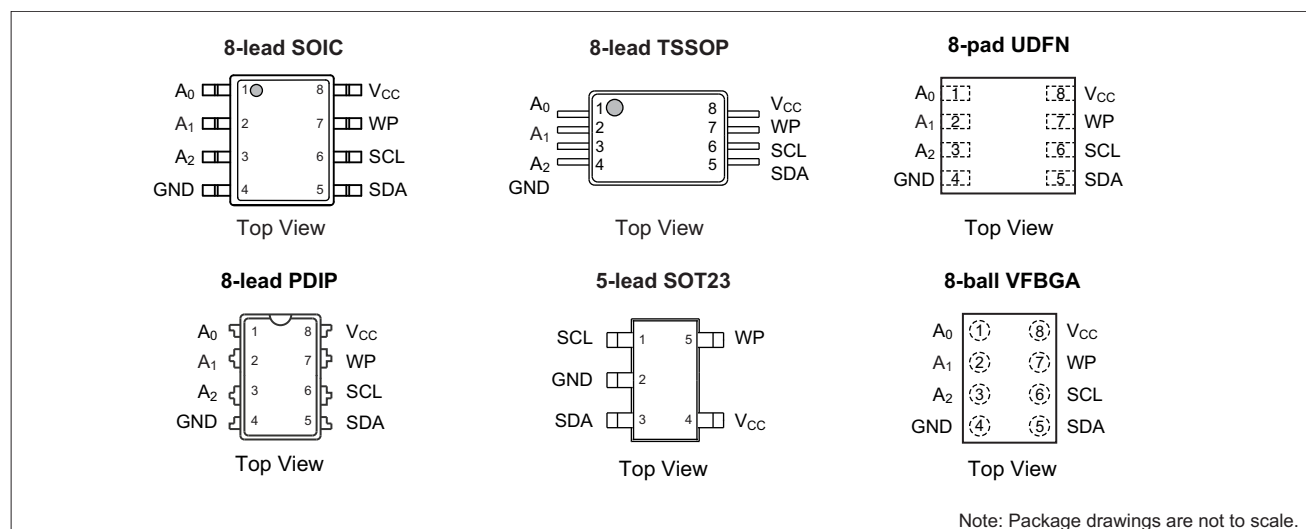


# 1. Pin Configurations and Pinouts

**Table 1-1. Pin Descriptions**

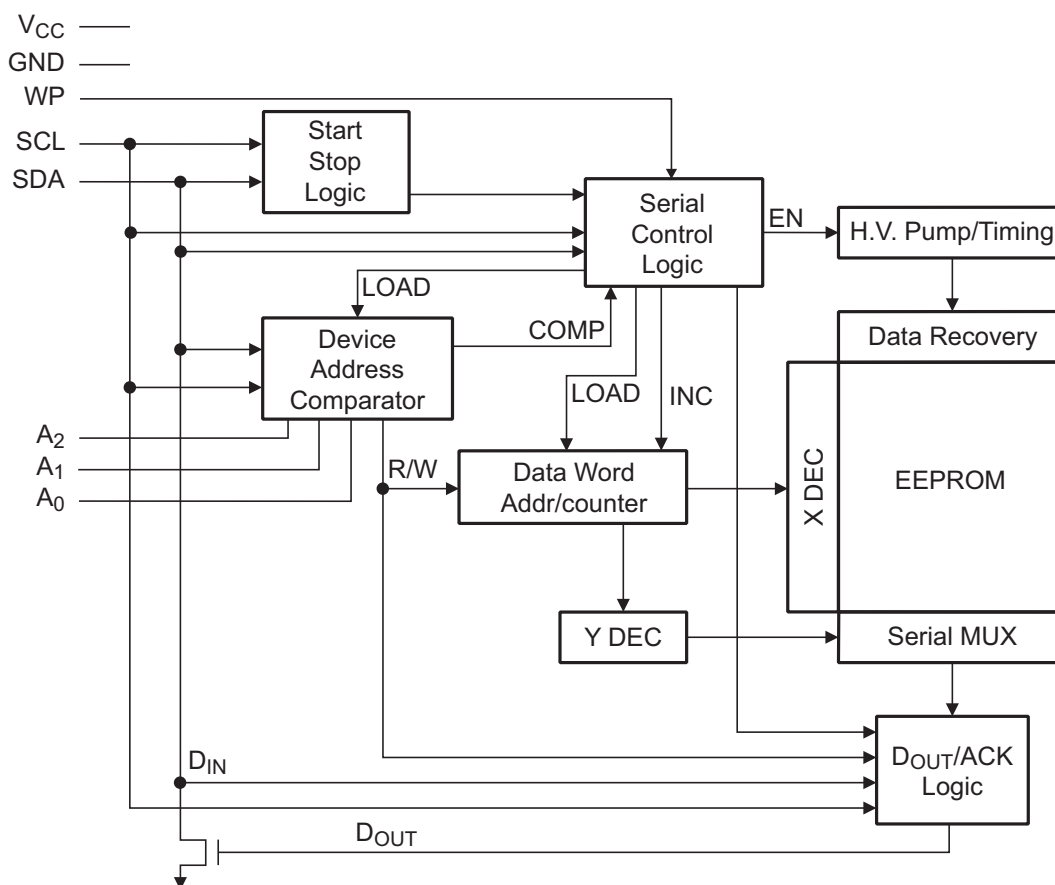
| Pin Number | Pin Symbol  | Pin Name and Functional Description                                                                                                                                                                                                                                                                   | Asserted State | Pin Type     |
|------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| 1, 2, 3    | $A_0 - A_2$ | <b>Address Inputs:</b> The $A_2$ , $A_1$ , and $A_0$ pins are device address inputs that are hard wired. As many as eight 1-Kbit or 2-Kbit devices may be addressed on a single bus system.                                                                                                           | —              | Input        |
| 4          | GND         | <b>Ground:</b> The ground reference for the power supply. GND should be connected to the system ground.                                                                                                                                                                                               | —              | Power        |
| 5          | SDA         | <b>Serial Data:</b> 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.                                                                                                          | —              | Input/Output |
| 6          | SCL         | <b>Serial Clock Input:</b> The SCL input is used to positive edge clock data into each EEPROM device and negative edge clock data out of each device.                                                                                                                                                 | —              | Input        |
| 7          | WP          | <b>Write Protect:</b> Provides hardware data protection. The Write Protect pin allows normal read/write operations when connected to Ground (GND). When the Write Protect pin is connected to $V_{CC}$ , the write protection feature is enabled and operates as shown in <a href="#">Table 5-1</a> . |                | Input        |
| 8          | $V_{CC}$    | <b>Device Power Supply:</b> The $V_{CC}$ pin is used to supply the source voltage to the device. Operations at invalid $V_{CC}$ voltages may produce spurious results and should not be attempted.                                                                                                    | —              | Power        |

Note: 1. For use of 5-lead SOT23, the software  $A_2$ ,  $A_1$ , and  $A_0$  bits in the device address word must be set to zero to properly communicate.



## 2. Block Diagram

Figure 2-1. Block Diagram



## 3. 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.

## 4. Memory Organization

**AT24C01C, 1K Serial EEPROM:** Internally organized with 16 pages of eight bytes each, the 1K requires a 7-bit data word address for random word addressing.

**AT24C02C, 2K Serial EEPROM:** Internally organized with 32 pages of eight bytes each, the 2K requires an 8-bit data word address for random word addressing.

### 4.1 Pin Capacitance

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

Applicable over recommended operating range from  $T_A = 25^\circ\text{C}$ ,  $f = 1.0\text{MHz}$ ,  $V_{CC} = 1.7\text{V}$  to  $5.5\text{V}$ .

| 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 ( $A_0, A_1, A_2, \text{SCL}$ ) | 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:  $T_A = -40^\circ\text{C}$  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         |
|-----------|-----------------------------------------|--------------------------------|---------------------|------|---------------------|---------------|
| $V_{CC1}$ | Supply Voltage                          |                                | 1.7                 |      | 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 $V_{CC} = 5.0\text{V}$   | Read at 400kHz                 |                     | 0.4  | 1.0                 | mA            |
| $I_{CC2}$ | Supply Current $V_{CC} = 5.0\text{V}$   | Write at 400kHz                |                     | 2.0  | 3.0                 | mA            |
| $I_{SB1}$ | Standby Current $V_{CC} = 1.7\text{V}$  | $V_{IN} = V_{CC}$ or $V_{SS}$  |                     |      | 1.0                 | $\mu\text{A}$ |
| $I_{SB2}$ | Standby Current $V_{CC} = 2.5\text{V}$  | $V_{IN} = V_{CC}$ or $V_{SS}$  |                     |      | 2.0                 | $\mu\text{A}$ |
| $I_{SB3}$ | Standby Current $V_{CC} = 5.5\text{V}$  | $V_{IN} = V_{CC}$ or $V_{SS}$  |                     |      | 6.0                 | $\mu\text{A}$ |
| $I_{LI}$  | Input Leakage Current                   | $V_{IN} = V_{CC}$ or $V_{SS}$  |                     | 0.10 | 3.0                 | $\mu\text{A}$ |
| $I_{LO}$  | Output Leakage Current                  | $V_{OUT} = V_{CC}$ or $V_{SS}$ |                     | 0.05 | 3.0                 | $\mu\text{A}$ |
| $V_{IL}$  | Input Low Level <sup>(1)</sup>          |                                | -0.6                |      | $V_{CC} \times 0.3$ | V             |
| $V_{IH}$  | Input High Level <sup>(1)</sup>         |                                | $V_{CC} \times 0.7$ |      | $V_{CC} + 0.5$      | V             |
| $V_{OL1}$ | Output Low Level $V_{CC} = 1.7\text{V}$ | $I_{OL} = 0.15\text{mA}$       |                     |      | 0.2                 | V             |
| $V_{OL2}$ | Output Low Level $V_{CC} = 3.0\text{V}$ | $I_{OL} = 2.1\text{mA}$        |                     |      | 0.4                 | 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  $T_{AI} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 1.7\text{V}$  to  $5.5\text{V}$ ,  $CL = 1\text{TTL Gate and } 100\text{pF}$  (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                                          | 1.2       |     | 0.4        |      | $\mu\text{s}$ |
| $t_{HIGH}$               | Clock Pulse Width High                                         | 0.6       |     | 0.4        |      | $\mu\text{s}$ |
| $t_I$                    | Noise Suppression Time                                         |           | 100 |            | 50   | ns            |
| $t_{AA}$                 | Clock Low to Data Out Valid                                    | 0.1       | 0.9 | 0.05       | 0.55 | $\mu\text{s}$ |
| $t_{BUF}$                | Time the bus must be free before a new transmission can start. | 1.2       |     | 0.5        |      | $\mu\text{s}$ |
| $t_{HD.STA}$             | Start Hold Time                                                | 0.6       |     | 0.25       |      | $\mu\text{s}$ |
| $t_{SU.STA}$             | Start Setup Time                                               | 0.6       |     | 0.25       |      | $\mu\text{s}$ |
| $t_{HD.DAT}$             | Data In Hold Time                                              | 0         |     | 0          |      | $\mu\text{s}$ |
| $t_{SU.DAT}$             | Data In Setup Time                                             | 100       |     | 100        |      | ns            |
| $t_R$                    | Inputs Rise Time <sup>(1)</sup>                                |           | 0.3 |            | 0.3  | $\mu\text{s}$ |
| $t_F$                    | Inputs Fall Time <sup>(1)</sup>                                |           | 300 |            | 100  | ns            |
| $t_{SU.STO}$             | Stop Setup Time                                                | 0.6       |     | .25        |      | $\mu\text{s}$ |
| $t_{DH}$                 | Data Out Hold Time                                             | 50        |     | 50         |      | ns            |
| $t_{WR}$                 | Write Cycle Time                                               |           | 5   |            | 5    | ms            |
| Endurance <sup>(1)</sup> | 3.3V, $+25^{\circ}\text{C}$ , Page Mode                        | 1,000,000 |     |            |      | Write Cycles  |

- Note:
1. This parameter is ensured by characterization only.
  2. AC measurement conditions:
    - $R_L$  (connects to  $V_{CC}$ ):  $1.3\text{ k}\Omega$  (2.5V, 5V),  $10\text{ k}\Omega$  (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:  $0.5 V_{CC}$

## 5. Write Protection

The AT24C01C/02C utilizes a hardware data protection scheme that allows the user to write protect the entire memory contents when the WP pin is at  $V_{CC}$  (or a valid  $V_{IH}$ ). No write protection will be set if the WP pin is at GND or left floating.

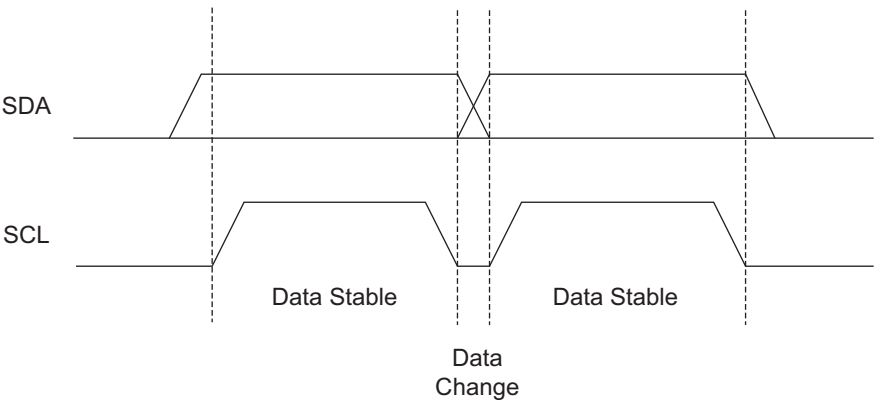
Table 5-1. Write Protect

| WP Pin Status | Part of the Array Protected  |
|---------------|------------------------------|
| At $V_{CC}$   | Full (2K) Array              |
| At GND        | Normal Read/Write Operations |

## 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.

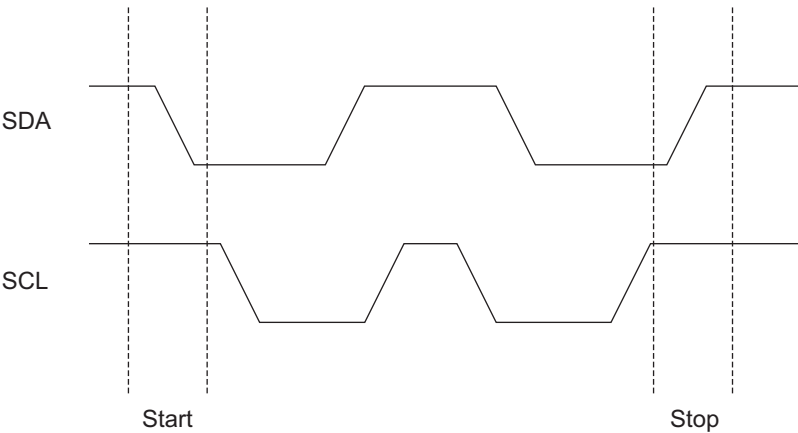
Figure 6-1. Data Validity



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

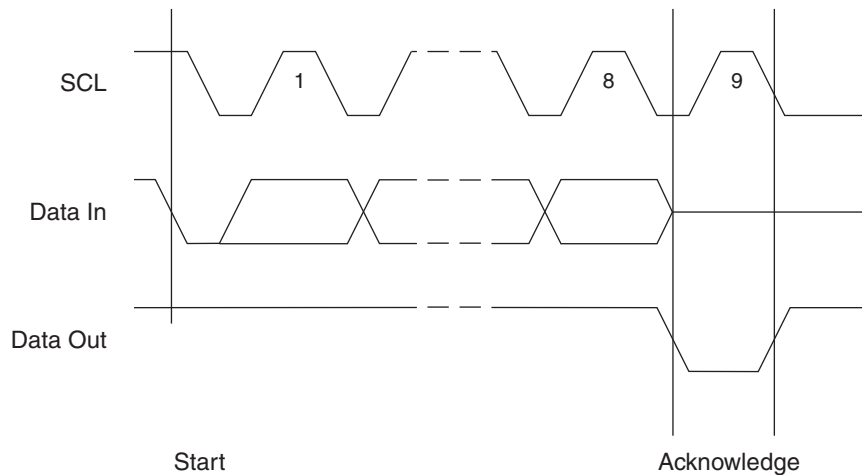
**Stop Condition:** A low-to-high transition of SDA with SCL high is a Stop condition. After a read sequence, the Stop condition will place the EEPROM in a standby power mode.

Figure 6-2. Start and Stop Definition



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

**Figure 6-3. Output Acknowledge**



**Standby Mode:** The AT24C01C/02C features a low-power standby mode which is enabled:

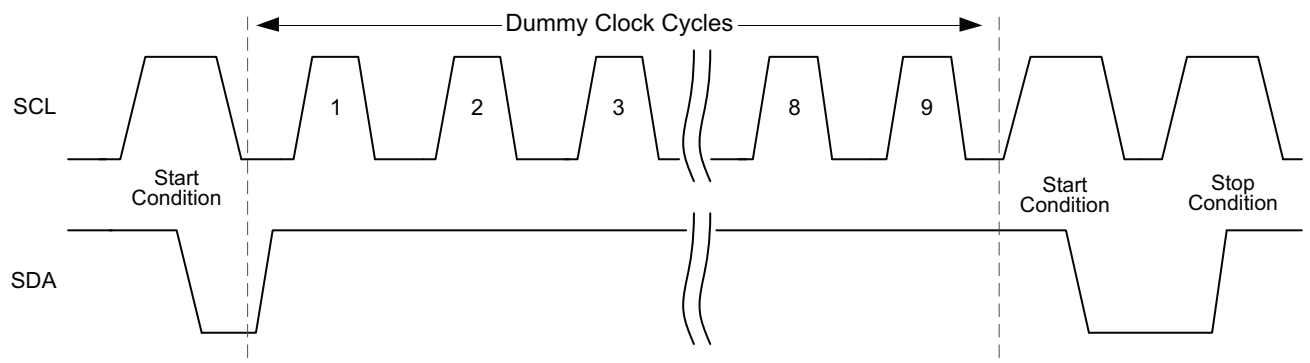
- Upon power-up.
- After the receipt of the Stop condition and the completion of any internal operations.

**2-wire Software Reset:** After an interruption in protocol, power-loss, or system reset, any 2-wire part can be 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 in [Figure 6-4](#).

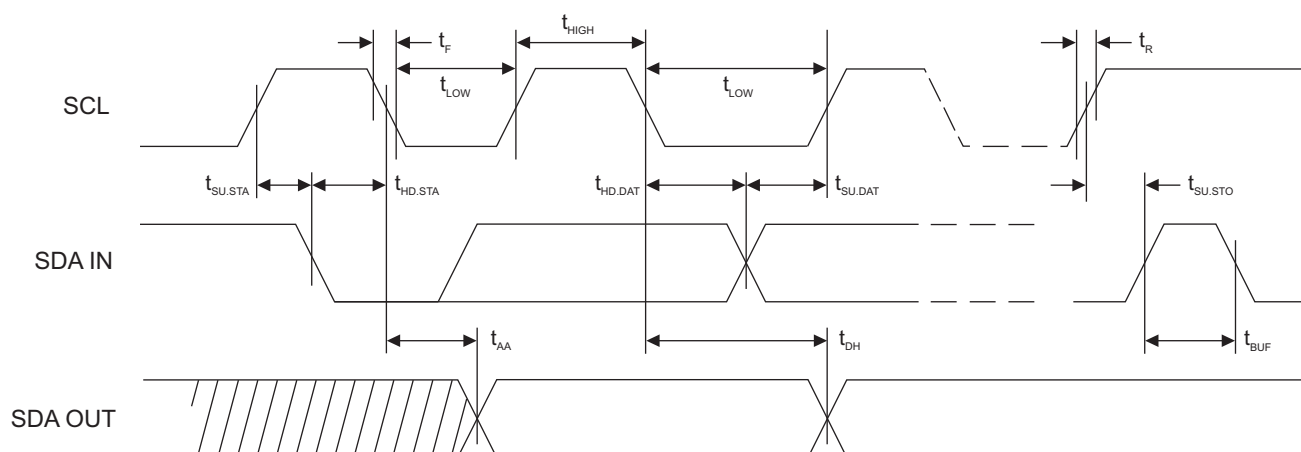
The device will be ready for the next communication after above steps have been completed. The device should be ready for the next communication after above steps have been completed. In the event that the device is still non-responsive or remains active on the SDA bus, a power cycle must be used to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

**Figure 6-4. Software Reset**



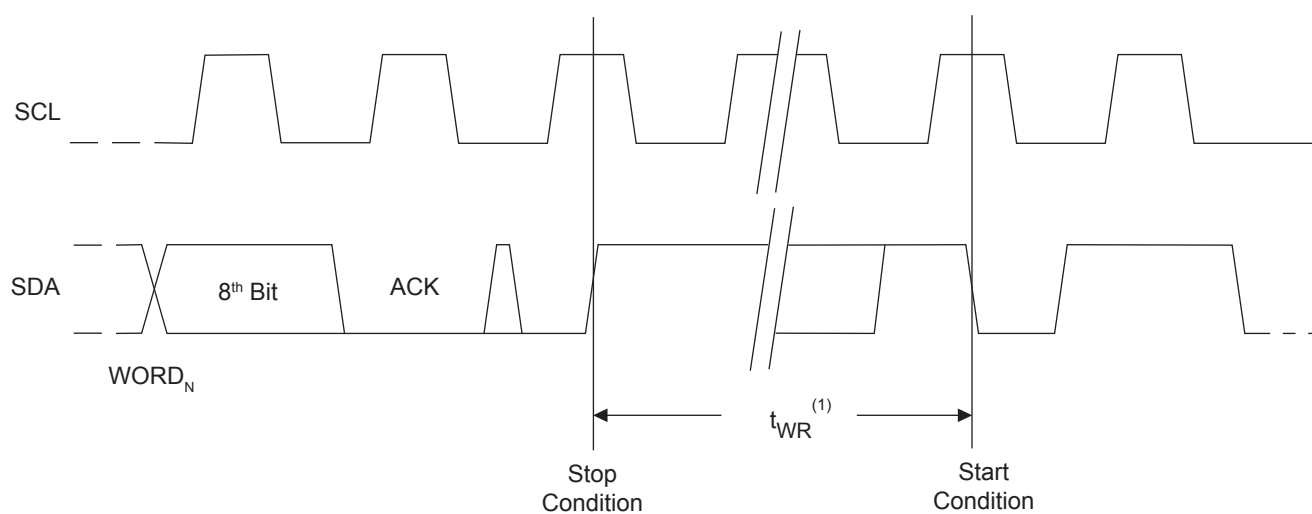
**Figure 6-5. Bus Timing**

SCL: Serial Clock, SDA: Serial Data I/O



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

SCL: Serial Clock, SDA: Serial Data I/O



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 1-Kbit and 2-Kbit EEPROM device requires an 8-bit device address word following a Start condition to enable the device for a Read or Write operation.

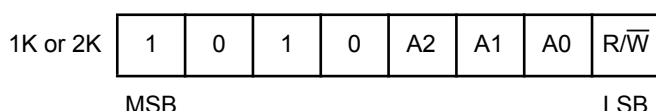
The device address word consists of a mandatory '1010' (0xA) sequence for the first four most significant bits as shown in Figure 7-1. This is common to all Serial EEPROM devices.

The next three bits are the A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> device address bits for the 1K and 2K EEPROM. These three bits must compare to their corresponding hard-wired input pins A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub> in order for the part to acknowledge.

The eighth bit of the device address is the Read/Write operation select bit. A Read operation is initiated if this bit is high and a Write operation is initiated if this bit is low.

Upon a valid compare of the device address with hard-wired input pins A<sub>2</sub>, A<sub>1</sub>, and A<sub>0</sub>, the EEPROM will output a zero. If a compare is not successfully made, the chip will return to a standby state.

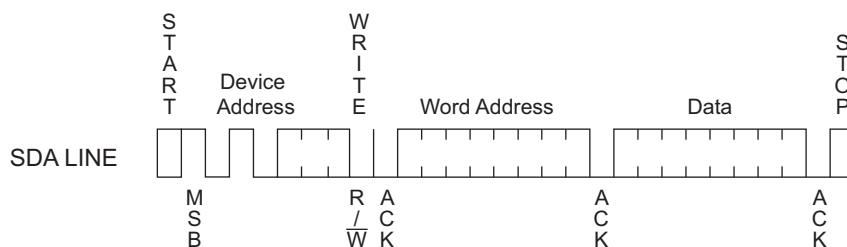
Figure 7-1. Device Address



## 8. Write Operations

**Byte Write:** A Byte Write operation requires an 8-bit data word address following the device address word and acknowledgment. Upon receipt of this address, the EEPROM will again respond with a zero and then clock in the first 8-bit data word. Following receipt of the 8-bit data word, the EEPROM will output a zero and the addressing device, such as a microcontroller, must 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. All inputs are disabled during this write cycle and the EEPROM will not respond until the write is complete.

Figure 8-1. Byte Write

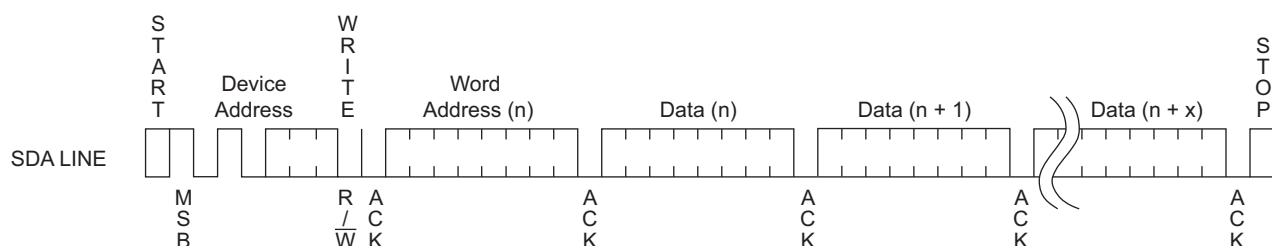


**Page Write:** The 1-Kbit and 2-Kbit EEPROM are capable of an 8-byte Page Write.

A Page Write is initiated the same 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 seven 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 three 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 eight data words are transmitted to the EEPROM, the data word address will "roll over" and previous data will be overwritten.

**Figure 8-2. Page Write**



**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.

**Data Security:** The AT24C01C/02C has a hardware data protection scheme that allows the user to write protect the entire memory when the WP pin is at  $V_{CC}$ .

## 9. Read Operations

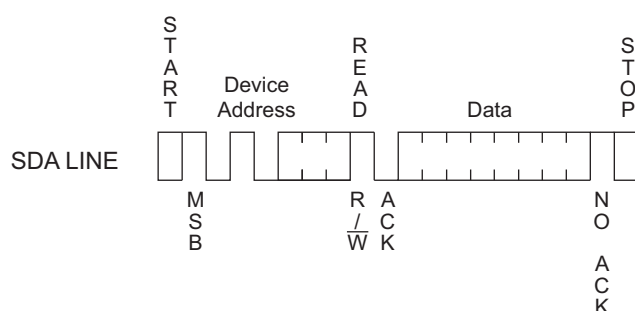
Read operations are initiated the same way as write operations with the exception that the read/write select bit in the device address word is set to one. There are three read operations:

- 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. The address roll-over during write is from the last byte of the current page to the first byte of the same page.

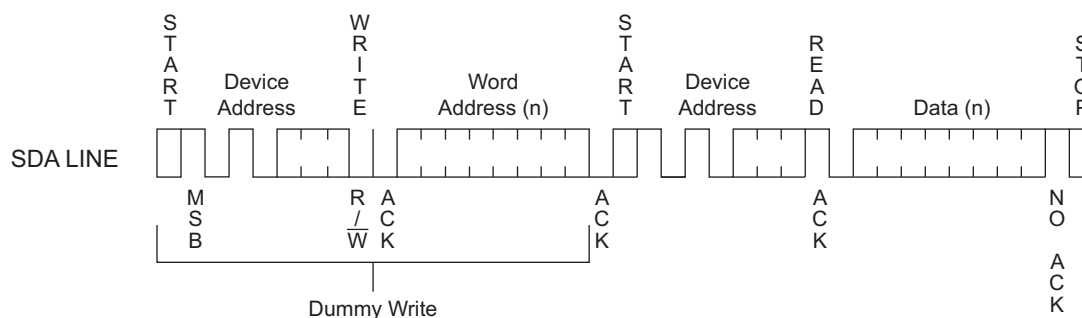
Once the device address with the read/write select bit set to one is clocked in and acknowledged by the EEPROM, the current address data word is serially clocked out. The microcontroller does not respond with an zero but does generate a following Stop condition

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



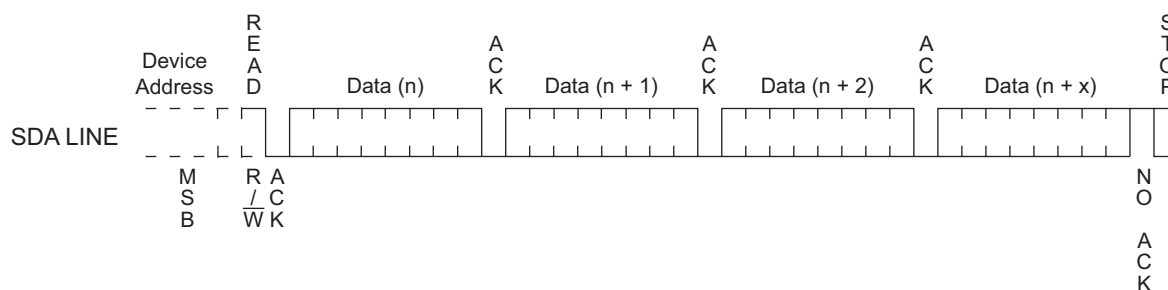
**Random Read:** A Random Read requires a dummy byte write sequence to load in the data word address. Once the device address word and data word address are clocked in and acknowledged by the EEPROM, the microcontroller must generate another start condition. The microcontroller now initiates a Current 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 following stop condition.

**Figure 9-2. Random Read**

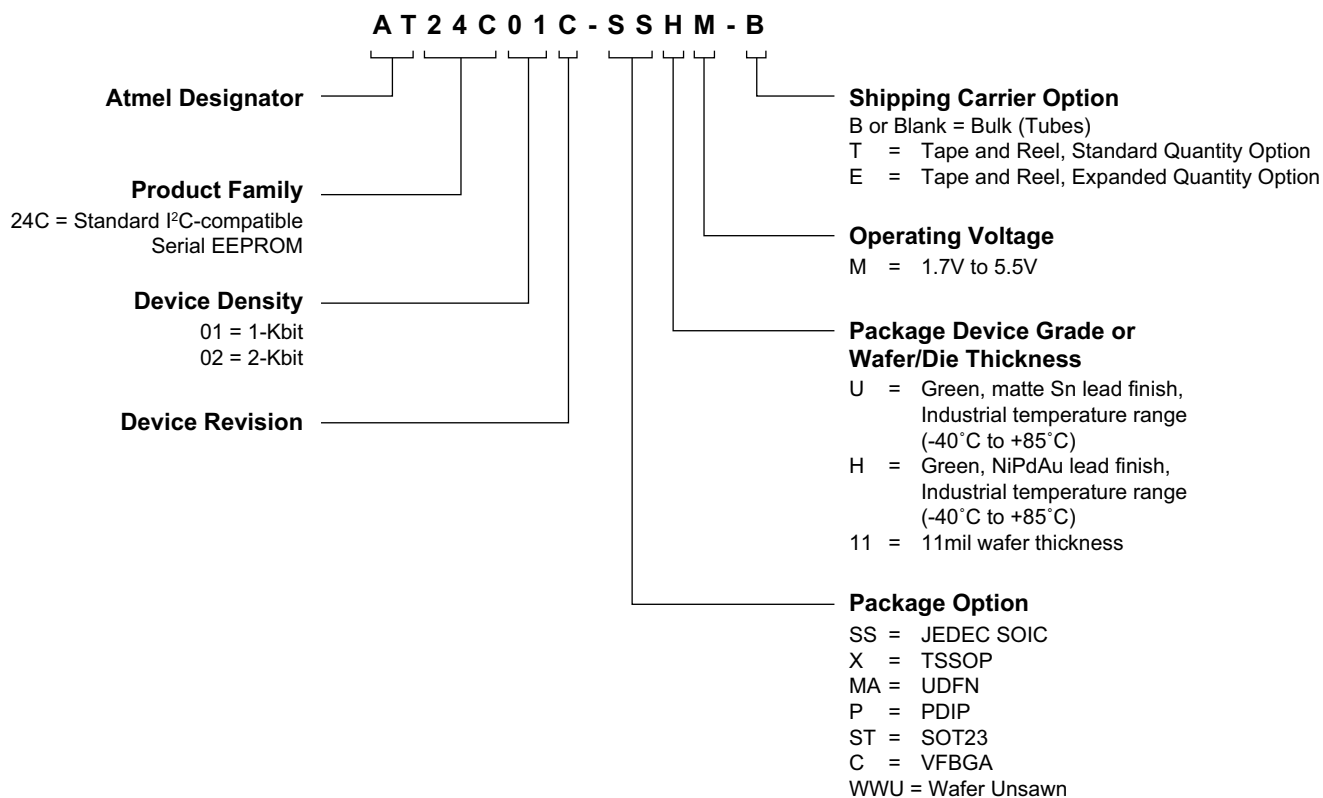


**Sequential Read:** Sequential Reads are initiated by either a Current Address Read or a Random Address Read. After the microcontroller receives a data word, it responds with an acknowledge. As long as the EEPROM receives an acknowledge, it will continue to increment the data word address and serially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

**Figure 9-3. Sequential Read**

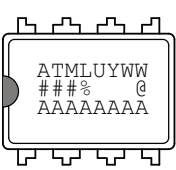
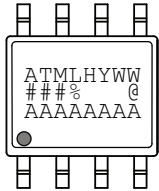
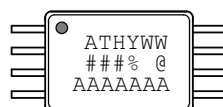
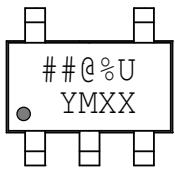
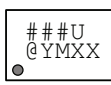


## 10. Ordering Code Detail



## 11. Part Markings

### AT24C01C and AT24C02C: Package Marking Information

| 8-lead PDIP                                                                                            | 8-lead SOIC                                                                       | 8-lead TSSOP                                                                                               |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|                       |  |                         |
| 8-pad UDFN                                                                                             | 5-lead SOT-23                                                                     | 8-ball VFBGA                                                                                               |
| 2.0 x 3.0 mm Body<br> |  | 2.35 x 3.73 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                                                            |              |                                   |                                                        |
|--------------------------------------------------------------------------------------|--------------|-----------------------------------|--------------------------------------------------------|
| AT24C01C                                                                             |              | Truncation Code ###: 01C / ##: 1C |                                                        |
| AT24C02C                                                                             |              | Truncation Code ###: 02C / ##: 2C |                                                        |
| Date Codes                                                                           |              |                                   | Voltages                                               |
| Y = Year                                                                             | M = Month    | WW = Work Week of Assembly        | % = Minimum Voltage                                    |
| 6: 2016      0: 2020                                                                 | A: January   | 02: Week 2                        | M: 1.7V min                                            |
| 7: 2017      1: 2021                                                                 | B: February  | 04: Week 4                        |                                                        |
| 8: 2018      2: 2022                                                                 | ...      ... | ...      ...                      |                                                        |
| 9: 2019      3: 2023                                                                 | L: December  | 52: Week 52                       |                                                        |
| 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                 |

12/7/16

|                                                                                                                                           |                                                                                            |                                       |                      |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------|----------------------|
| <br>Package Mark Contact:<br>DL-CSO-Assy_eng@atmel.com | <b>TITLE</b><br><br><b>24C01-02CSM</b> , AT24C01C and AT24C02C Package Marking Information | <b>DRAWING NO.</b><br><br>24C01-02CSM | <b>REV.</b><br><br>C |
|                                                                                                                                           |                                                                                            |                                       |                      |

## 12. Ordering Information

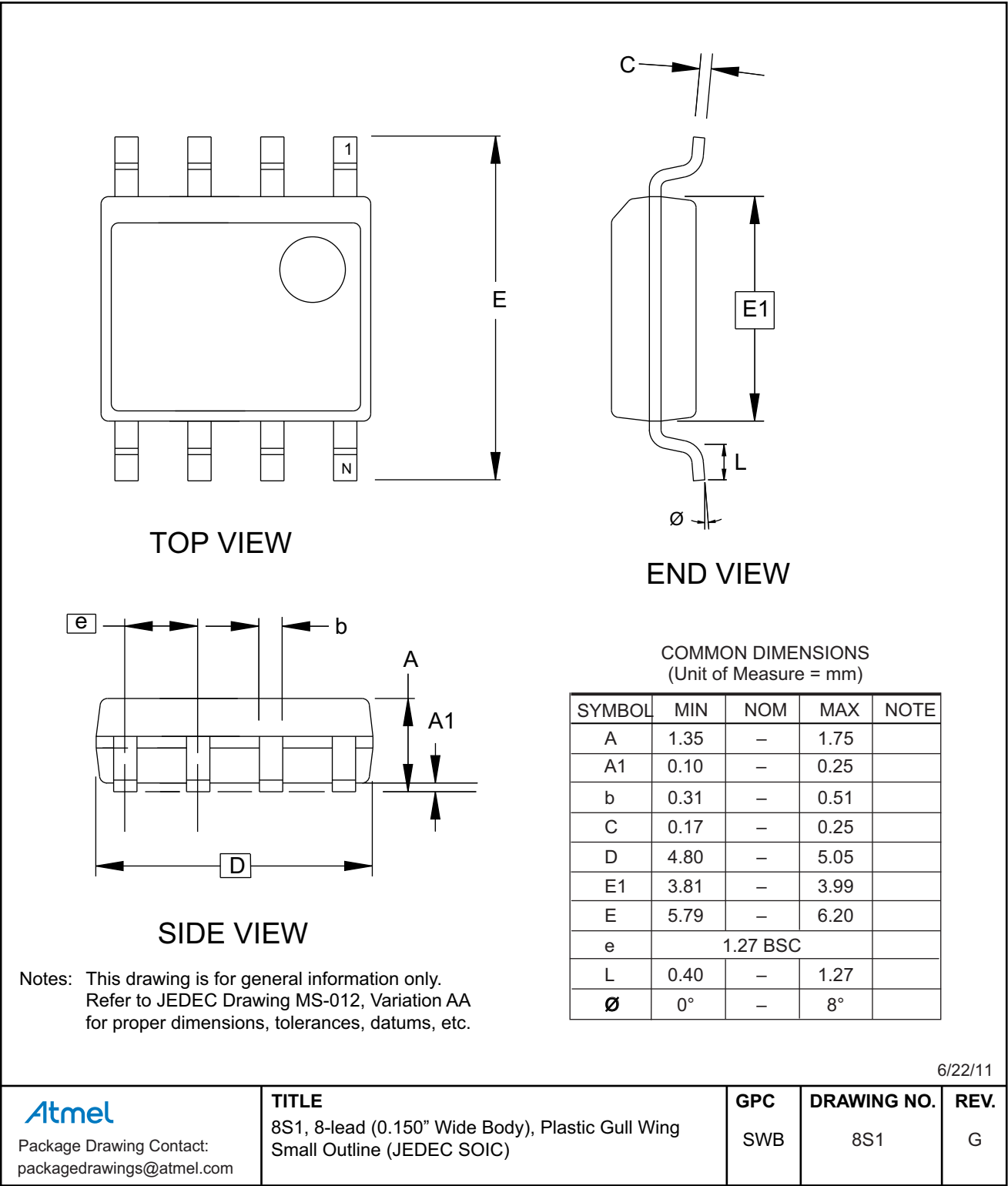
| Atmel Ordering Code            | Lead Finish                             | Package    | Delivery Information |                 | Operation Range                           |
|--------------------------------|-----------------------------------------|------------|----------------------|-----------------|-------------------------------------------|
|                                |                                         |            | Form                 | Quantity        |                                           |
| AT24C01C-SSHM-B                | NiPdAu<br>(Lead-free/Halogen-free)      | 8S1        | Bulk (Tubes)         | 100 per Tube    | Industrial Temperature<br>(-40°C to 85°C) |
| AT24C01C-SSHM-T                |                                         |            | Tape and Reel        | 4,000 per Reel  |                                           |
| AT24C01C-XHM-B                 |                                         | 8X         | Bulk (Tubes)         | 100 per Tube    |                                           |
| AT24C01C-XHM-T                 |                                         |            | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C01C-MAHM-T                |                                         | 8MA2       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C01C-MAHM-E                |                                         |            | Tape and Reel        | 15,000 per Reel |                                           |
| AT24C01C-PUM                   | Matte Tin<br>(Lead-free/Halogen-free)   | 8P3        | Bulk (Tubes)         | 50 per Tube     |                                           |
| AT24C01C-STUM-T                |                                         | 5TS1       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C01C-CUM-T                 | SnAgCu Ball<br>(Lead-free/Halogen-free) | 8U3-1      | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C01C-WWU11M <sup>(1)</sup> | N/A                                     | Wafer Sale | Note 1               |                 |                                           |
|                                |                                         |            |                      |                 |                                           |
| AT24C02C-SSHM-B                | NiPdAu<br>(Lead-free/Halogen-free)      | 8S1        | Bulk (Tubes)         | 100 per Tube    | Industrial Temperature<br>(-40°C to 85°C) |
| AT24C02C-SSHM-T                |                                         |            | Tape and Reel        | 4,000 per Reel  |                                           |
| AT24C02C-XHM-B                 |                                         | 8X         | Bulk (Tubes)         | 100 per Tube    |                                           |
| AT24C02C-XHM-T                 |                                         |            | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C02C-MAHM-T                |                                         | 8MA2       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C02C-MAHM-E                |                                         |            | Tape and Reel        | 15,000 per Reel |                                           |
| AT24C02C-PUM                   | Matte Tin<br>(Lead-free/Halogen-free)   | 8P3        | Bulk (Tubes)         | 50 per Tube     |                                           |
| AT24C02C-STUM-T                |                                         | 5TS1       | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C02C-CUM-T                 | SnAgCu Ball<br>(Lead-free/Halogen-free) | 8U3-1      | Tape and Reel        | 5,000 per Reel  |                                           |
| AT24C02C-WWU11M <sup>(1)</sup> | N/A                                     | Wafer Sale | Note 1               |                 |                                           |

Note: 1. For Wafer sales, please contact Atmel Sales.

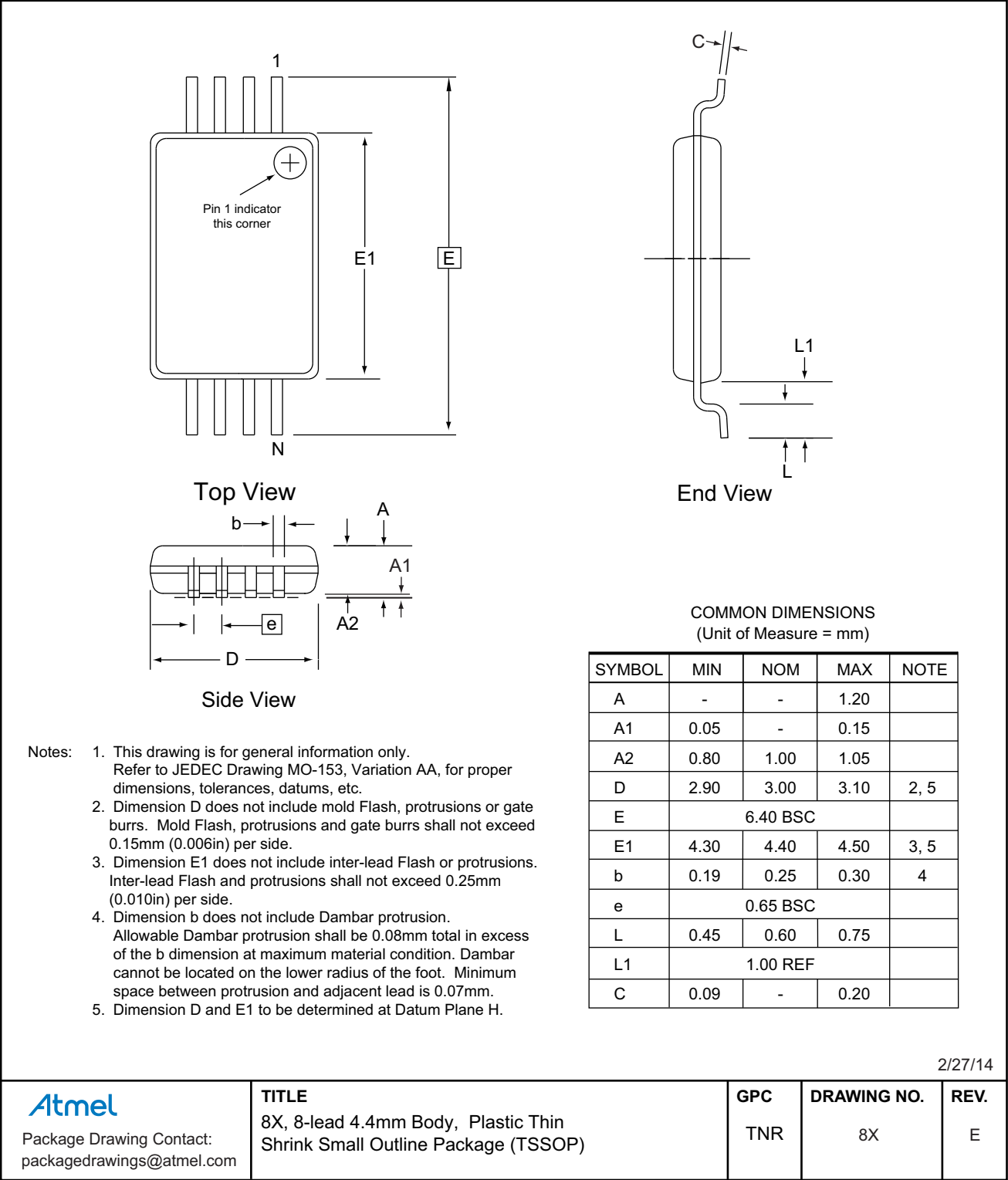
| Package Type |                                                                                 |
|--------------|---------------------------------------------------------------------------------|
| 8P3          | 8-lead, 0.300" wide, Plastic Dual Inline (PDIP)                                 |
| 8S1          | 8-lead, 0.150" wide, Plastic Gull Wing Small Outline (JEDEC SOIC)               |
| 8X           | 8-lead, 4.4mm body, Plastic Thin Shrink Small Outline (TSSOP)                   |
| 8MA2         | 8-lead, 2.00mm x 3.00mm body, 0.50mm Pitch, Ultra Thin Dual Flat No Lead (UDFN) |
| 5TS1         | 5-lead, 2.90mm x 1.60mm body, Plastic Thin Shrink Small Outline (SOT23)         |
| 8U3-1        | 8-ball, die Ball Grid Array (VFBGA)                                             |

13. Packaging Information

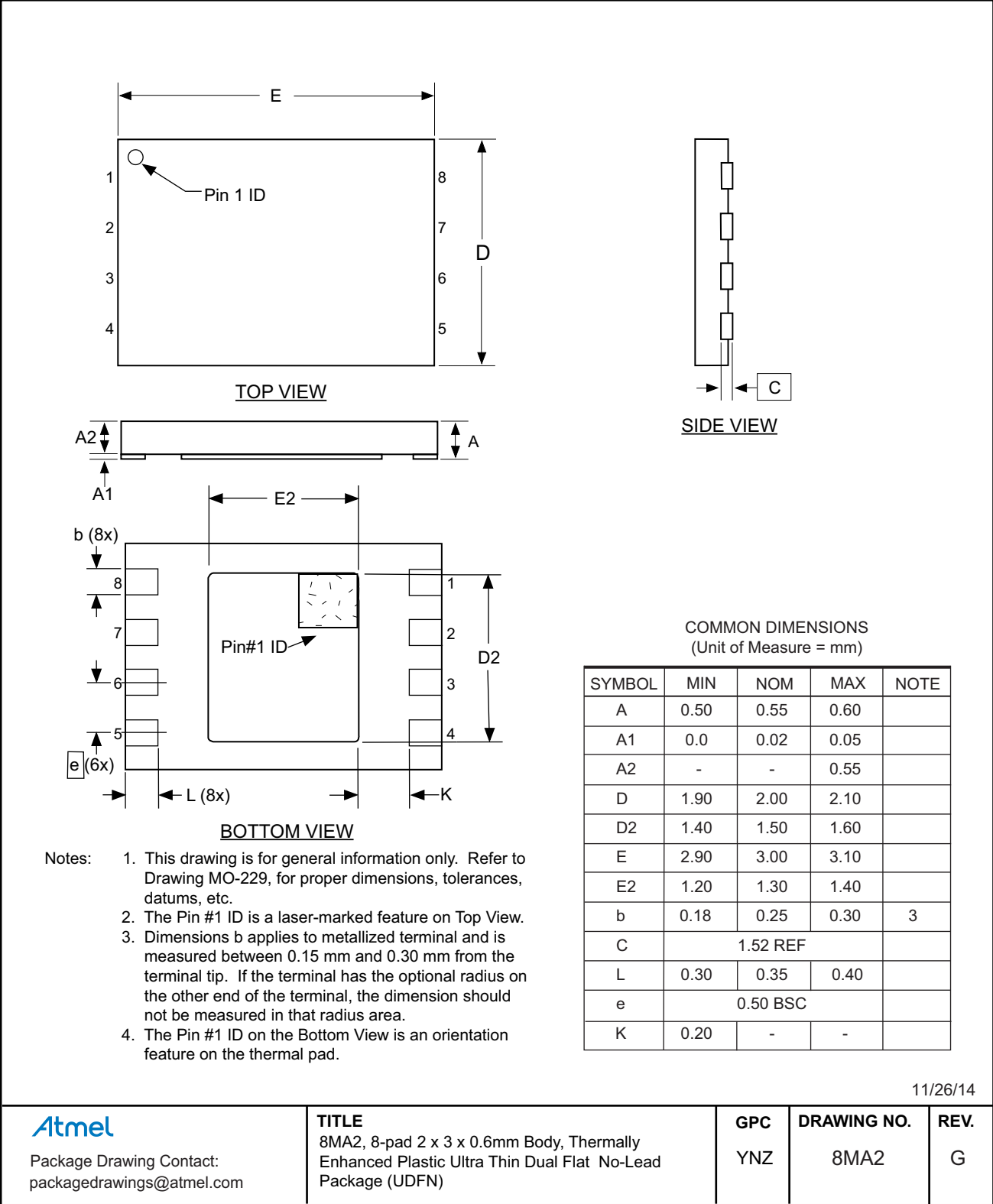
13.1 8S1 — 8-lead JEDEC SOIC



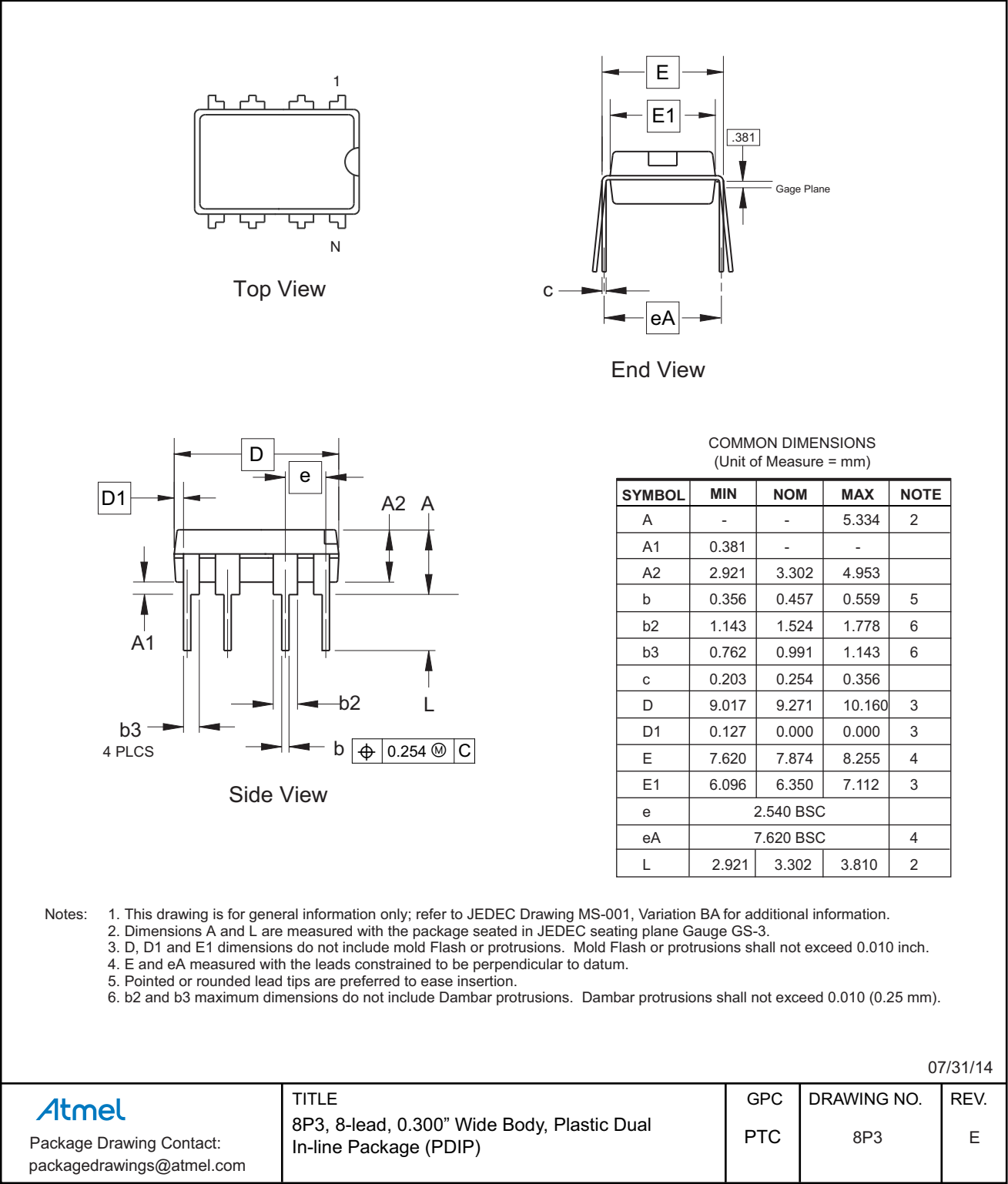
13.2 8X — 8-lead TSSOP



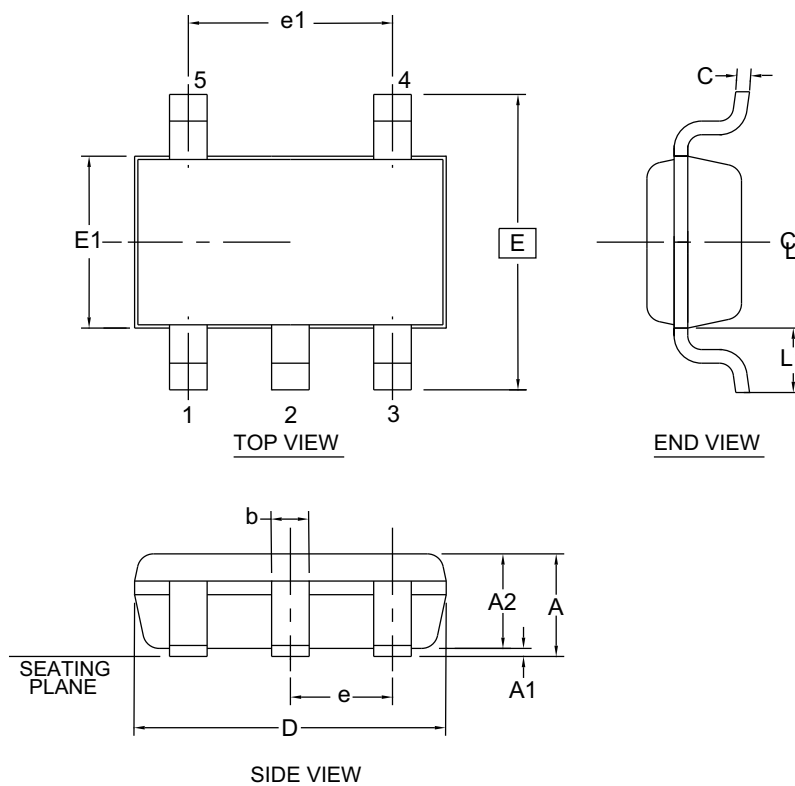
13.3 8MA2 — 8-pad UDFN



13.4 8P3 — 8-lead PDIP



## 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

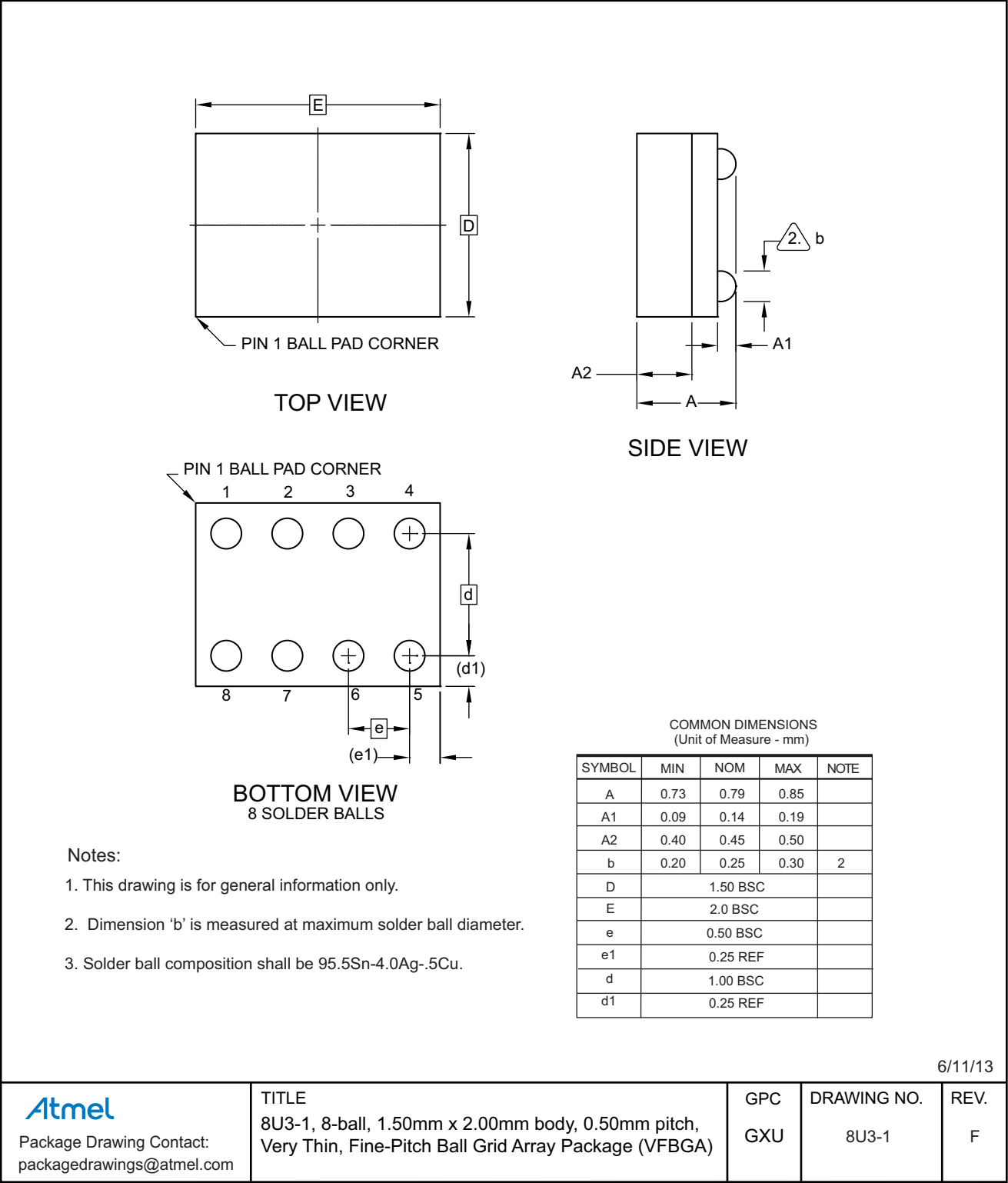
DRAWING NO.

5TS1

REV.

D

13.6 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 |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|----------------------|-----------|

## 14. Revision History

| Doc. Rev. | Date    | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8700H     | 12/2016 | Part marking SOT23:<br>- Moved backside mark (YMXX) to front side line2.<br>- Added @ = Country of Assembly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 8700G     | 01/2015 | Add the UDFN extended quantity option.<br>Update part markings, package drawings, ordering information, template, and reorganize.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 8700F     | 06/2012 | Correct ordering codes:<br>- AT24C01C-WWU11, Die Sale to AT24C01C-WWU11M, Wafer Sale.<br>- AT24C02C-WWU11, Die Sale to AT24C02C-WWU11M, Wafer Sale.<br>Remove WDT from ordering code detail.<br>Update Atmel logos and disclaimer page.                                                                                                                                                                                                                                                                                                                                                                                                        |
| 8700E     | 05/2012 | Update datasheet template.<br>Add AT24C01C to document.<br>Electrical performance improvements:<br>- Reduce all ISB from legacy values<br>- Increase 1MHz frequency range to include 2.5V operation.<br>Update package drawings to latest versions (where applicable) and selected waveforms.                                                                                                                                                                                                                                                                                                                                                  |
| 8700D     | 08/2010 | Change AT24C02C-XHM Part Marking from C02CM@ to 02CM @.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 8700C     | 07/2010 | Ordering Information:<br>- Change Atmel AT24C02C-TSUM-T to Atmel AT24C02C-STUM-T.<br>- Change Atmel AT24C02CY6-MAHM-T to Atmel AT24C02C-MAHM-T.<br>- Change Atmel AT24C02CU3-CUM-T to Atmel AT24C02C-CUM-T.<br>Catalog numbering scheme, change TS = SOT23 to ST = SOT23.<br>Part marking SOT23:<br>- Change 2CMWU to 2CMBU.<br>- Change W = Write Protection Feature to B = Write Protection.<br>Part marking PDIP and SOIC: Added @ = Country of Assembly.<br>Part marking TSSOP: Replaced and removed bottom mark.<br>Part marking UDFN: Added HM@.<br>Remove preliminary status.<br>Change $t_l$ Max 40 to 50 in Table AC Characteristics. |
| 8700B     | 02/2010 | Correct catalog numbering scheme and ordering information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8700A     | 12/2009 | Initial document release.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

