, the address counter will roll-over and the previously written data will be overwritten. The AT25080B/160B is automatically returned to the write disable state at the completion of a write cycle.

Note: 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  $\overline{CS}$  falling edge is required to reinstate the serial communication.

**Table 6-6. Address Key**

| Address         | AT25080B          | AT25160B          |
|-----------------|-------------------|-------------------|
| $A_N$           | $A_9 - A_0$       | $A_{10} - A_0$    |
| Don't Care Bits | $A_{15} - A_{10}$ | $A_{15} - A_{11}$ |

## 7. Timing Diagrams

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

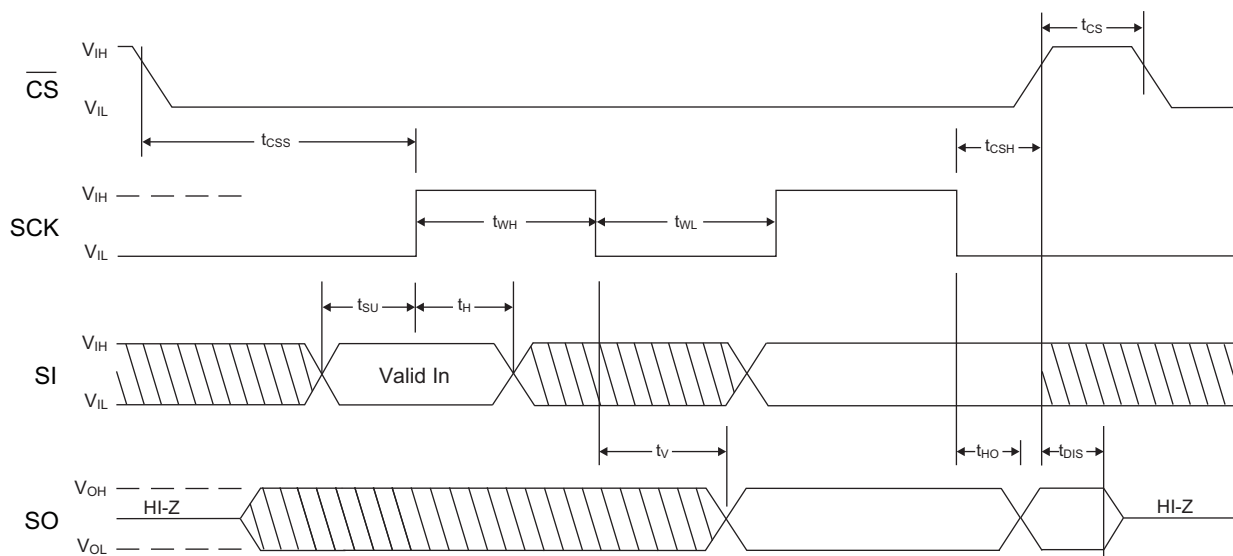


**Figure 7-2. WREN Timing**

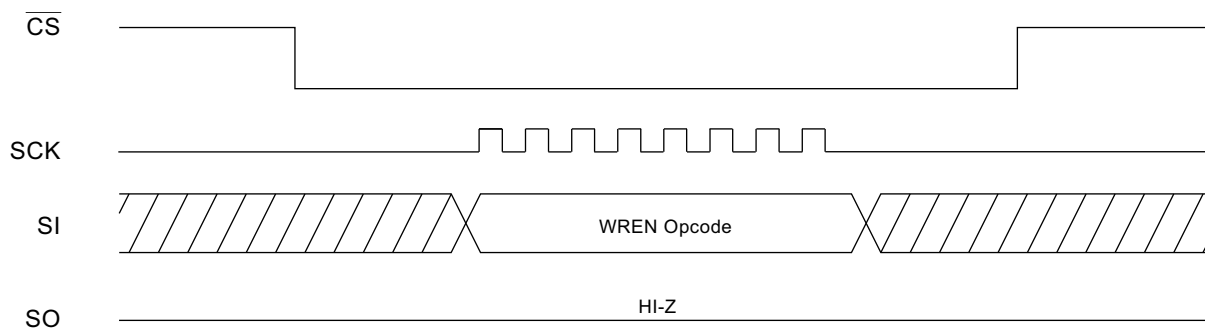


**Figure 7-3. WRDI Timing**

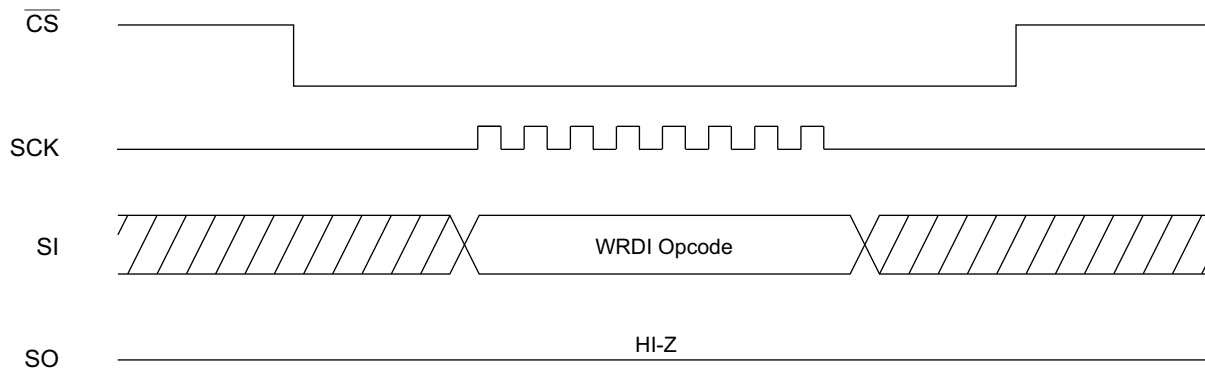


**Figure 7-4. RDSR Timing**

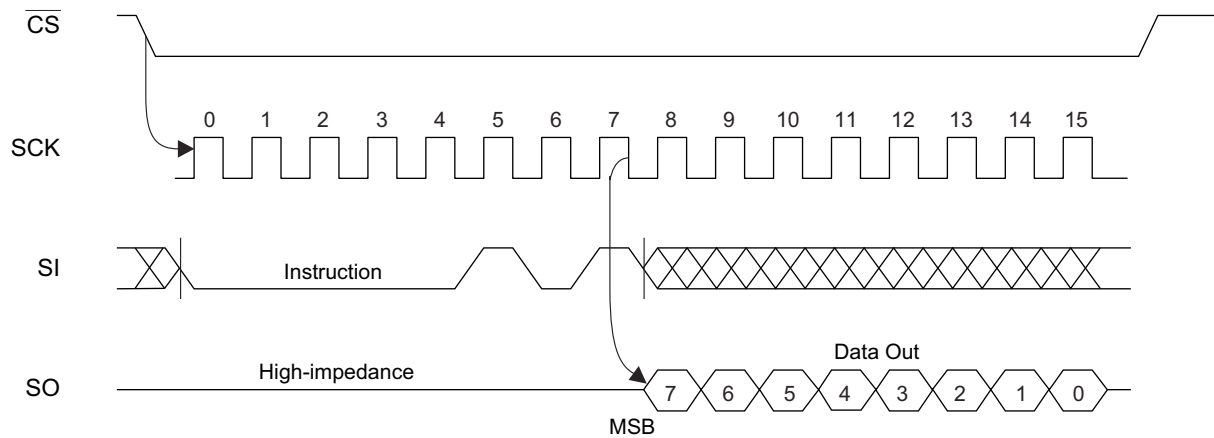


**Figure 7-5. WRSR Timing**

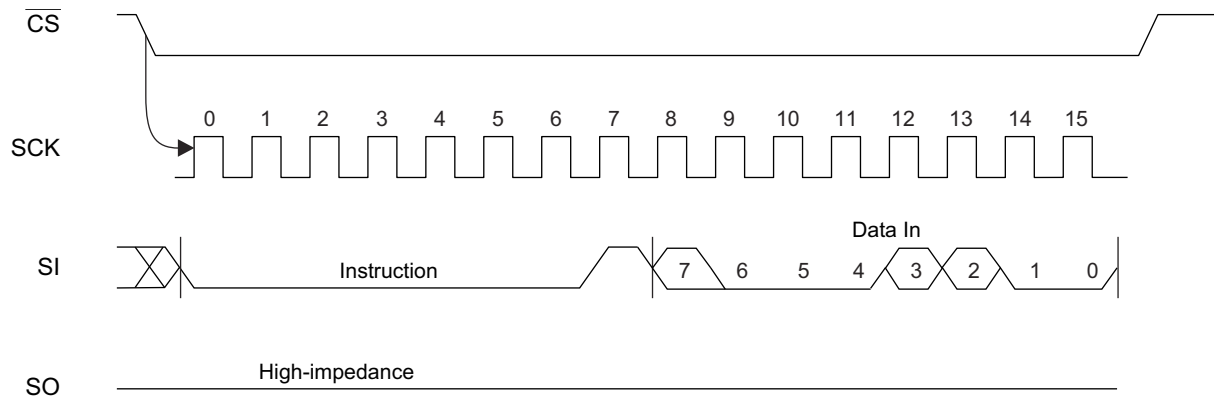


**Figure 7-6. Read Timing**

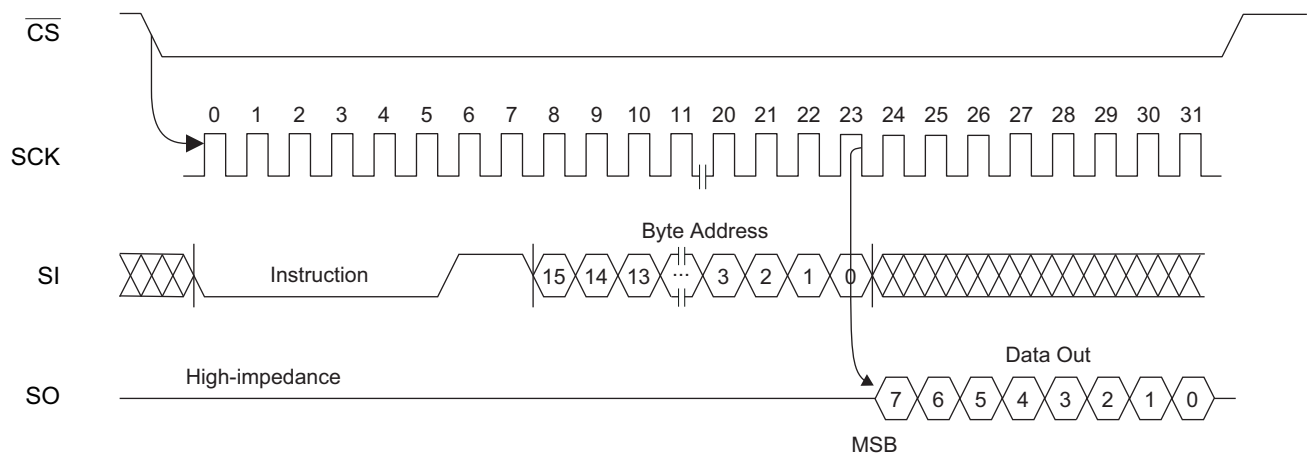


**Figure 7-7. Write Timing**

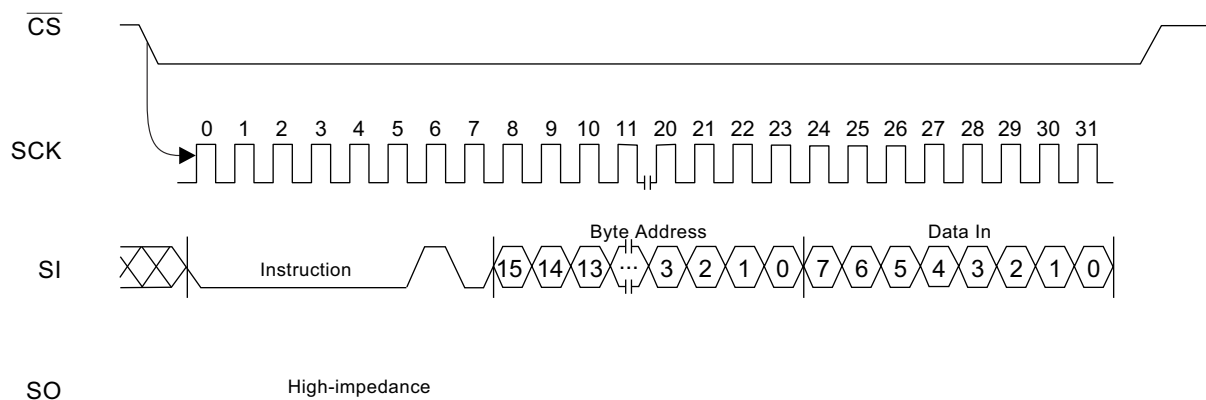
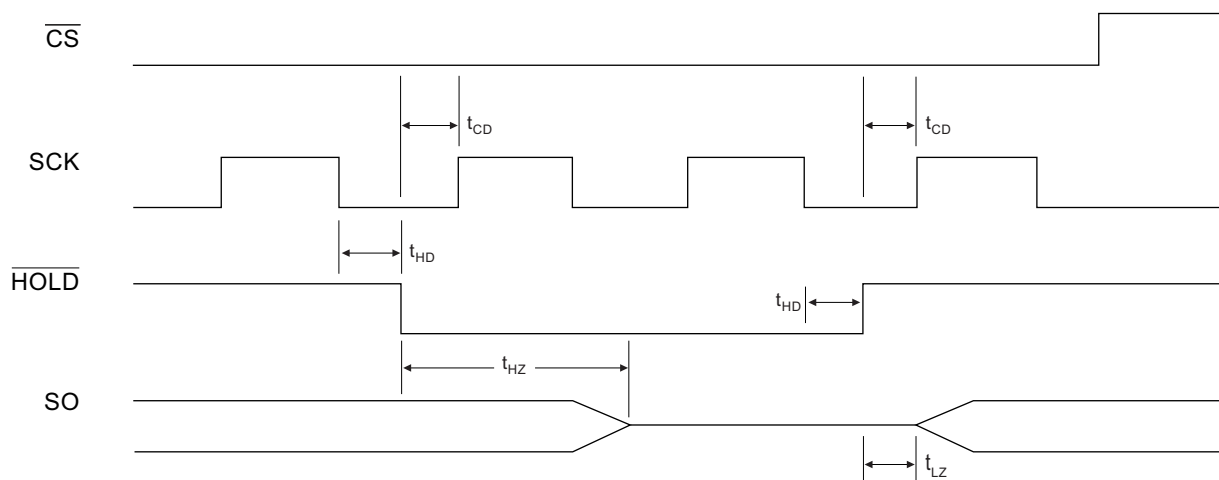
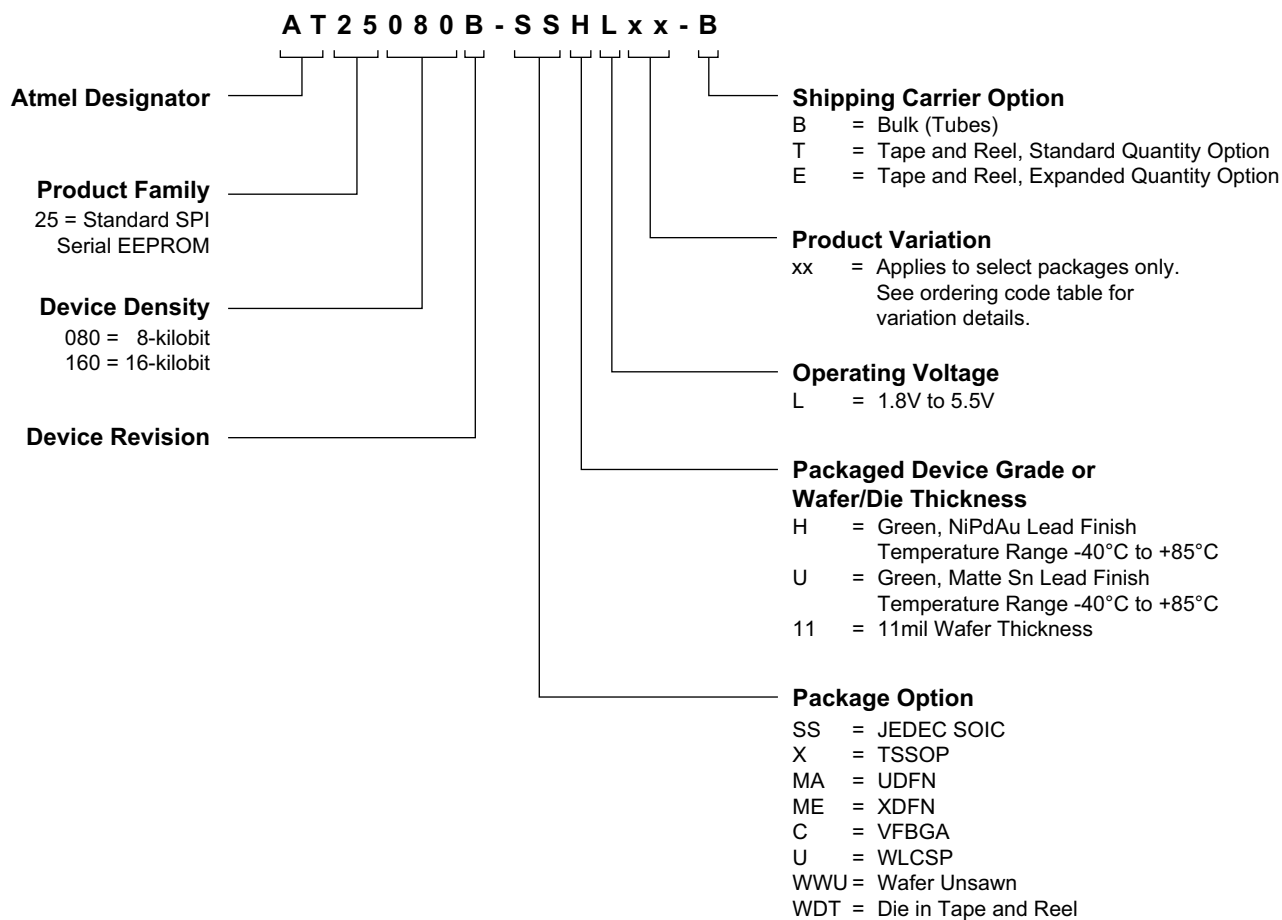


**Figure 7-8. HOLD Timing**

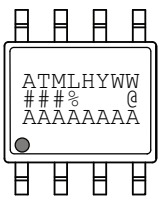


## 8. Ordering Code Detail



## 9. Part Markings

### AT25080B and AT25160B: Package Marking Information

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

Note 1: ● designates pin 1

Note 2: Package drawings are not to scale

| Catalog Number Truncation                                                            |              |                                  |                                        |
|--------------------------------------------------------------------------------------|--------------|----------------------------------|----------------------------------------|
| AT25080B                                                                             |              | Truncation Code ###: 58B         |                                        |
| AT25160B                                                                             |              | Truncation Code ###: 5AB         |                                        |
| 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                   |
| Trace Code                                                                           |              |                                  | Atmel Truncation                       |
| XX = Trace Code (Atmel Lot Numbers Correspond to Code)<br>Example: AA, AB.... YZ, ZZ |              |                                  | AT: Atmel<br>ATM: Atmel<br>ATML: Atmel |

6/10/14

|                                                                                                                                           |                                                                                         |  |                                    |                  |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--|------------------------------------|------------------|
| <br>Package Mark Contact:<br>DL-CSO-Assy_eng@atmel.com | <b>TITLE</b><br><b>25080-160BSM</b> , AT25080B and AT25160B Package Marking Information |  | <b>DRAWING NO.</b><br>25080-160BSM | <b>REV.</b><br>B |
|                                                                                                                                           |                                                                                         |  |                                    |                  |

## 10. Ordering Information

| Atmel Ordering Code             | Lead Finish                        | Package    | Delivery Information |                 | Operation Range                         |
|---------------------------------|------------------------------------|------------|----------------------|-----------------|-----------------------------------------|
|                                 |                                    |            | Form                 | Quantity        |                                         |
| AT25080B-SSHL-B                 | NiPdAu<br>(Lead-free/Halogen-free) | 8S1        | Bulk (Tubes)         | 100 per Tube    | Industrial Temperature<br>(-40 to 85°C) |
| AT25080B-SSHL-T                 |                                    |            | Tape and Reel        | 4,000 per Reel  |                                         |
| AT25080B-XHL-B                  |                                    | 8X         | Bulk (Tubes)         | 100 per Tube    |                                         |
| AT25080B-XHL-T                  |                                    |            | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25080B-MAHL-T                 |                                    | 8MA2       | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25080B-MAHL-E                 |                                    |            | Tape and Reel        | 15,000 per Reel |                                         |
| AT25080B-MEHL-T                 |                                    | 8ME1       | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25080B-CUL-T                  | SnAgCu<br>(Lead-free/Halogen-free) | 8U3-1      | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25080B-UUL0B-T <sup>(1)</sup> |                                    | 8U-12      | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25080B-WWU11L <sup>(2)</sup>  | N/A                                | Wafer Sale | Note 2               |                 |                                         |
| AT25160B-SSHL-B                 | NiPdAu<br>(Lead-free/Halogen-free) | 8S1        | Bulk (Tubes)         | 100 per Tube    | Industrial Temperature<br>(-40 to 85°C) |
| AT25160B-SSHL-T                 |                                    |            | Tape and Reel        | 4,000 per Reel  |                                         |
| AT25160B-XHL-B                  |                                    | 8X         | Bulk (Tubes)         | 100 per Tube    |                                         |
| AT25160B-XHL-T                  |                                    |            | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25160B-MAHL-T                 |                                    | 8MA2       | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25160B-MAHL-E                 |                                    |            | Tape and Reel        | 15,000 per Reel |                                         |
| AT25160B-MEHL-T                 |                                    | 8ME1       | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25160B-CUL-T                  | SnAgCu<br>(Lead-free/Halogen-free) | 8U3-1      | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25160B-UUL0B-T <sup>(1)</sup> |                                    | 8U-12      | Tape and Reel        | 5,000 per Reel  |                                         |
| AT25160B-WWU11L <sup>(2)</sup>  | N/A                                | Wafer Sale | Note 2               |                 |                                         |

Notes: 1. WLCSP Package:

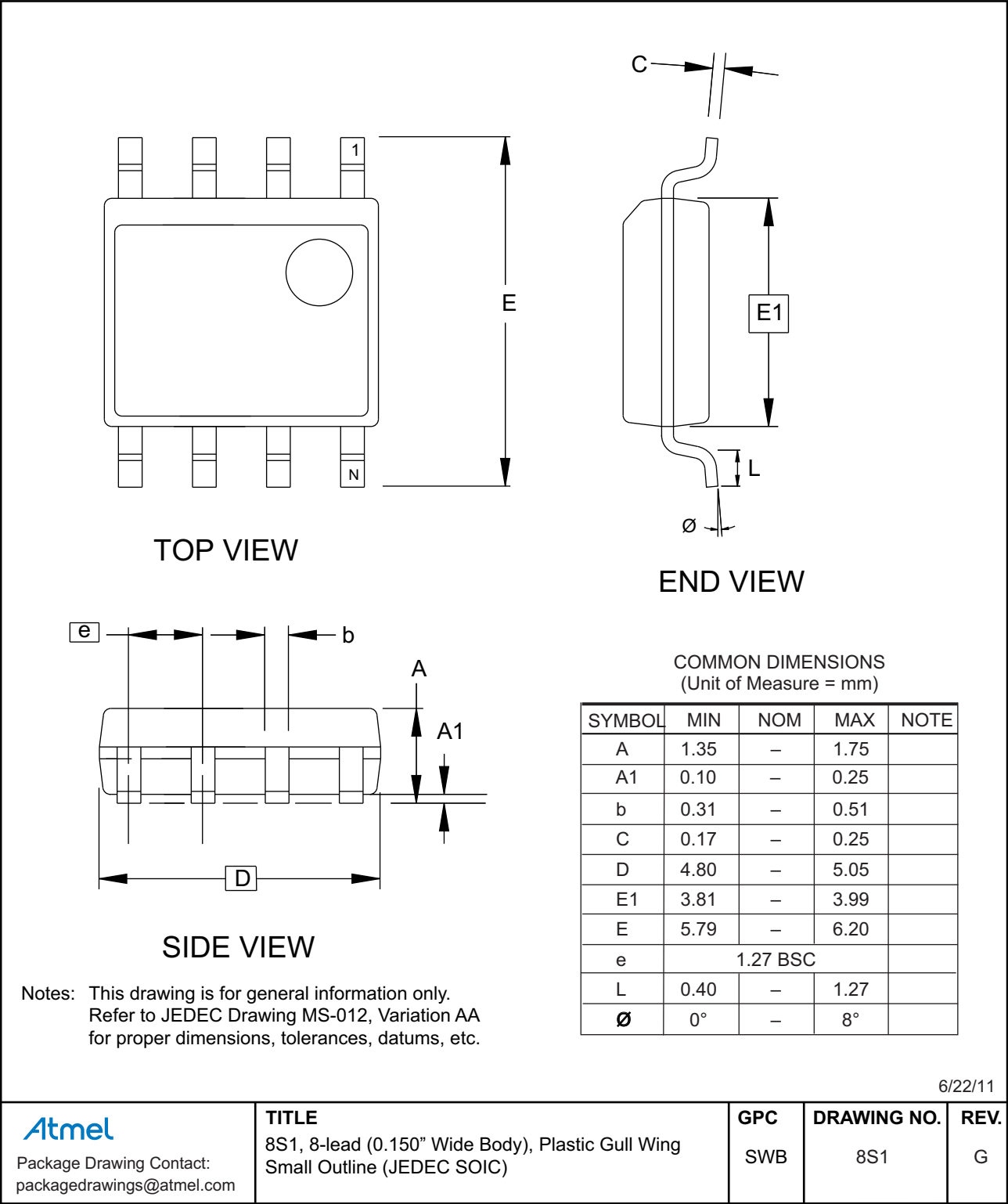
- This device includes a backside coating to increase product robustness.
- **CAUTION:** Exposure to ultraviolet (UV) light can degrade the data stored in the EEPROM cells. Therefore, customers who use a WLCSP product must ensure that exposure to ultraviolet light does **not** occur.

2. Contact Atmel Sales for Wafer sales.

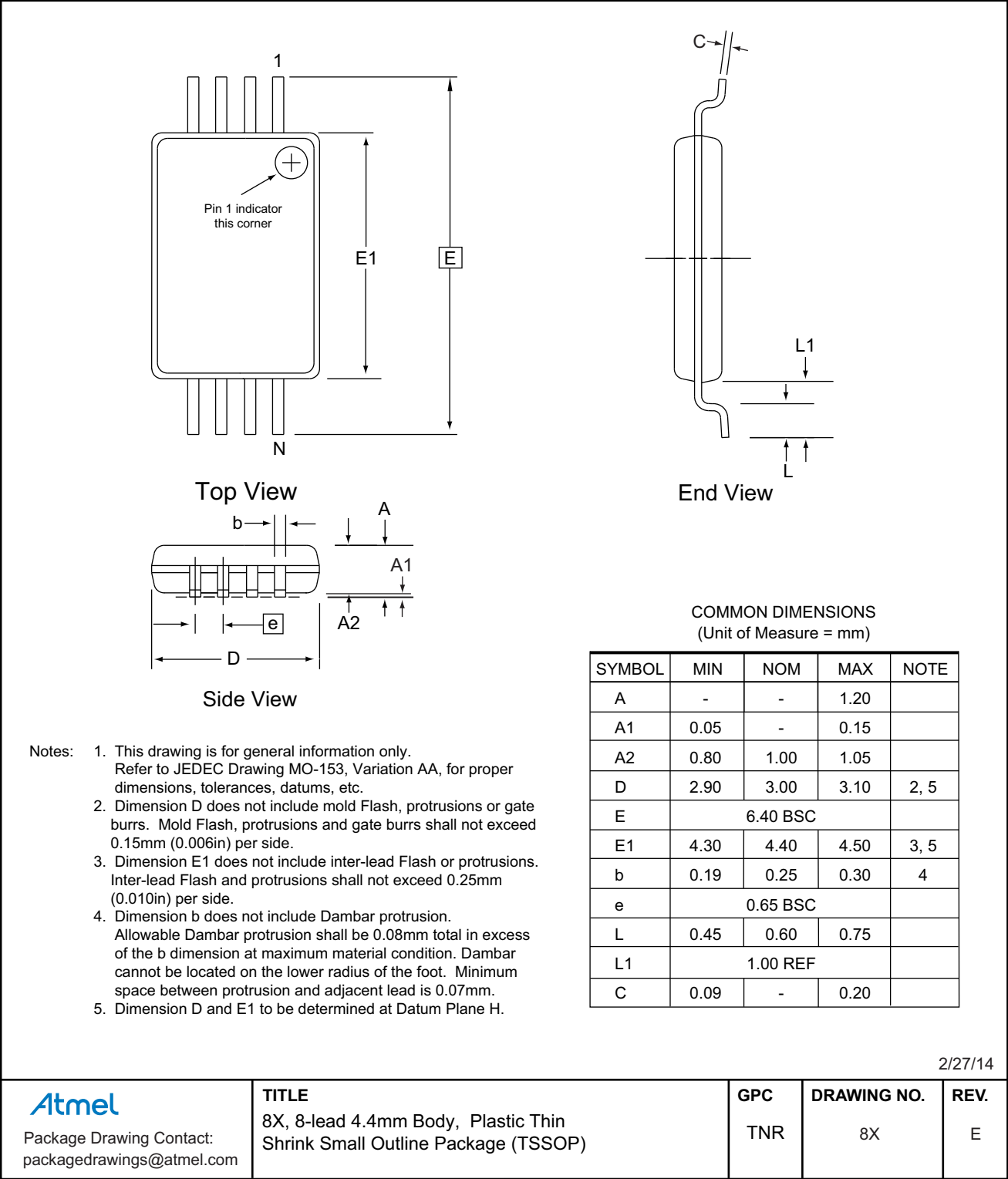
| Package Type |                                                                                                        |
|--------------|--------------------------------------------------------------------------------------------------------|
| <b>8S1</b>   | 8-lead, 0.150" wide, Plastic Gull Wing Small Outline (JEDEC SOIC)                                      |
| <b>8X</b>    | 8-lead, 4.4mm body, Plastic Thin Shrink Small Outline Package (TSSOP)                                  |
| <b>8MA2</b>  | 8-pad, 2.0mm x 3.0mm x 0.6mm body, Thermally Enhanced Plastic Ultra Thin Dual Flat Dual No Lead (UDFN) |
| <b>8ME1</b>  | 8-pad 1.8mm x 2.2mm body, Extra Thin DFN (XDFN)                                                        |
| <b>8U3-1</b> | 8-ball, 1.50mm x 2.00mm body, 0.50mm pitch, Very Thin, Fine-Pitch Ball Grid Array (VFBGA)              |
| <b>8U-12</b> | 8-ball, 5 x 3 grid array, 0.40mm pitch, Wafer Level Chip Scale Package (WLCSP)                         |

11. Packaging Information

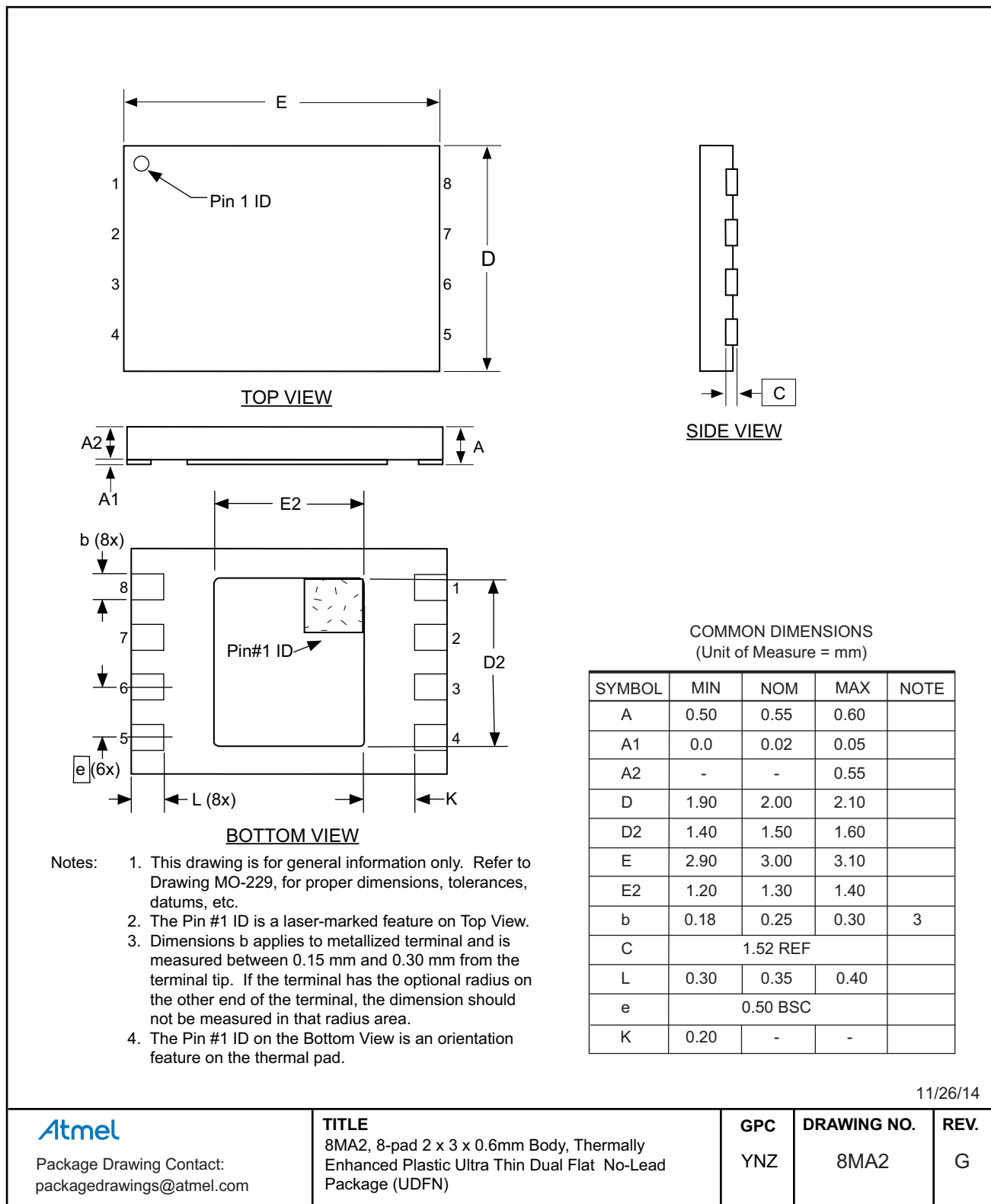
11.1 8S1 — 8-lead JEDEC SOIC



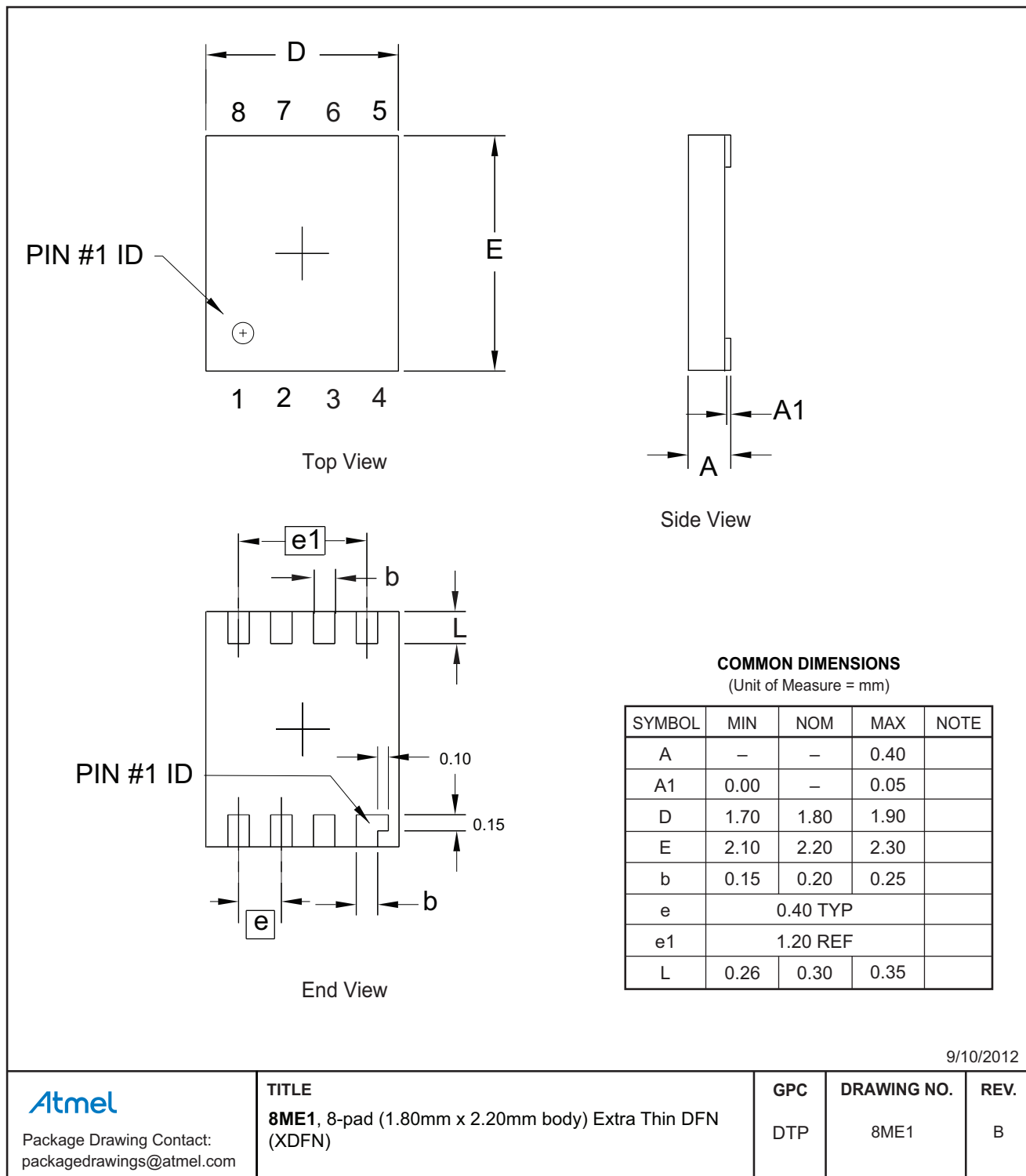
11.2 8X — 8-lead TSSOP



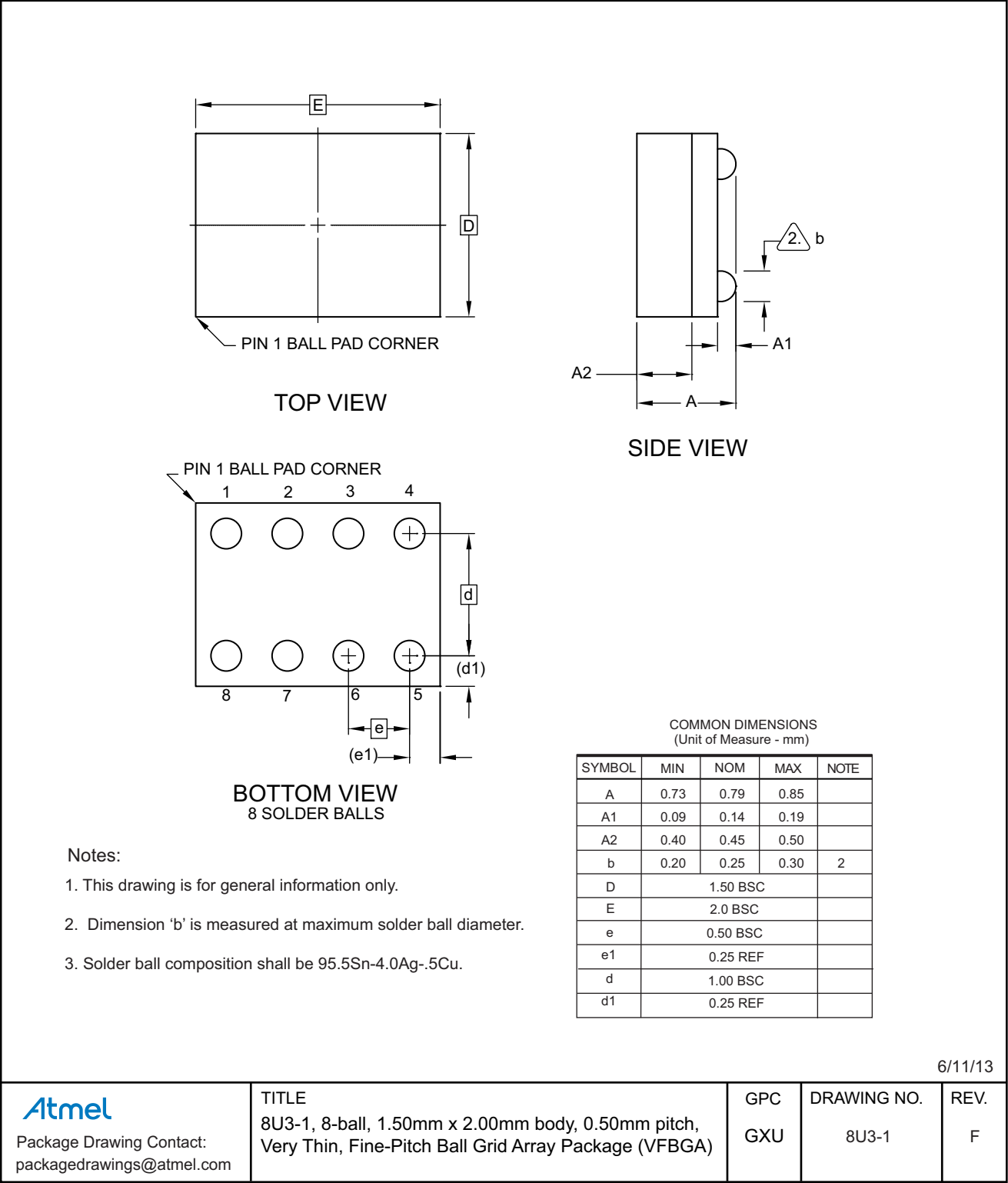
## 11.3 8MA2 — 8-pad UDFN



## 11.4 8ME1 — 8-pad XDFN



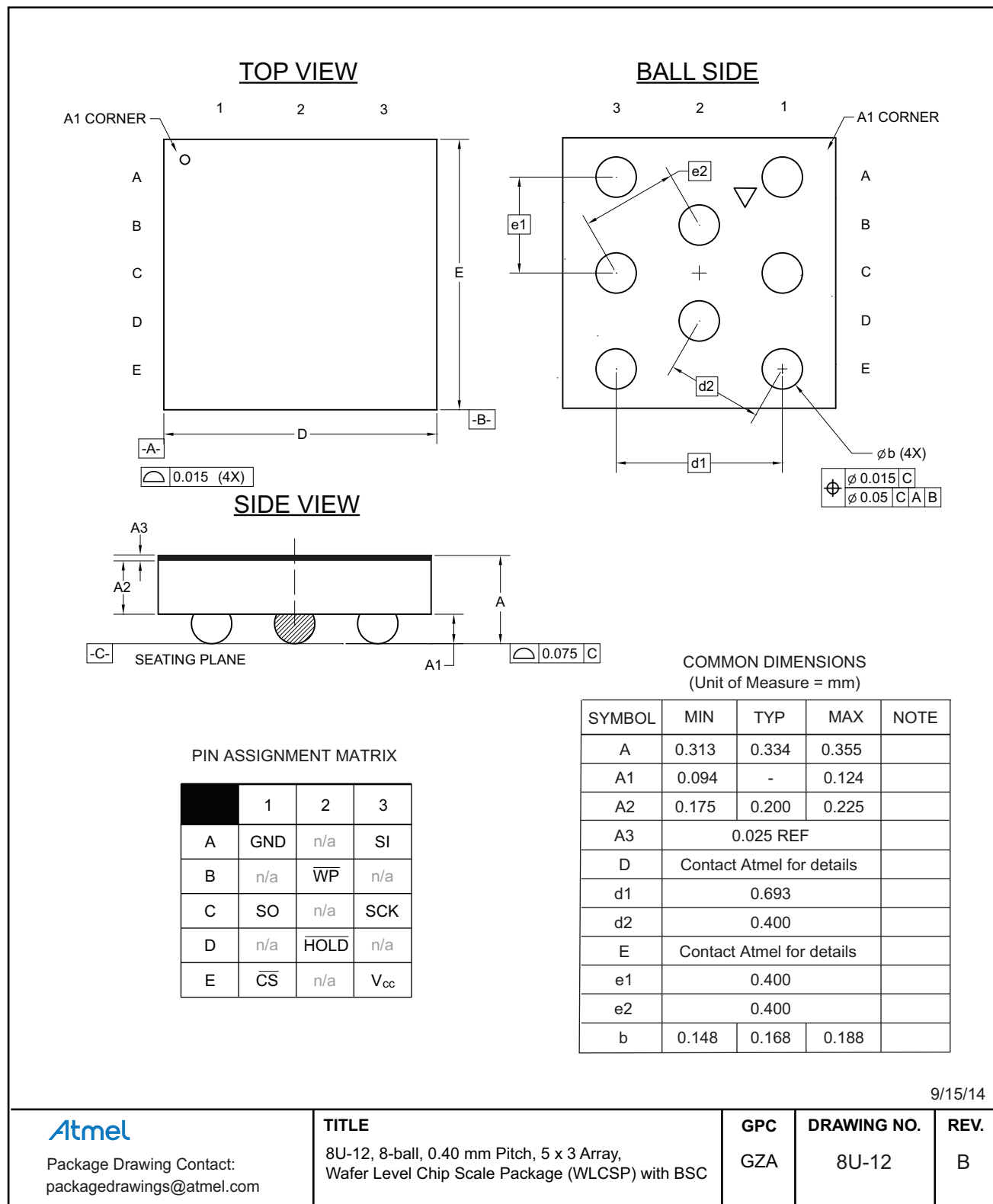
11.5 8U3-1 — 8-ball VFBGA



6/11/13

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

## 11.6 8U-12 — 8-ball WLCSP



## 12. Revision History

| Doc. Rev. | Date    | Comments                                                                                                                                 |
|-----------|---------|------------------------------------------------------------------------------------------------------------------------------------------|
| 5228G     | 01/2015 | Add the AT25080B-MAHL-E and AT25160B-MAHL-E package options.<br>Update the 8MA2 and 8U-12 package drawings and the ordering information. |
| 5228F     | 07/2014 | Add WLSCP package option.<br>Update 8X, 8MA2, 8ME1, and 8U3-1 package drawings.<br>Update template, Atmel logos, disclaimer page.        |
| 5228E     | 03/2012 | Update 8A2 to 8X and 8S1, 8MA2, 8U3-1 package drawings.                                                                                  |
| 5228D     | 04/2010 | Update Ordering Code Detail and Ordering Information.                                                                                    |
| 5228C     | 08/2009 | Change Catalog Scheme and add Marking Details.                                                                                           |
| 5228B     | 07/2008 | Change 'Endurance' parameter on page 6.                                                                                                  |
| 5228A     | 09/2007 | Initial document release.                                                                                                                |



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