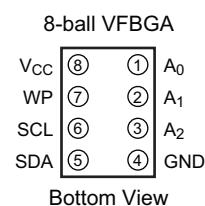
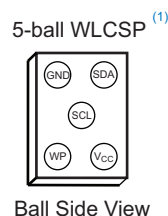
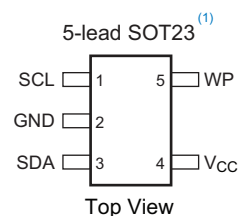
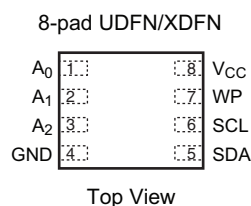
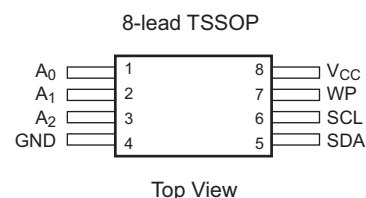
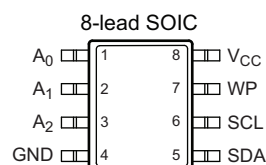


# 1. Pin Configurations and Pinouts

**Table 1-1. Pin Configuration**

| Pin             | Function            |
|-----------------|---------------------|
| A <sub>0</sub>  | Address Input       |
| A <sub>1</sub>  | Address Input       |
| A <sub>2</sub>  | Address Input       |
| GND             | Ground              |
| SDA             | Serial Data         |
| SCL             | Serial Clock Input  |
| WP              | Write Protect       |
| V <sub>CC</sub> | Device Power Supply |

**Note:** When using the 5-lead SOT-23 or the 5-ball WLCSP, the software bits A2, A1, and A0 must be set to Logic 0 to properly communicate with the device.



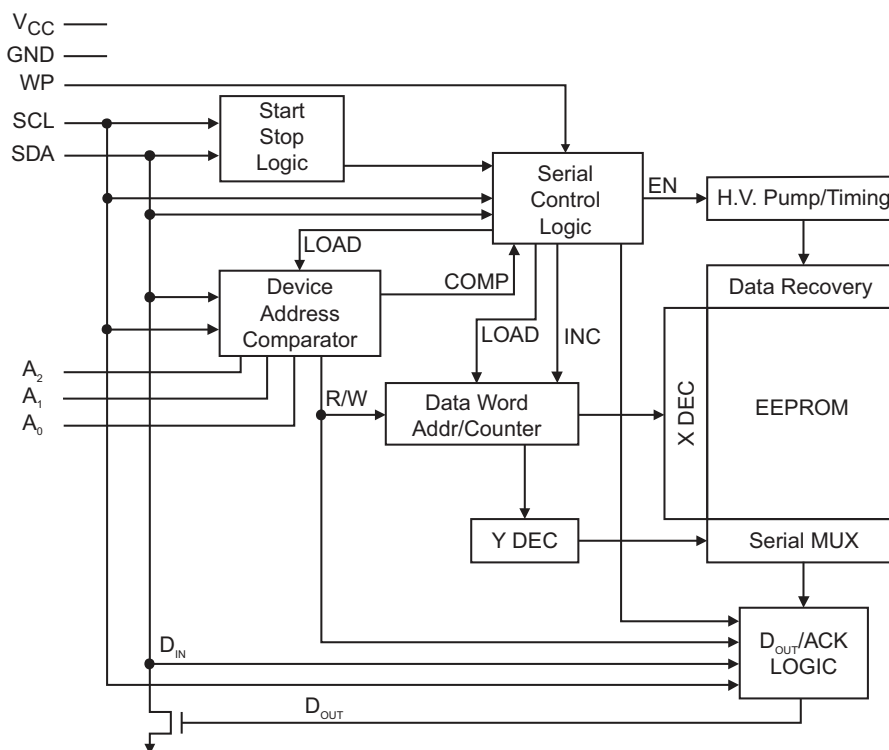
\* Note: Drawings are not to scale

# 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 | -1.0 V +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 are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### 3. Block Diagram



### 4. Pin Descriptions

**Serial Clock (SCL):** The SCL input is used to positive-edge clock data into each EEPROM device and negative-edge clock data out of each device.

**Serial Data (SDA):** The SDA pin is bidirectional for serial data transfer. This pin is open drain driven and may be wire-ORed with any number of other open-drain or open-collector devices.

**Device Addresses ( $A_2$ ,  $A_1$ ,  $A_0$ ):** The  $A_2$ ,  $A_1$ , and  $A_0$  pins are device address inputs that are hard wired (directly to GND or to  $V_{CC}$ ) for compatibility with other Atmel AT24C devices. When the pins are hard wired, as many as eight 32K devices may be addressed on a single bus system. (Device addressing is discussed in detail in [Section 7.](#), “Device Addressing” on page 9). A device is selected when a corresponding hardware and software match is true. If these pins are left floating, the  $A_2$ ,  $A_1$ , and  $A_0$  pins will be internally pulled down to GND. However, due to capacitive coupling that may appear during customer applications, Atmel recommends always connecting the address pins to a known state. When using a pull-up resistor, Atmel recommends using 10k $\Omega$  or less.

**Write Protect (WP):** The Write Protect input, when connected to GND, allows normal write operations. When WP is connected directly to  $V_{CC}$ , all Write operations to the memory are inhibited. If the pin is left floating, the WP pin will be internally pulled down to GND; however, due to capacitive coupling that may appear during customer applications, Atmel recommends always connecting the WP pins to a known state. When using a pull-up resistor, Atmel recommends using 10k $\Omega$  or less.

**Table 4-1. Write Protect**

| WP Pin Status | Part of the Array Protected  |
|---------------|------------------------------|
| At $V_{CC}$   | Full Array                   |
| At GND        | Normal Read/Write Operations |

## 5. Memory Organization

**AT24C32D, 32K Serial EEPROM:** The 32K is internally organized as 128 pages of 32-bytes each. Random word addressing requires a 12-bit data word address.

### 5.1 Pin Capacitance

**Table 5-1. Pin Capacitance<sup>(1)</sup>**

Applicable over recommended operating range from:  $T_A = 25^\circ\text{C}$ ,  $f = 1.0\text{MHz}$ ,  $V_{CC} = 5.5\text{V}$ .

| Symbol    | Test Condition                                       | Max | Units | Conditions            |
|-----------|------------------------------------------------------|-----|-------|-----------------------|
| $C_{I/O}$ | Input/Output Capacitance (SDA)                       | 8   | pF    | $V_{I/O} = 0\text{V}$ |
| $C_{IN}$  | Input Capacitance ( $A_0$ , $A_1$ , $A_2$ , and SCL) | 6   | pF    | $V_{IN} = 0\text{V}$  |

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

### 5.2 DC Characteristics

**Table 5-2. DC Characteristics**

Applicable over recommended operating range from:  $T_A = -40^\circ\text{C}$  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 <sub>CC1</sub> | Supply Voltage                                |                                                       |                                                      | 1.7                   |      | 5.5                   | V     |
| I <sub>CC1</sub> | Supply Current                                | V <sub>CC</sub> = 5.0V                                | Read at 400kHz                                       |                       | 0.4  | 1.0                   | mA    |
| I <sub>CC2</sub> | Supply Current                                | V <sub>CC</sub> = 5.0V                                | Write at 400kHz                                      |                       | 2.0  | 3.0                   | mA    |
| I <sub>SB1</sub> | Standby Current                               | V <sub>CC</sub> = 1.7V                                | V <sub>IN</sub> = V <sub>CC</sub> or V <sub>SS</sub> |                       |      | 1.0                   | μA    |
|                  |                                               | V <sub>CC</sub> = 5.0V                                |                                                      |                       |      | 6.0                   | μA    |
| I <sub>LI</sub>  | Input Leakage Current V <sub>CC</sub> = 5.0V  | V <sub>IN</sub> = V <sub>CC</sub> or V <sub>SS</sub>  |                                                      |                       | 0.10 | 3.0                   | μA    |
| I <sub>LO</sub>  | Output Leakage Current V <sub>CC</sub> = 5.0V | V <sub>OUT</sub> = V <sub>CC</sub> or V <sub>SS</sub> |                                                      |                       | 0.05 | 3.0                   | μA    |
| V <sub>IL</sub>  | Input Low Level <sup>(1)</sup>                |                                                       |                                                      | -0.6                  |      | V <sub>CC</sub> × 0.3 | V     |
| V <sub>IH</sub>  | Input High Level <sup>(1)</sup>               |                                                       |                                                      | V <sub>CC</sub> × 0.7 |      | V <sub>CC</sub> + 0.5 | V     |
| V <sub>OL1</sub> | Output Low Level                              | V <sub>CC</sub> = 1.7V                                | I <sub>OL</sub> = 0.15mA                             |                       |      | 0.2                   | V     |
| V <sub>OL2</sub> | Output Low Level                              | V <sub>CC</sub> = 3.0V                                | I <sub>OL</sub> = 2.1mA                              |                       |      | 0.4                   | V     |

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

## 5.3 AC Characteristics

**Table 5-3. AC Characteristics (Industrial Temperature)**

Applicable over recommended operating range from:  $T_{AI} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 1.7\text{V}$  to  $5.5\text{V}$ ,  $C_L = 100\text{pF}$  (unless otherwise noted). Test conditions are listed in [Note 2](#).

| Symbol                   | Parameter                                                                    | 1.7V      |     | 2.5V, 5.0V |      | Units        |
|--------------------------|------------------------------------------------------------------------------|-----------|-----|------------|------|--------------|
|                          |                                                                              | Min       | Max | Min        | Max  |              |
| $f_{SCL}$                | Clock Frequency, SCL                                                         |           | 400 |            | 1000 | kHz          |
| $t_{LOW}$                | Clock Pulse Width Low                                                        | 1300      |     | 400        |      | ns           |
| $t_{HIGH}$               | Clock Pulse Width High                                                       | 600       |     | 400        |      | ns           |
| $t_I$                    | Noise Suppression Time <sup>(1)</sup>                                        |           | 100 |            | 50   | ns           |
| $t_{AA}$                 | Clock Low to Data Out Valid                                                  | 50        | 900 | 50         | 550  | ns           |
| $t_{BUF}$                | Time the bus must be free before a new transmission can start <sup>(1)</sup> | 1300      |     | 500        |      | ns           |
| $t_{HD.STA}$             | Start Condition Hold Time                                                    | 600       |     | 250        |      | ns           |
| $t_{SU.STA}$             | Start Condition Set-up Time                                                  | 600       |     | 250        |      | ns           |
| $t_{HD.DAT}$             | Data In Hold Time                                                            | 0         |     | 0          |      | ns           |
| $t_{SU.DAT}$             | Data In Set-up Time                                                          | 100       |     | 100        |      | ns           |
| $t_R$                    | Inputs Rise Time <sup>(1)</sup>                                              |           | 300 |            | 300  | ns           |
| $t_F$                    | Inputs Fall Time <sup>(1)</sup>                                              |           | 300 |            | 100  | ns           |
| $t_{SU.STO}$             | Stop Condition Set-up Time                                                   | 600       |     | 250        |      | ns           |
| $t_{DH}$                 | Data Out Hold Time                                                           | 50        |     | 50         |      | ns           |
| $t_{WR}$                 | Write Cycle Time                                                             |           | 5   |            | 5    | ms           |
| Endurance <sup>(1)</sup> | 25°C, Page Mode, 3.3V                                                        | 1,000,000 |     |            |      | Write Cycles |

Notes: 1. This parameter is ensured by characterization and is not 100% tested.

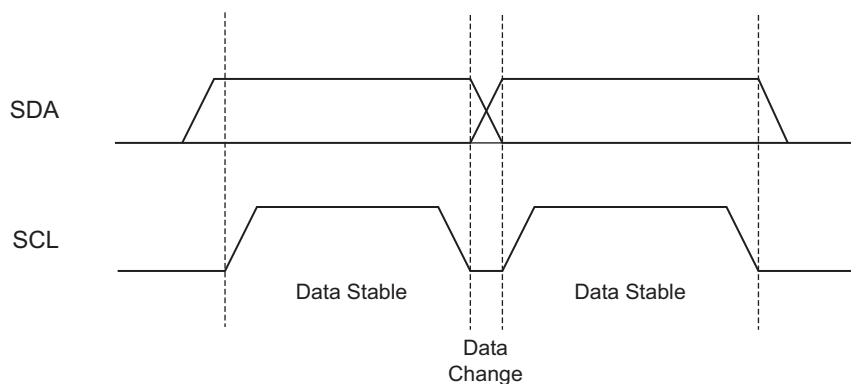
2. AC measurement conditions:

- $R_L$  (connects to  $V_{CC}$ ): 1.3k $\Omega$  (2.5V, 5.5V), 10k $\Omega$  (1.7V)
- Input pulse voltages: 0.3 $V_{CC}$  to 0.7 $V_{CC}$
- Input rise and fall times:  $\leq 50\text{ns}$
- Input and output timing reference voltages: 0.5 x  $V_{CC}$

## 6. Device Operation

**Clock and Data Transitions:** The SDA pin is normally pulled high with an external device. Data on the SDA pin may change only during SCL low time periods. Data changes during SCL high periods will indicate a Start or Stop condition as defined below.

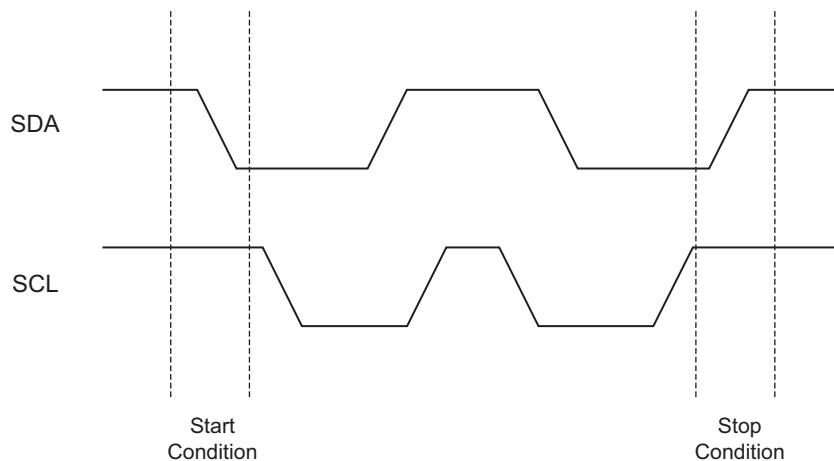
**Figure 6-1. Data Validity**



**Start Condition:** A high-to-low transition of SDA with SCL high is a Start condition that must precede every command.

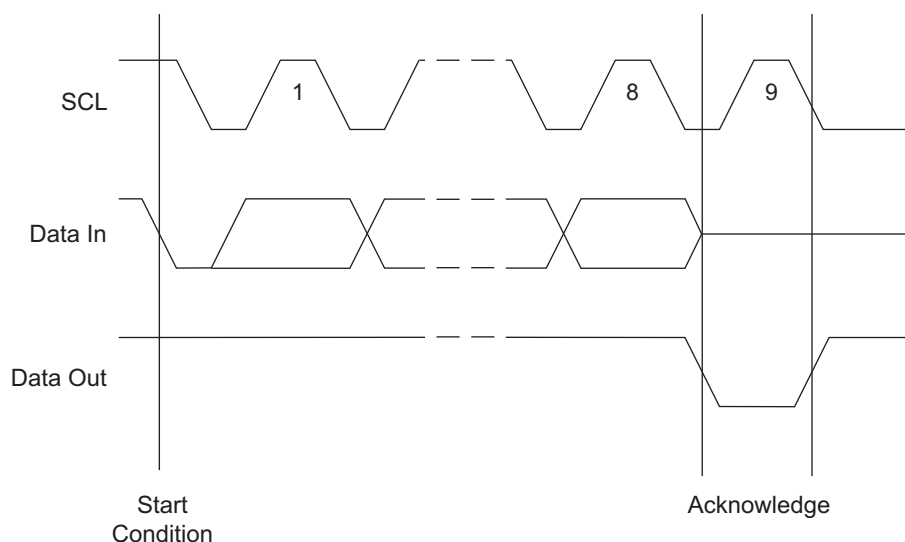
**Stop Condition:** A low-to-high transition of SDA with SCL high is a Stop condition. After a Read sequence, the Stop condition will place the EEPROM in a standby power mode.

**Figure 6-2. Start Condition and Stop Condition Definition**



**Acknowledge:** All addresses and data words are serially transmitted to and from the EEPROM in 8-bit words. The receiving device sends a zero during the ninth clock cycle to acknowledge that it has received each word. This zero response is referred to as an Acknowledge.

**Figure 6-3. Output Acknowledge**



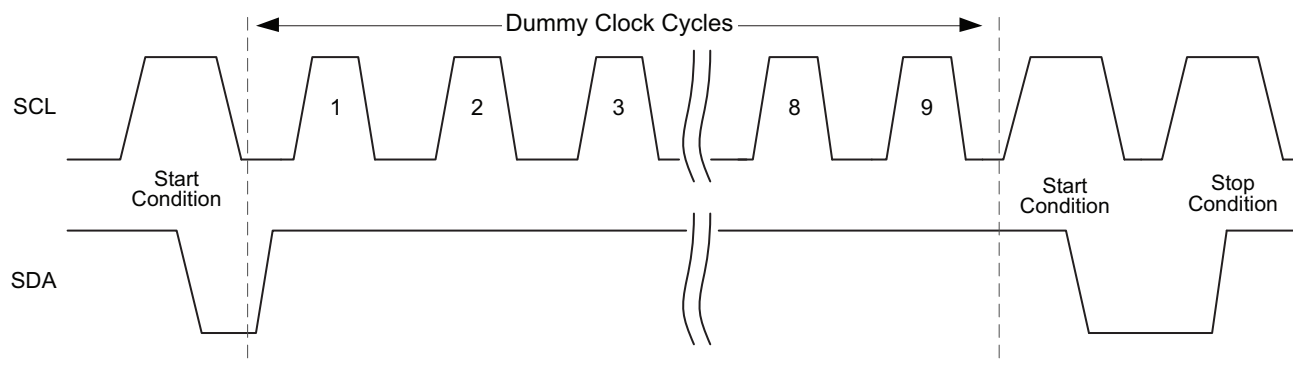
**Standby Mode:** AT24C32D features a low-power standby mode that is enabled upon power-up and after the receipt of the Stop condition and the completion of any internal operations.

**Software Reset:** After an interruption in protocol, power loss or system reset, any 2-wire part can be protocol reset by following these steps:

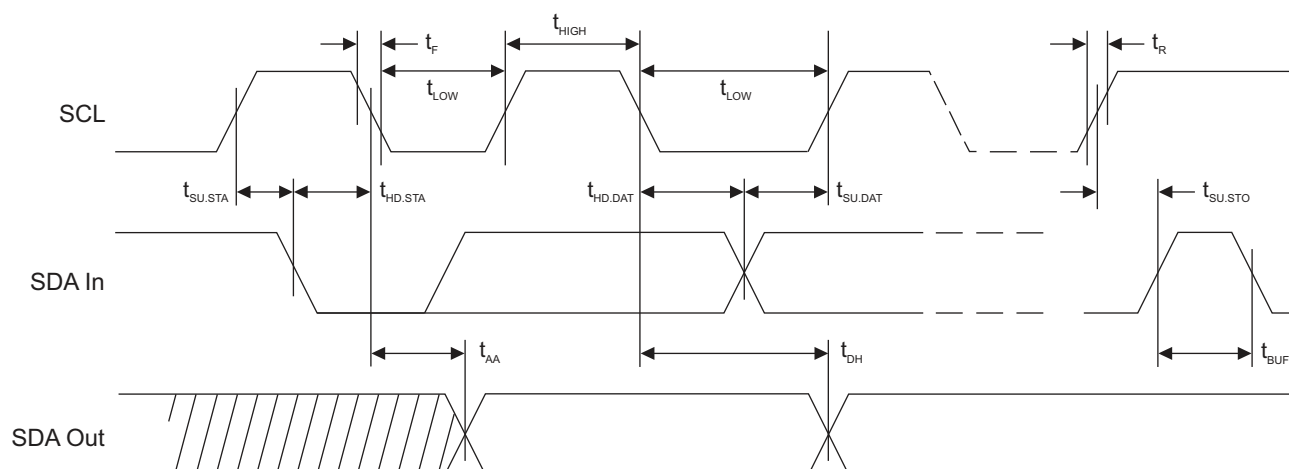
1. Create a Start condition (if possible).
2. Clock nine cycles.
3. Create another Start condition followed by Stop condition as shown below.

The device should be ready for the next communication after above steps have been completed. In the event that the device is still non-responsive or remains active on the SDA bus, a power cycle must be used to reset the device.

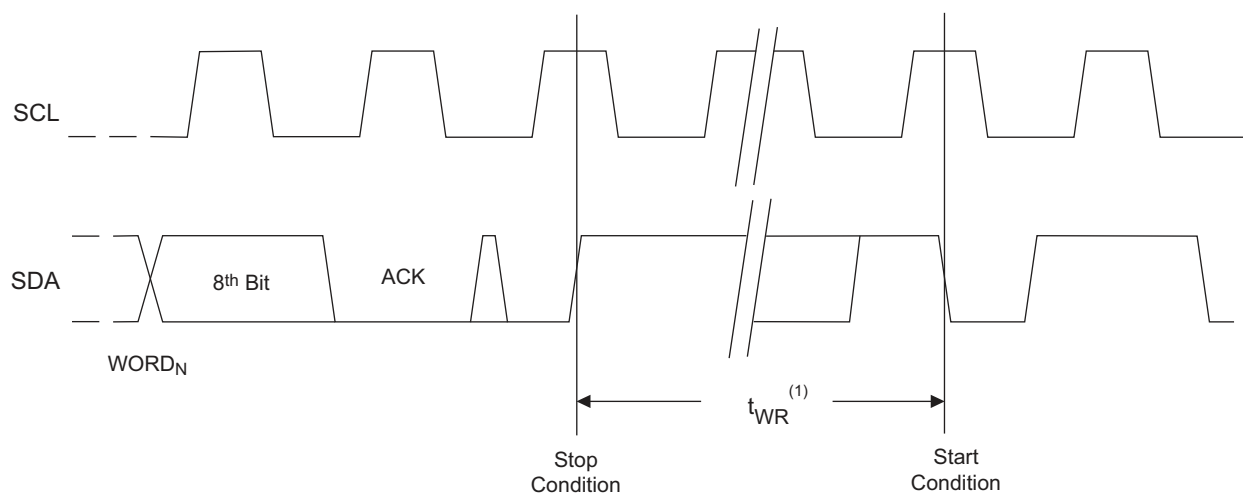
**Figure 6-4. Software Reset**



**Figure 6-5. Bus Timing**



**Figure 6-6. Write Cycle Timing**



Note: 1. The Write cycle time  $t_{WR}$  is the time from a valid Stop condition of a Write sequence to the end of the internal Clear/Write cycle.

## 7. Device Addressing

The 32K EEPROM requires an 8-bit device address word following a Start condition to enable the chip for a Read or Write operation. The device address word consists of a mandatory '1010' sequence for the first four most significant bits which is known as the device type identifier. These four bits are bit 7, bit 6, bit 5, and bit 4 as seen in Figure 7-1. This is common to all 2-wire Serial EEPROM devices.

The next three bits are the A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> hardware address select bits which allow as many as eight devices on the same bus. These bits must compare to their corresponding hard wired input pins, A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub>. The A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> pins use an internal proprietary circuit that biases them to a logic low condition if the pins are allowed to float.

When utilizing the 5-ball WLCSP or the 5-lead SOT-23 packages, the A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> pins are not available. The A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> pins are internally pulled to ground and thus the A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> device address bits must always be set to a Logic 0 to communicate with the device. This condition is depicted in Figure 7-1 below.

The eighth bit of the device address is the Read/write operation select bit. A Read operation is initiated if this bit is a Logic 1, and a Write operation is initiated if this bit is a Logic 0.

Upon a successful comparison of the device address, the EEPROM will output a zero during the following clock cycle. If a compare is not made, the device will not acknowledge and will instead return to a standby state.

**Figure 7-1. Device Addressing**

| Package                            | Device Type Identifier |       |       |       | Hardware Address Select Bits |                |                | R/W Select        |
|------------------------------------|------------------------|-------|-------|-------|------------------------------|----------------|----------------|-------------------|
|                                    | Bit 7                  | Bit 6 | Bit 5 | Bit 4 | Bit 3                        | Bit 2          | Bit 1          | Bit 0             |
| SOIC, TSSOP, UDFN, XDFN, and VFBGA | 1                      | 0     | 1     | 0     | A <sub>2</sub>               | A <sub>1</sub> | A <sub>0</sub> | R/ $\overline{W}$ |
| SOT-23 and WLCSP                   | 1                      | 0     | 1     | 0     | 0                            | 0              | 0              | R/ $\overline{W}$ |

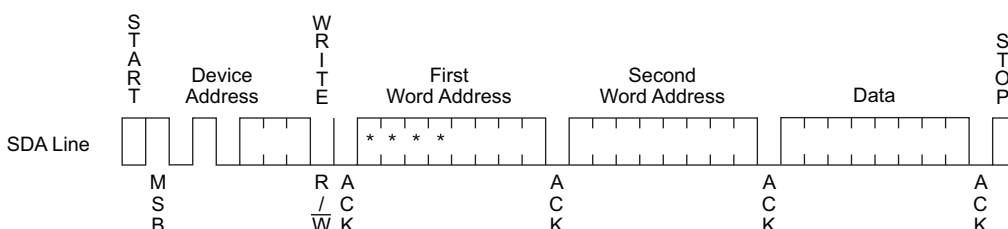
MSBLSB

**Data Security:** The AT24C32D has a hardware data protection scheme that allows the user to write protect the whole memory when the WP pin is at V<sub>CC</sub>.

## 8. Write Operations

**Byte Write:** A Write operation requires two 8-bit data word addresses following the device address word and acknowledgment. Upon receipt of this address, the EEPROM will again respond with a zero then clock in the first 8-bit data word. Following receipt of the 8-bit data word, the EEPROM will output a zero. The addressing device, such as a microcontroller, must then terminate the write sequence with a Stop condition. At this time, the EEPROM enters an internally-timed Write cycle,  $t_{WR}$ , to the nonvolatile memory (See Figure 6-6). All inputs are disabled during this Write cycle and the EEPROM will not respond until the Write is complete.

**Figure 8-1. Byte Write**



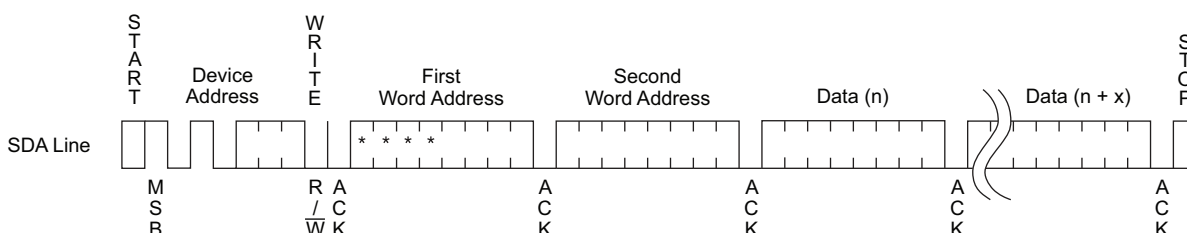
Note: \* = Don't care bit.

**Page Write:** The 32K EEPROM is capable of 32-byte Page Writes.

A Page Write is initiated the same way as a Byte Write, but the microcontroller does not send a Stop condition after the first data word is clocked in. Instead, after the EEPROM acknowledges receipt of the first data word, the microcontroller can transmit up to 31 more data words. The EEPROM will respond with a zero after each data word received. The microcontroller must terminate the Page Write sequence with a Stop condition.

The data word address lower five bits are internally incremented following the receipt of each data word. The higher data word address bits are not incremented, retaining the memory page row location. When the word address, internally generated, reaches the page boundary, the following byte is placed at the beginning of the same page. If more than 32 data words are transmitted to the EEPROM, the data word address will roll-over and the previously loaded data will be altered. The address roll-over during Write is from the last byte of the current page to the first byte of the same page.

**Figure 8-2. Page Write**



Note: \* = Don't care bit.

**Acknowledge Polling:** Once the internally-timed Write cycle has started and the EEPROM inputs are disabled, acknowledge polling can be initiated. This involves sending a Start condition followed by the device address word. The Read/Write bit is representative of the operation desired. Only if the internal Write cycle has completed will the EEPROM respond with a zero, allowing the Read or Write sequence to continue.

## 9. Read Operations

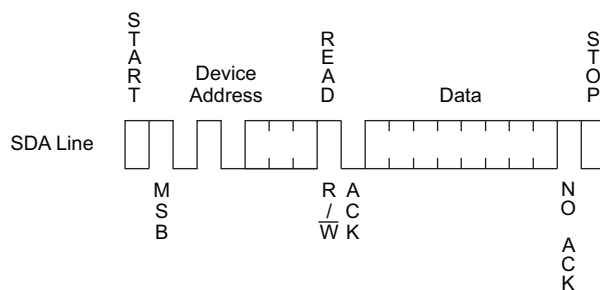
Read operations are initiated the same way as Write operations with the exception that the Read/Write select bit in the device address word is set to one. There are three Read operations:

- Current Address Read
- Random Address Read
- Sequential Read

**Current Address Read:** The internal data word address counter maintains the last address accessed during the last Read or Write operation, incremented by one. This address stays valid between operations as long as the chip power is maintained. The address roll-over during read is from the last byte of the last memory page, to the first byte of the first page.

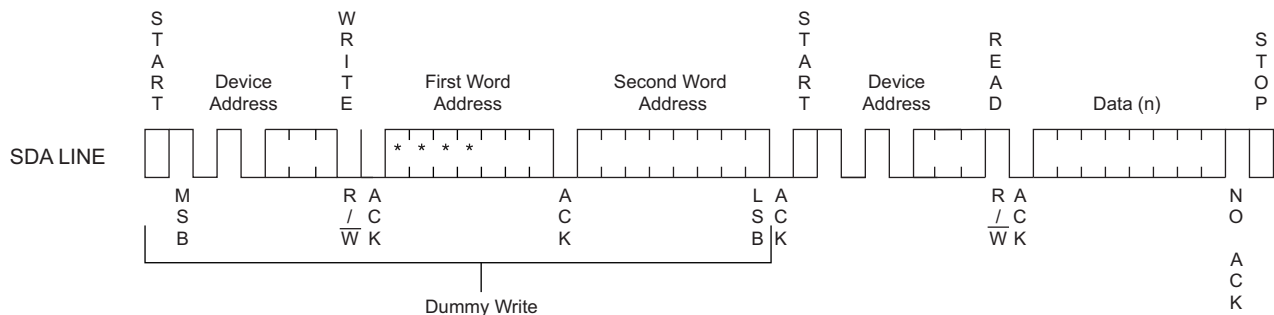
Once the device address with the Read/Write select bit set to one is clocked in and acknowledged by the EEPROM, the current address data word is serially clocked out. The microcontroller does not respond with an zero but does generate a Stop condition.

**Figure 9-1. Current Address Read**



**Random Read:** A Random Read requires a dummy Byte Write sequence to load in the data word address. Once the device address word and data word address are clocked in and acknowledged by the EEPROM, the microcontroller must generate another Start condition. The microcontroller now initiates a Current Address Read by sending a device address with the Read/write select bit high. The EEPROM acknowledges the device address and serially clocks out the data word. The microcontroller does not respond with a zero but does generate a Stop condition.

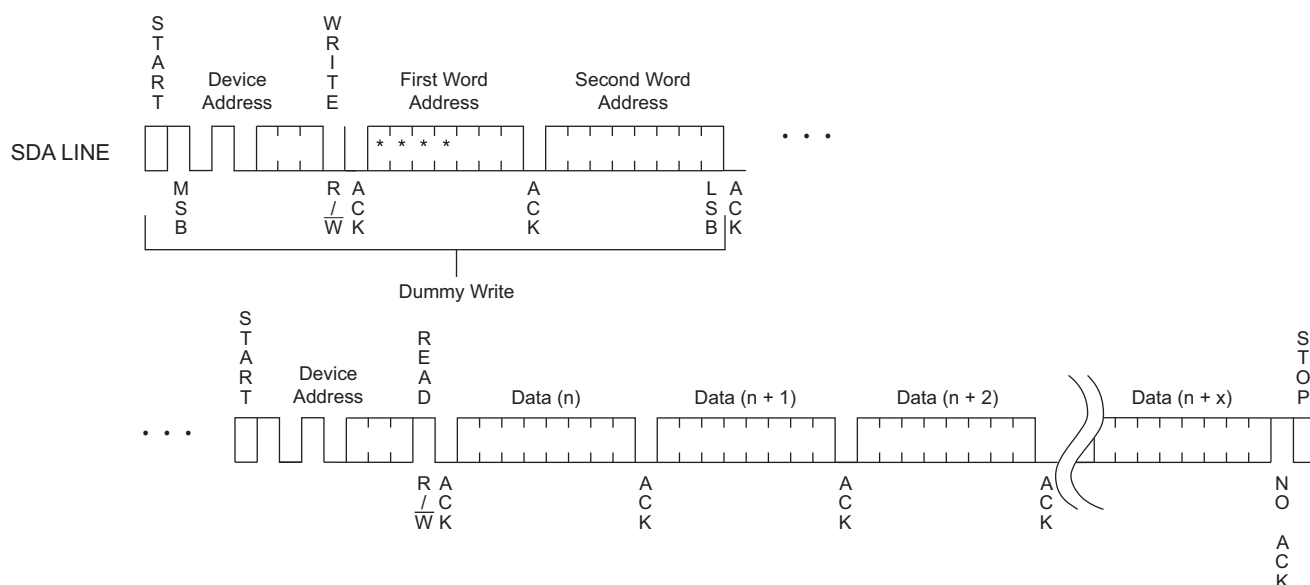
**Figure 9-2. Random Read**



Note: \* = Don't care bit.

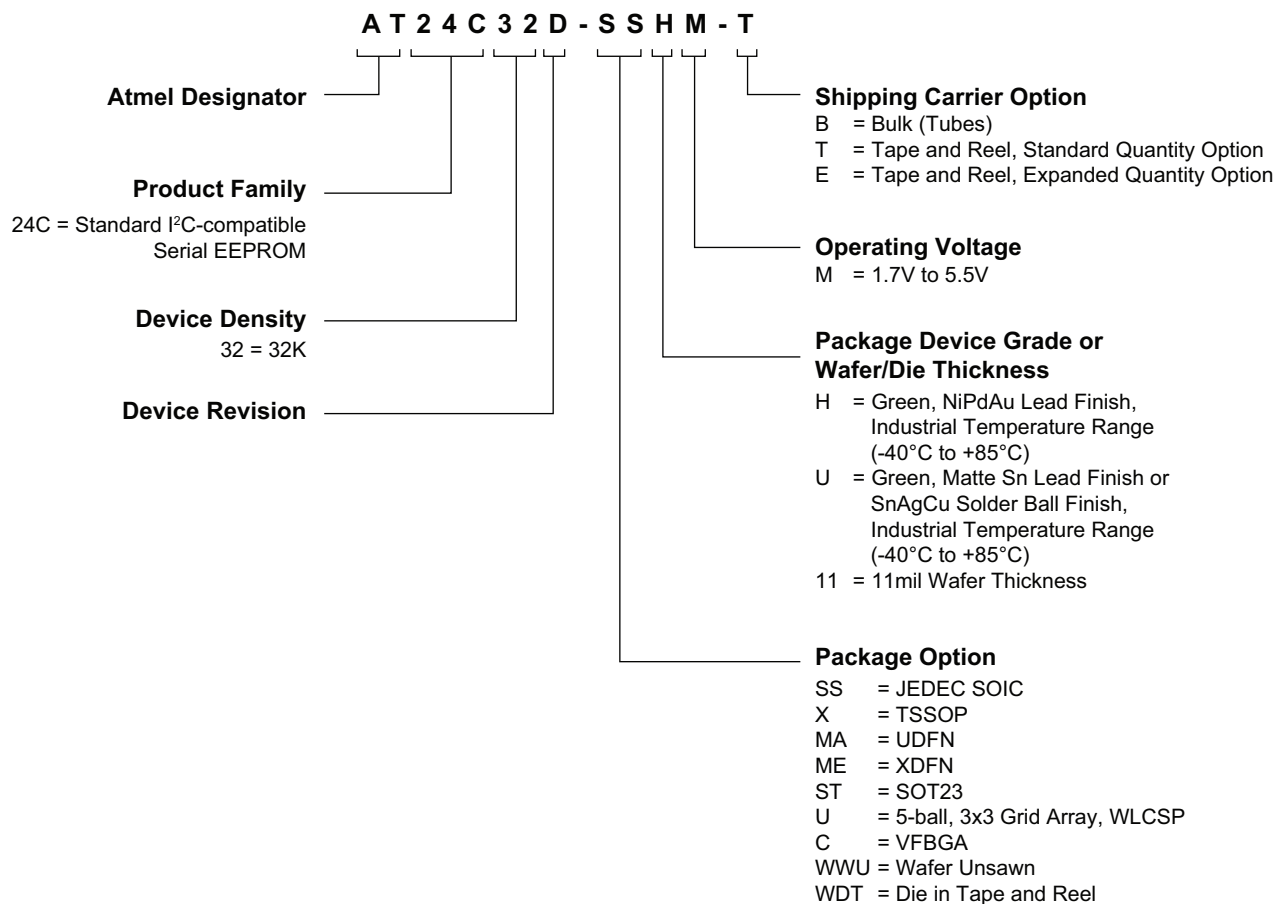
**Sequential Read:** Sequential Reads are initiated by either a Current Address Read or a Random Address Read. After the microcontroller receives a data word, it responds with an acknowledge. As long as the EEPROM receives an acknowledge, it will continue to increment the data word address and serially clock out sequential data words. When the memory address maximum address is reached, the data word address will roll-over and the Sequential Read will continue from the beginning of the array. The Sequential Read operation is terminated when the microcontroller does not respond with a zero but does generate a Stop condition.

**Figure 9-3. Sequential Read**



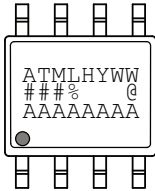
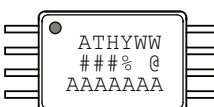
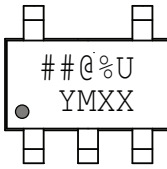
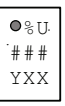
Note: \* = Don't care bit.

## 10. Ordering Code Detail



## 11. Part Markings

### AT24C32D: Package Marking Information

| 8-lead SOIC                                                                       | 8-lead TSSOP                                                                      | 8-pad UDFN                                                                                              | 8-pad XDFN                                                                                               |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  |  | 2.0 x 3.0 mm Body<br> | 1.8 x 2.2 mm Body<br> |
| 5-lead SOT-23                                                                     | 5-ball WLCSP                                                                      | 8-ball VFBGA                                                                                            |                                                                                                          |
|  |  | 1.5 x 2.0 mm Body<br> |                                                                                                          |

Note 1: ● designates pin 1

Note 2: Package drawings are not to scale

Note 3: For SOT23 package with date codes before 7B, the bottom line (YMXX) is marked on the bottom side and there is no Country of Assembly (@) mark on the top line.

| Catalog Number Truncation                                                            |           |                                   |                                                        |  |
|--------------------------------------------------------------------------------------|-----------|-----------------------------------|--------------------------------------------------------|--|
| AT24C32D                                                                             |           | Truncation Code ###: 32D / ##: BD |                                                        |  |
| Date Codes                                                                           |           |                                   | Voltages                                               |  |
| Y = Year                                                                             | M = Month | WW = Work Week of Assembly        | % = Minimum Voltage                                    |  |
| 6: 2016                                                                              | 0: 2020   | A: January                        | M: 1.7V min                                            |  |
| 7: 2017                                                                              | 1: 2021   | B: February                       |                                                        |  |
| 8: 2018                                                                              | 2: 2022   | ... ..                            |                                                        |  |
| 9: 2019                                                                              | 3: 2023   | L: December                       |                                                        |  |
| Country of Assembly                                                                  |           | Lot Number                        | Grade/Lead Finish Material                             |  |
| @ = Country of Assembly                                                              |           | AAA...A = Atmel Wafer Lot Number  | U: Industrial/Matte Tin/SnAgCu<br>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                 |  |

12/6/16

|                                                                                                                                           |                                                                           |                                    |                      |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------|----------------------|
| <br>Package Mark Contact:<br>DL-CSO-Assy_eng@atmel.com | <b>TITLE</b><br><br><b>24C32DSM, AT24C32D Package Marking Information</b> | <b>DRAWING NO.</b><br><br>24C32DSM | <b>REV.</b><br><br>C |
|                                                                                                                                           |                                                                           |                                    |                      |

## 12. Ordering Information

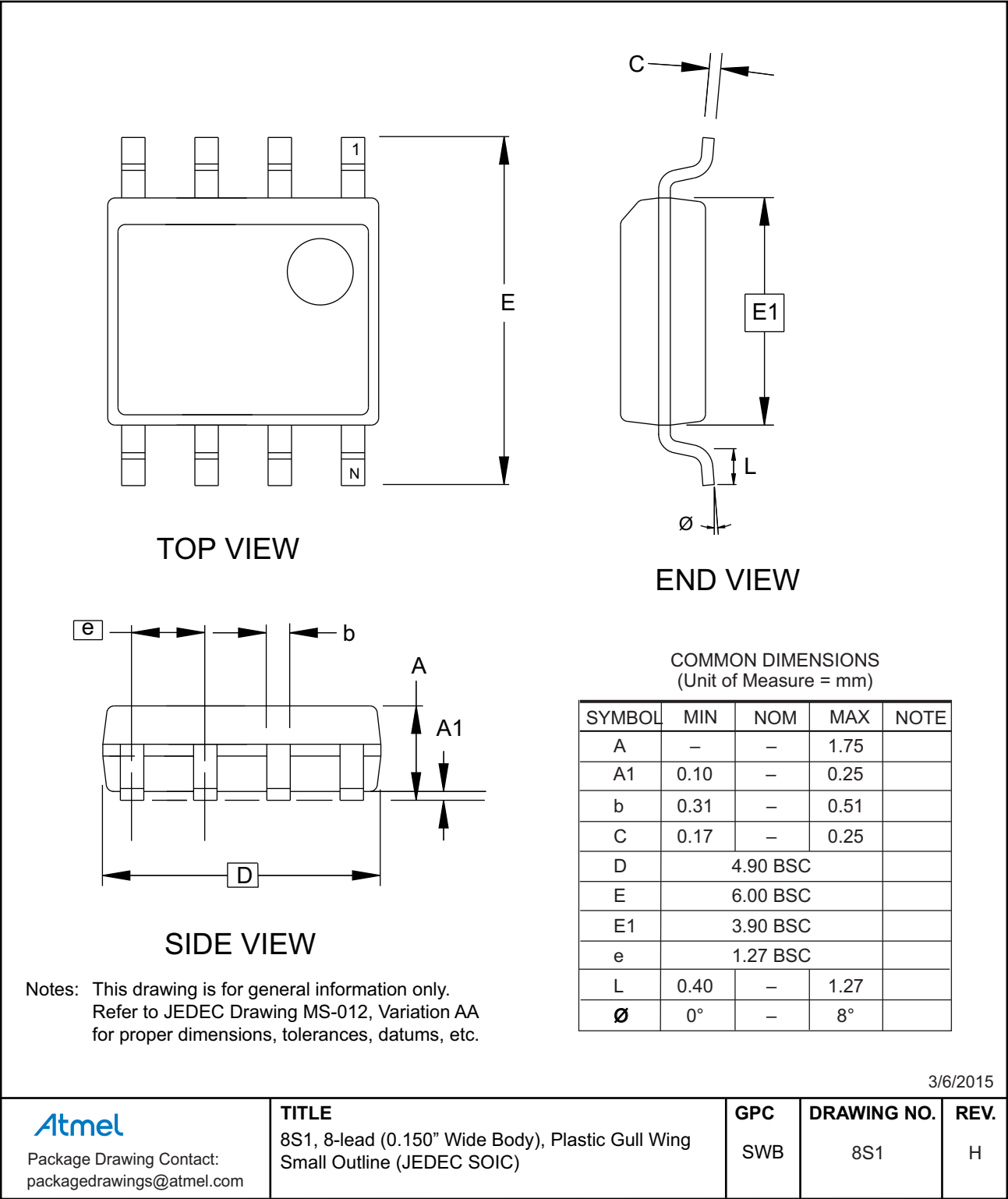
| Atmel Ordering Code            | Lead Finish                           | Package    | Delivery Information |                 | Operating Range                           |
|--------------------------------|---------------------------------------|------------|----------------------|-----------------|-------------------------------------------|
|                                |                                       |            | Form                 | Quantity        |                                           |
| AT24C32D-SSHM-B                | NiPdAu<br>(Lead-free/Halogen-free)    | 8S1        | Bulk (Tubes)         | 100 per Tube    | Industrial Temperature<br>(-40°C to 85°C) |
| AT24C32D-SSHM-T                |                                       |            | Tape and Reel        | 4,000 per Reel  |                                           |
| AT24C32D-XHM-B                 |                                       | 8X         | Bulk (Tubes)         | 100 per Tube    |                                           |
| AT24C32D-XHM-T                 |                                       |            | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-MAHM-T                |                                       | 8MA2       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-MAHM-E                |                                       |            | Tape and Reel        | 15,000 per Reel |                                           |
| AT24C32D-MEHM-T                |                                       | 8ME1       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-STUM-T                | Matte Tin<br>(Lead-free/Halogen-free) | 5TS1       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-UUM-T <sup>(1)</sup>  | SnAgCu<br>(Lead-free/Halogen-free)    | 5U-3       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-CUM-T                 |                                       | 8U2-1      | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C32D-WWU11M <sup>(2)</sup> | N/A                                   | Wafer Sale | Note 2               |                 |                                           |

- Notes: 1. WLCSP Package: **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.

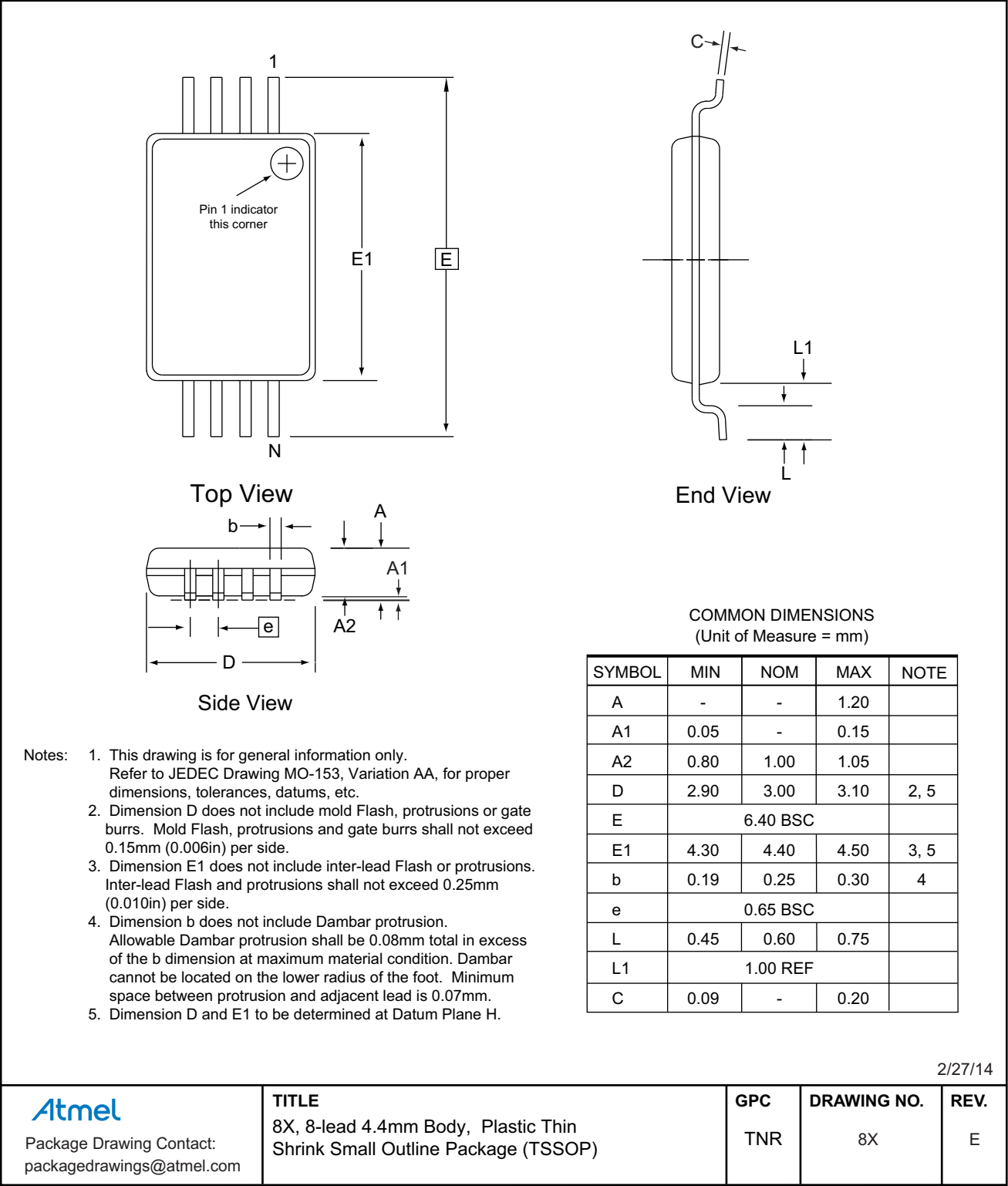
| Package Type |                                                                        |
|--------------|------------------------------------------------------------------------|
| 8S1          | 8-lead, 0.150" wide, Plastic Gull Wing Small Outline (JEDEC SOIC)      |
| 8X           | 8-lead, 4.40mm body, Plastic Thin Shrink Small Outline Package (TSSOP) |
| 8MA2         | 8-pad, 2.00mm x 3.00mm body, 0.50mm pitch, Dual No Lead (UDFN)         |
| 8ME1         | 8-pad, 1.80mm x 2.20mm body, 0.40mm pitch, Extra Thin DFN (XDFN)       |
| 5TS1         | 5-lead, 2.90mm x 1.60mm Plastic Thin Shrink Small Outline (SOT23)      |
| 5U-3         | 5-ball, 3x3 Grid Array, Wafer Level Chip Scale Package (WLCSP)         |
| 8U2-1        | 8-ball, Die Ball Grid Array (VFBGA)                                    |

# 13. Packaging Information

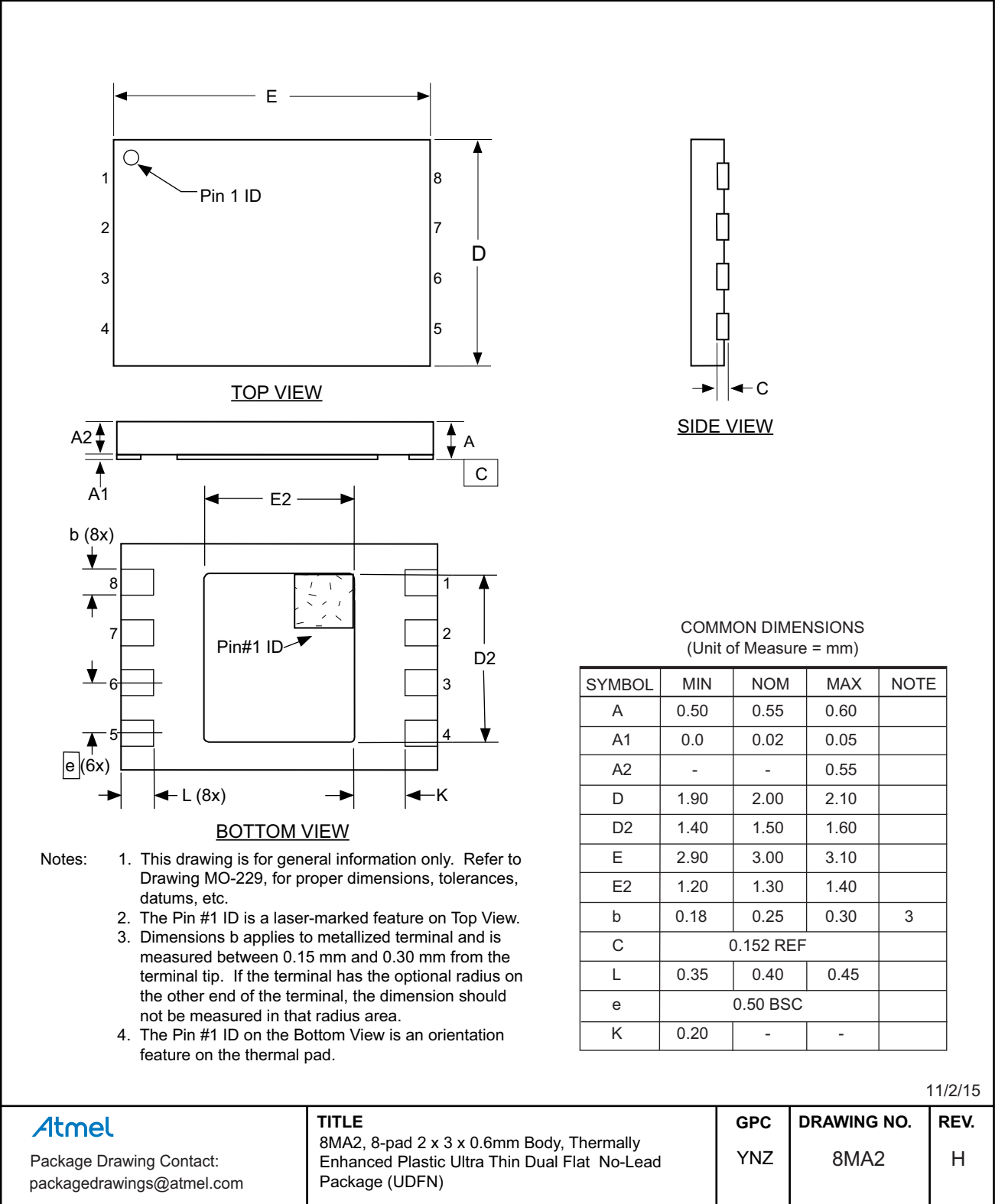
## 13.1 8S1 — 8-lead JEDEC SOIC



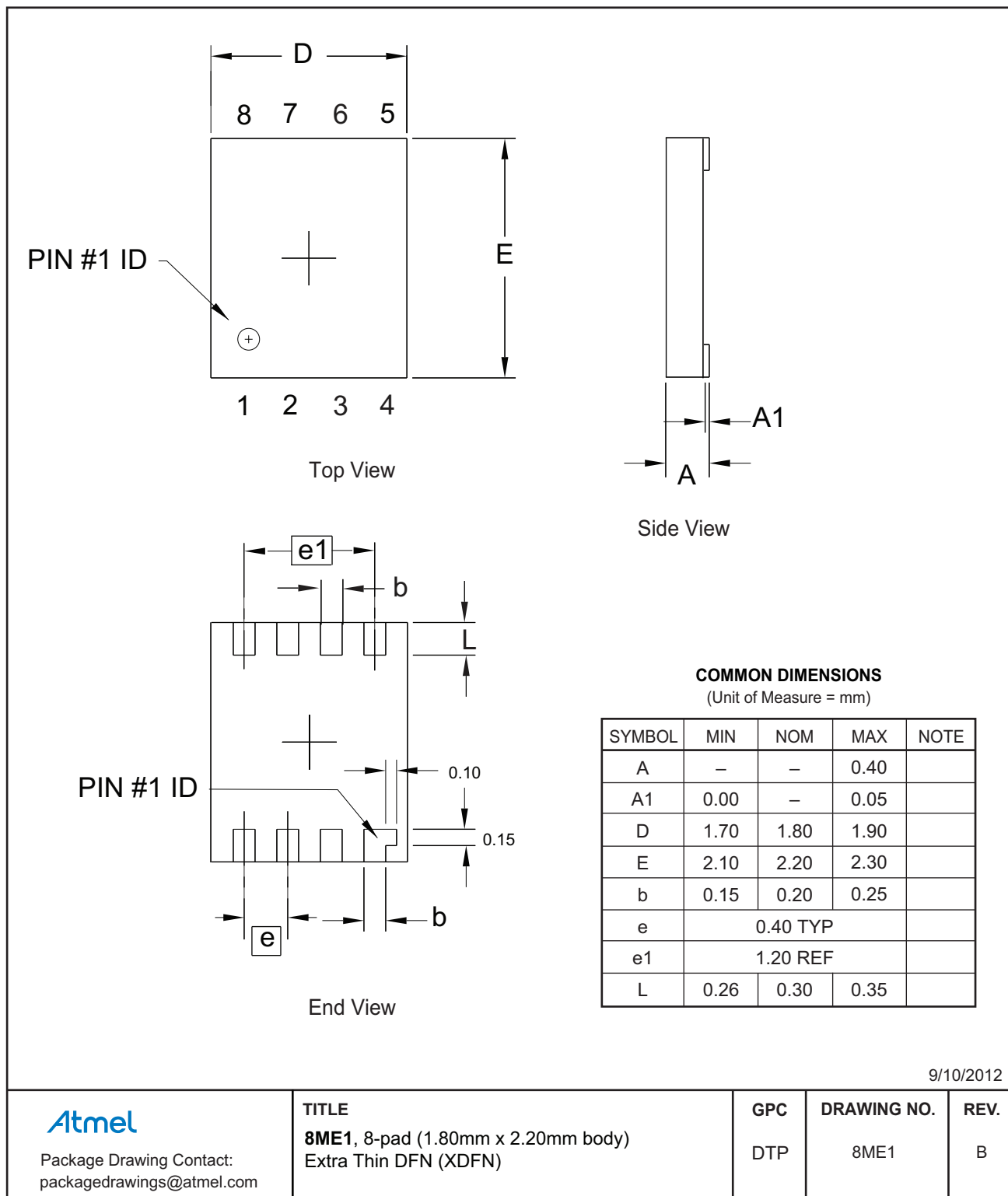
13.2 8X — 8-lead TSSOP



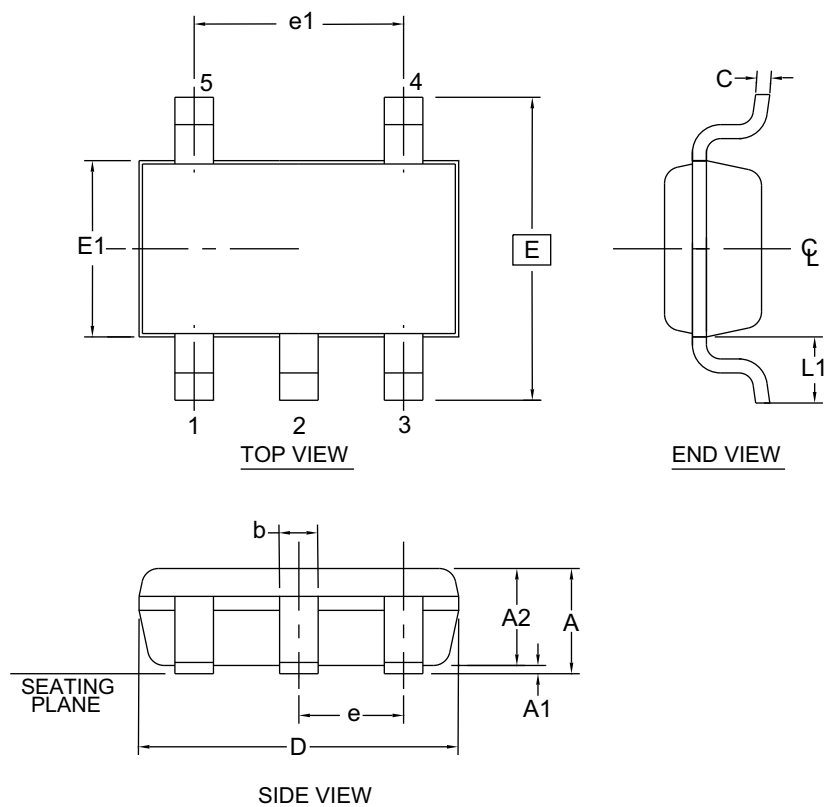
13.3 8MA2 — 8-pad UDFN



## 13.4 8ME1 — 8-pad XDFN



## 13.5 5TS1 — 5-lead SOT23



1. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15 mm per side.
2. The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.
3. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.
4. Dimension "b" does not include dambar protrusion. Allowable dambar protrusion shall be 0.08 mm total in excess of the "b" dimension at maximum material condition. The dambar cannot be located on the lower radius of the foot. Minimum space between protrusion and an adjacent lead shall not be less than 0.07 mm.

This drawing is for general information only. Refer to JEDEC Drawing MO-193, Variation AB for additional information.

COMMON DIMENSIONS  
(Unit of Measure = mm)

| SYMBOL | MIN      | NOM  | MAX  | NOTE |
|--------|----------|------|------|------|
| A      | -        | -    | 1.00 |      |
| A1     | 0.00     | -    | 0.10 |      |
| A2     | 0.70     | 0.90 | 1.00 |      |
| c      | 0.08     | -    | 0.20 | 3    |
| D      | 2.90 BSC |      |      | 1,2  |
| E      | 2.80 BSC |      |      | 1,2  |
| E1     | 1.60 BSC |      |      | 1,2  |
| L1     | 0.60 REF |      |      |      |
| e      | 0.95 BSC |      |      |      |
| e1     | 1.90 BSC |      |      |      |
| b      | 0.30     | -    | 0.50 | 3,4  |

5/31/12

**Atmel**

Package Drawing Contact:  
packagedrawings@atmel.com

TITLE

5TS1, 5-lead 1.60mm Body, Plastic Thin  
Shrink Small Outline Package (Shrink SOT)

GPC

TSZ

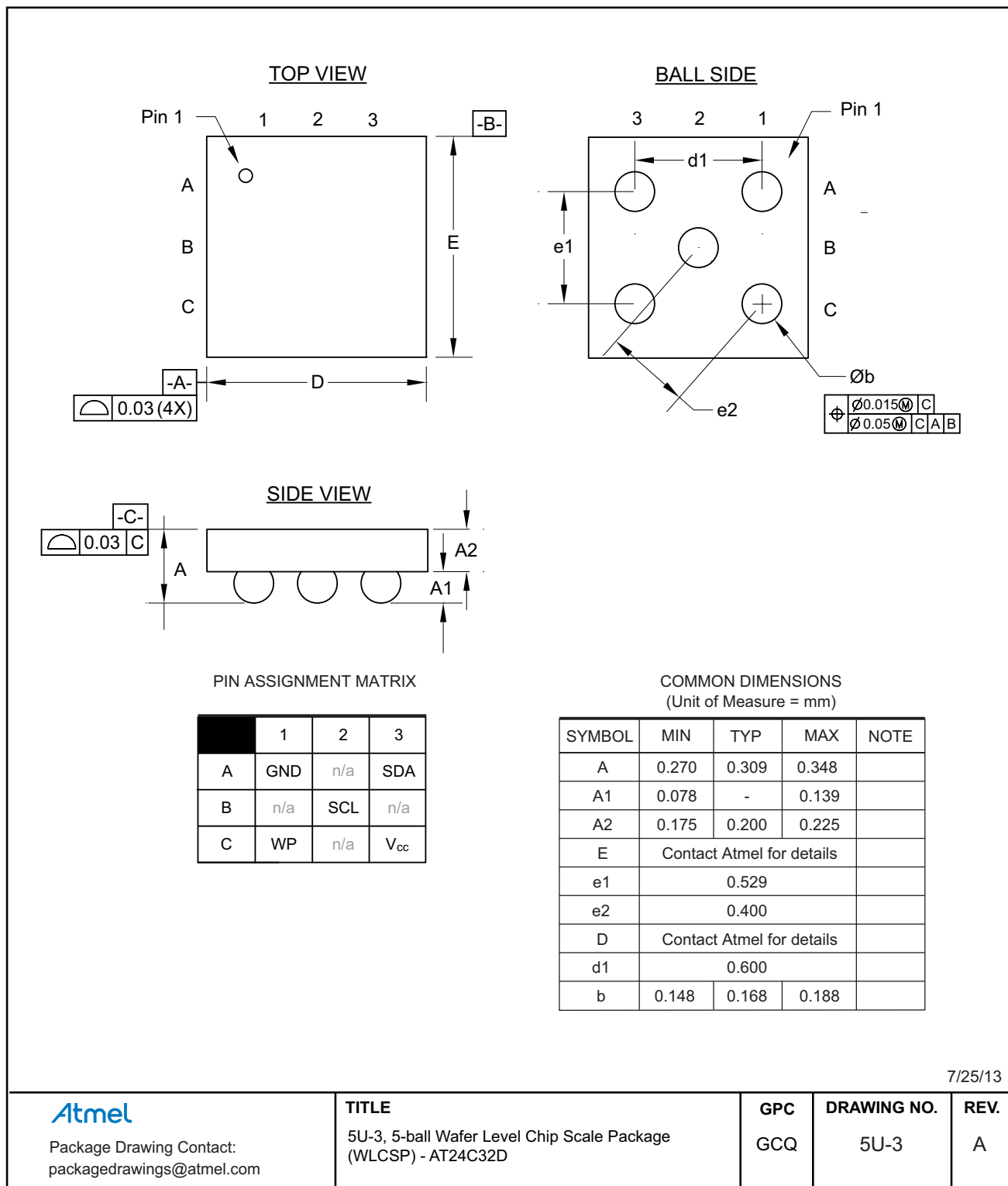
DRAWING NO.

5TS1

REV.

D

## 13.6 5U-3 — 5-ball, WLCSP



7/25/13

**Atmel**

Package Drawing Contact:  
packagedrawings@atmel.com

**TITLE**

5U-3, 5-ball Wafer Level Chip Scale Package  
(WLCSP) - AT24C32D

**GPC**

GCQ

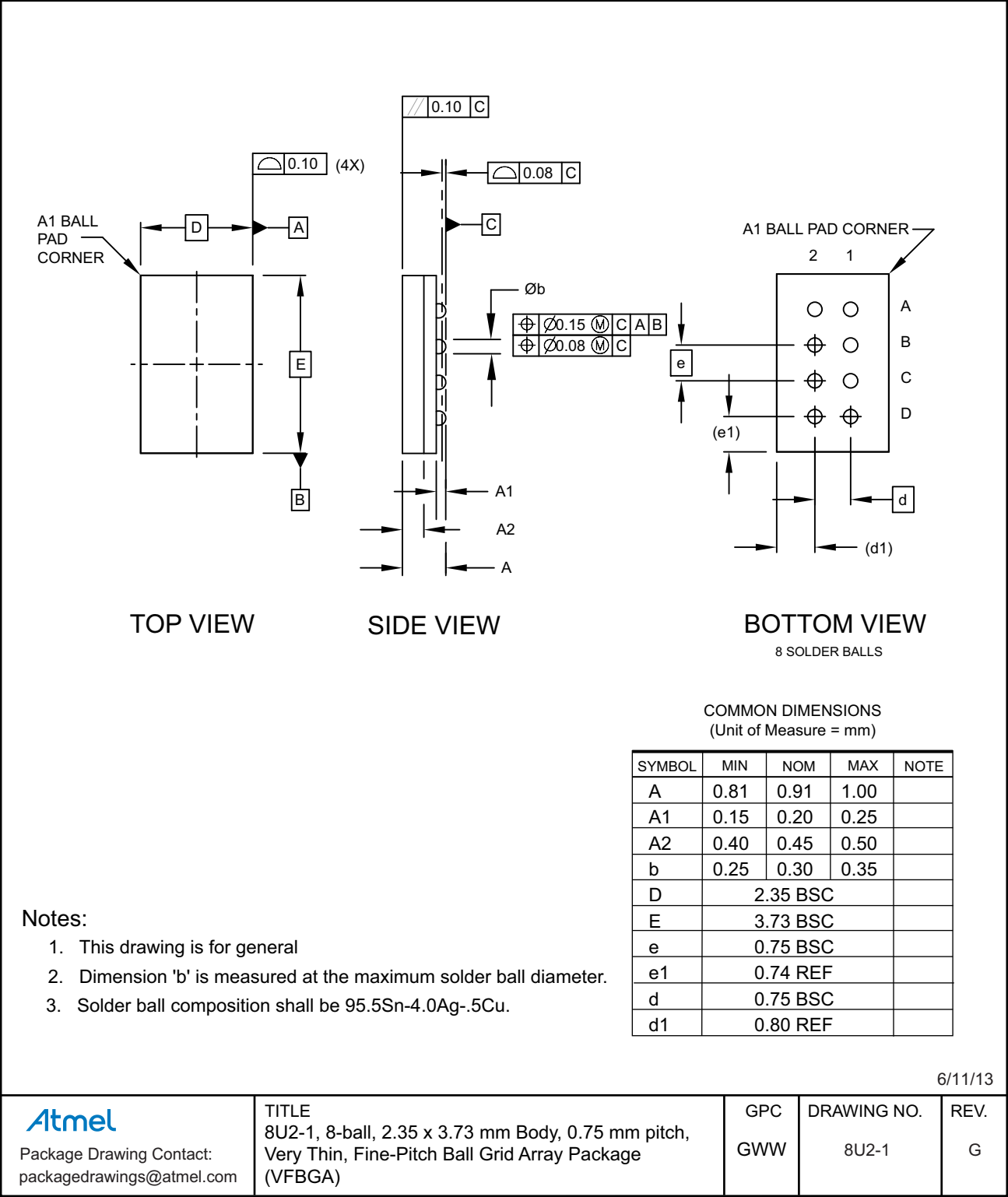
**DRAWING NO.**

5U-3

**REV.**

A

13.7 8U2-1 — 8-ball VFBGA



## 14. Revision History

| Doc. Rev. | Date    | Comments                                                                                                                                                                                                                         |
|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8866D     | 12/2016 | Removed AT24C32D-STUMHY-T part number from datasheet<br>Removed Product Variation code from Ordering Code Detail<br>Part marking SOT23:<br>- Moved backside mark (YMXX) to front side line2.<br>- Added @ = Country of Assembly. |
| 8866C     | 12/2015 | Add the AT24C32D-STUMHY-T option and updated the 8S1 and 8MA2 package drawings.                                                                                                                                                  |
| 8866B     | 01/2015 | Add the UDFN Expanded Quantity Option.<br>Update the 8X and 8MA2 package outline drawings, the part markings page, and the ordering information section.                                                                         |
| 8866A     | 08/2013 | Split AT24C32D from AT24C64D due to growing differences in package offerings.<br>Add 5-ball WLCSP package.<br>Update template and Atmel logos.                                                                                   |

