AT25M01

SPI Serial EEPROM
1-Mbit (131,072 x 8)

DATASHEET

Features

- Serial Peripheral Interface (SPI) Compatible
- Supports SPI Modes 0 (0,0) and 3 (1,1)
- Datasheet Describes Mode 0 Operation
- Low-voltage Operation
  - V_{CC} = 1.7V to 5.5V
- High Frequency Operation
  - 20MHz Clock Rate Capable from 4.5V to 5.5V V_{CC}
  - 10MHz Clock Rate Capable from 2.5V to 5.5V V_{CC}
  - 5MHz Clock Rate Capable from 1.7V to 5.5V V_{CC}
- 256-byte Page Mode and Byte Write Operation Supported
- Block Write Protection
  - Protect ¼, ½, or Entire Array
- Write Protect ($\overline{WP}$) Pin and Write Disable Instructions for Both Hardware and Software Data Protection
- Self-timed Write Cycle (5ms max)
- High-reliability
  - Endurance: 1,000,000 Write Cycles
  - Data Retention: 100 Years
- Green Package Options (Pb/Halide-free/RoHS Compliant)
  - 8-lead JEDEC SOIC, 8-lead EIAJ SOIC, and 8-ball WLCSP
- Die Sales Options: Wafer Form, Waffle Pack, and Bumped Die

Description

The Atmel® AT25M01 provides 1,048,576 bits of Serial Electrically Erasable Programmable Read-Only Memory (EEPROM) organized as 131,072 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operation are essential.

The AT25M01 is enabled through the Chip Select pin ($\overline{CS}$) and accessed via a 3-wire interface consisting of Serial Data Input (SI), Serial Data Output (SO), and Serial Clock (SCK). All programming cycles are completely self-timed, and no separate Erase cycle is required before Write.

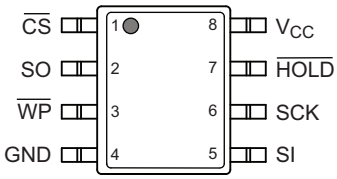
Block Write protection is enabled by programming the status register with top ¼, top ½ or entire array of write protection. Separate Program Enable and Program Disable instructions are provided for additional data protection. Hardware data protection is provided via the $\overline{WP}$ pin to protect against inadvertent write attempts to the status register. The $\overline{HOLD}$ pin may be used to suspend any serial communication without resetting the serial sequence.

1. Pin Configurations

Figure 1. Pin Configurations

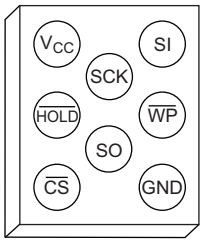
Pin Name	Function
$\overline{CS}$	Chip Select
SO	Serial Data Output
$\overline{WP}$	Write Protect
GND	Ground
SI	Serial Data Input
SCK	Serial Data Clock
$\overline{HOLD}$	Suspends Serial Input
V_{CC}	Device Power Supply

8-lead SOIC



Top View

8-ball WLCSP



Bottom View

* Note: Drawings are not to scale.

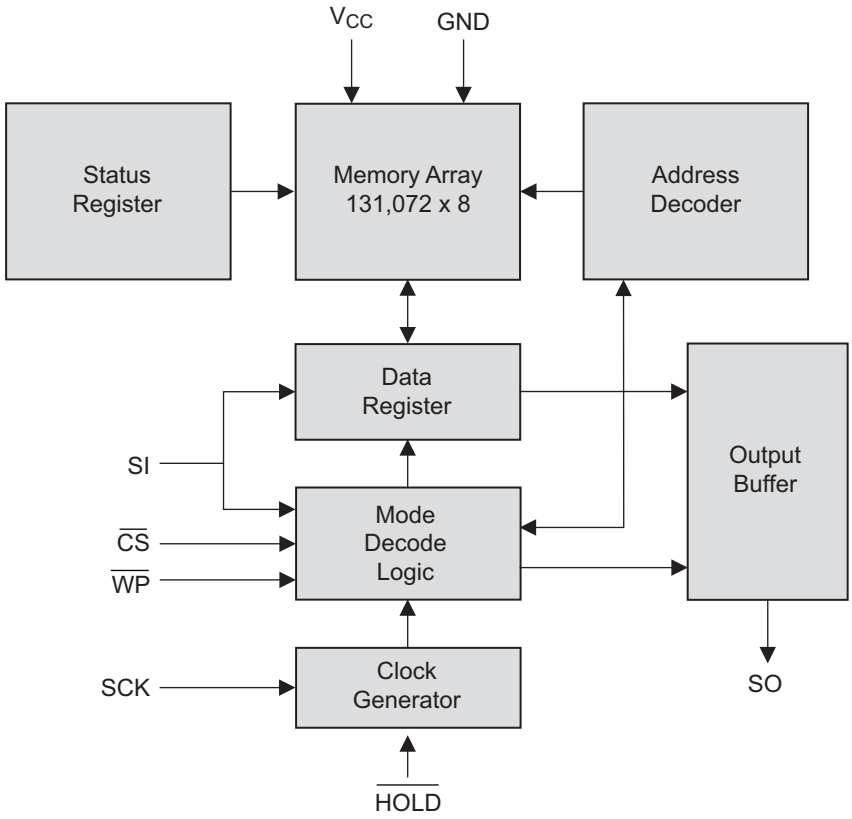
2. Absolute Maximum Ratings*

Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Voltage on Any Pin 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. Electrical Specifications

4.1 Pin Capacitance

Table 4-1. Pin Capacitance[1]

Applicable over recommended operating range from T_A = 25°C, f = 1.0MHz, V_{CC} = 5.0V (unless otherwise noted).

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

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°C to +85°C, V_{CC} = 1.7V to 5.5V, (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} = 5.0V at 20MHz, SO = Open, Read			7.0	10.0	mA
I_{CC2}	Supply Current	V_{CC} = 5.0V at 10MHz, SO = Open, Read, Write			5.0	7.0	mA
I_{CC3}	Supply Current	V_{CC} = 5.0V at 1MHz, SO = Open, Read, Write			2.2	3.5	mA
I_{SB1}	Standby Current	V_{CC} = 1.7V, $\overline{CS}$ = V_{CC}			0.2	3.0	µA
I_{SB2}	Standby Current	V_{CC} = 2.5V, $\overline{CS}$ = V_{CC}			0.4	3.0	µA
I_{SB3}	Standby Current	V_{CC} = 5.0V, $\overline{CS}$ = V_{CC}			2.0	5.0	µA
I_{IL}	Input Leakage	V_{IN} = 0V to V_{CC}		-3.0		3.0	µA
I_{OL}	Output Leakage	V_{IN} = 0V to V_{CC}, T_{AC} = 0°C to 70°C		-3.0		3.0	µA
V_{IL}[1]	Input Low-voltage			-1.0		V_{CC} x 0.3	V
V_{IH}[1]	Input High-voltage			V_{CC} x 0.7		V_{CC} + 0.5	V
V_{OL1}	Output Low-voltage	3.6 ≤ V_{CC} ≤ 5.5V	I_{OL} = 3.0mA			0.4	V
V_{OH1}	Output High-voltage		I_{OH} = –1.6mA	V_{CC} – 0.8			V
V_{OL2}	Output Low-voltage	1.7V ≤ V_{CC} ≤ 3.6V	I_{OL} = 0.15mA			0.2	V
V_{OH2}	Output High-voltage		I_{OH} = –100µA	V_{CC} – 0.2			V

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

4.3 AC Characteristics

Table 4-3. AC Characteristics

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

Symbol	Parameter	Voltage	Min	Max	Units
f_{SCK}	SCK Clock Frequency	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	0 0 0	20 10 5	MHz
t_{RI}	Input Rise Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V		15 40 80	ns
t_{FI}	Input Fall Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V		15 40 80	ns
t_{WH}	SCK High Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	20 40 80		ns
t_{WL}	SCK Low Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	20 40 80		ns
t_{CS}	$\overline{CS}$ High Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	100 100 200		ns
t_{CSS}	$\overline{CS}$ Setup Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	100 100 200		ns
t_{CSH}	$\overline{CS}$ Hold Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	100 100 200		ns
t_{SU}	Data In Setup Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	5 10 20		ns
t_H	Data In Hold Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	5 10 20		ns
t_{HD}	$\overline{Hold}$ Setup Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	5 10 20		ns
t_{CD}	$\overline{Hold}$ Hold Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	5 10 20		ns
t_V	Output Valid	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	0 0 0	20 40 80	ns
t_{HO}	Output Hold Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	0 0 0		ns

Table 4-3. AC Characteristics (Continued)

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

Symbol	Parameter	Voltage	Min	Max	Units
t_{LZ}	$\overline{Hold}$ to Output Low Z	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V	0 0 0	25 50 100	ns
t_{HZ}	$\overline{Hold}$ to Output High Z	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V		25 50 100	ns
t_{DIS}	Output Disable Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V		25 50 100	ns
t_{WC}	Write Cycle Time	4.5V – 5.5V 2.5V – 5.5V 1.7V – 5.5V		5 5 5	ms
Endurance(1)	25°C, Page Mode, 5.0V		1,000,000		Write Cycles

Notes: 1. This parameter is characterized and is not 100% tested. Contact Atmel for further information.

5. Serial Interface Description

Master: The device that generates the serial clock.

Slave: Because the Serial Clock pin (SCK) is always an input, the AT25M01 always operates as a slave.

Transmitter/Receiver: The AT25M01 has separate pins designated for data transmission (SO) and reception (SI).

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

Serial Opcode: After the device is selected with $\overline{CS}$ going low, the first byte will be received. This byte contains the opcode that defines the operations to be performed.

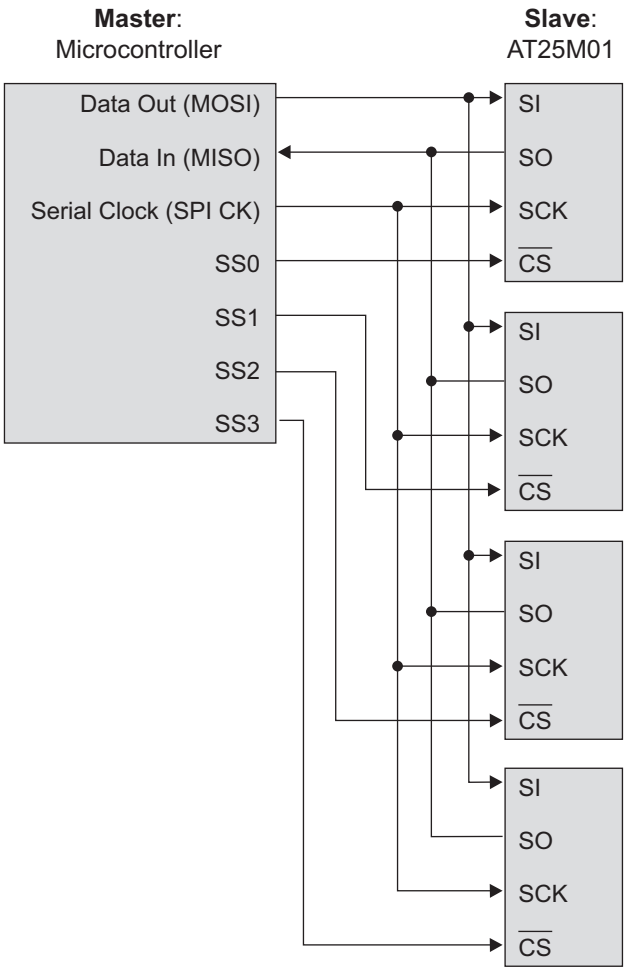
Invalid Opcode: If an invalid opcode is received, no data will be shifted into the AT25M01, and the Serial Output pin (SO) will remain in a high-impedance state until the falling edge of $\overline{CS}$ is detected again. This will reinitialize the serial communication.

Chip Select: The AT25M01 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.

Hold: The $\overline{HOLD}$ pin is used in conjunction with the $\overline{CS}$ pin to select the AT25M01. 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 $\overline{HOLD}$). Inputs to the SI pin will be ignored while the SO pin is in the high impedance state.

Write Protect: The Write Protect pin ($\overline{WP}$) will allow normal read/write operations when held high. When the $\overline{WP}$ pin is brought low, and WPEN bit is one, all write operations to the status register are inhibited. $\overline{WP}$ going low while $\overline{CS}$ is still low 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 AT25M01 in a system with the $\overline{WP}$ pin tied to ground and still 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 AT25M01 is designed to interface directly with the synchronous Serial Peripheral Interface (SPI) of the 6800 type series of microcontrollers. The AT25M01 utilizes an 8-bit instruction register. The list of instructions and their operation codes are contained in Table 6-1. All instructions, addresses, and data are transferred with the MSB first and start with a high-to-low $\overline{CS}$ transition.

Table 6-1. Instruction Set for Atmel AT25M01

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 Write Disable instruction disables all programming modes. The WRDI instruction is independent of the status of the $\overline{WP}$ pin.

Read Status Register (RDSR): The Read Status Register instruction provides access to the status register. The 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	$\overline{RDY}$

Table 6-3. Read Status Register Bit Detection

Bit	Definition
Bit 0 ($\overline{RDY}$)	Bit 0 = 0 ($\overline{RDY}$) indicates the device is ready. Bit 0 = 1 indicates the write cycle is in progress.
Bit 1 (WEN)	Bit 1 = 0 indicates the device *is not* write enabled. Bit 1 = 1 indicates the device is write enabled.
Bit 2 (BP0)	See Table 6-4 on page 9.
Bit 3 (BP1)	See Table 6-4 on page 9.
Bits 4 – 6 are zeros when device is not in an internal write cycle.	
Bit 7 (WPEN)	See Table 6-5 on page 9.
Bits 0 – 7 are ones during an internal write cycle.	

Write Status Register (WRSR): The WRSR instruction allows the user to select one of four levels of protection. The AT25M01 is divided into four array segments. Top quarter (¼), top half (½), or all of the memory segments can be protected. Any of the data within any selected segment will therefore be read-only. The block write protection levels and corresponding status register control bits are shown in Table 6-4.

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	AT25M01
0	0	0	None
1(¼)	0	1	18000h – 1FFFFh
2(½)	1	0	10000h – 1FFFFh
3(All)	1	1	00000h – 1FFFFh

The WRSR instruction also 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 which are not block protected (see Table 6-5).

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	WP	WEN	Protected Blocks	Unprotected Blocks	Status Register
0	x	0	Protected	Protected	Protected
0	x	1	Protected	Writable	Writable
1	Low	0	Protected	Protected	Protected
1	Low	1	Protected	Writable	Protected
X	High	0	Protected	Protected	Protected
X	High	1	Protected	Writable	Writable

Read Sequence (READ): Reading the AT25M01 via the 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 a 3-byte address to be read (see Table 6-6 on page 10). Upon completion, any data on the SI line will be ignored. The data (D7 – D0) at the specified address is then shifted out onto the SO line. If only one byte is to be read, the $\overline{CS}$ line should be driven high after the data comes out. The read sequence can be continued since the byte address is automatically incremented and data will continue to be shifted out. When the highest address is reached, the address counter will roll over to the lowest address allowing the entire memory to be read in one continuous read cycle.

Write Sequence (Write): In order to program the AT25M01, two separate instructions must be executed. First, the device *must be write enabled* via the Write Enable (WREN) Instruction. Then, a Write instruction may be executed. Also, the address of the memory location(s) to be programmed must be outside the protected address field location selected by the block write protection level. During an internal write cycle, all commands will be ignored except the RDSR instruction.

A Write Instruction requires the following sequence. After the $\overline{CS}$ line is pulled low to select the device, the Write opcode is transmitted via the SI line followed by the byte address and the data (D7 – 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 Read Status Register (RDSR) Instruction. If Bit 0 = 1, the Write cycle is still in progress. If Bit 0 = 0, the Write cycle has ended. Only the Read Status Register instruction is enabled during the Write programming cycle.

The AT25M01 is capable of a 256-byte Page Write operation. After each byte of data is received, the eight low order address bits are internally incremented by one; the high order bits of the address will remain constant. If more than 256 bytes of data are transmitted, the address counter will roll-over and the previously written data will be overwritten. The AT25M01 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 re-initiate the serial communication.

Table 6-6. Address Key

Address	AT25M01
A(n)	A23 – A0

Note: The A23 through A17 address bits of the most significant address byte are don’t care values as these bits fall outside the addressable 1Mbit range.

7. Timing Diagrams (for SPI Mode 0 (0, 0))

Figure 7-1. Synchronous Data Timing

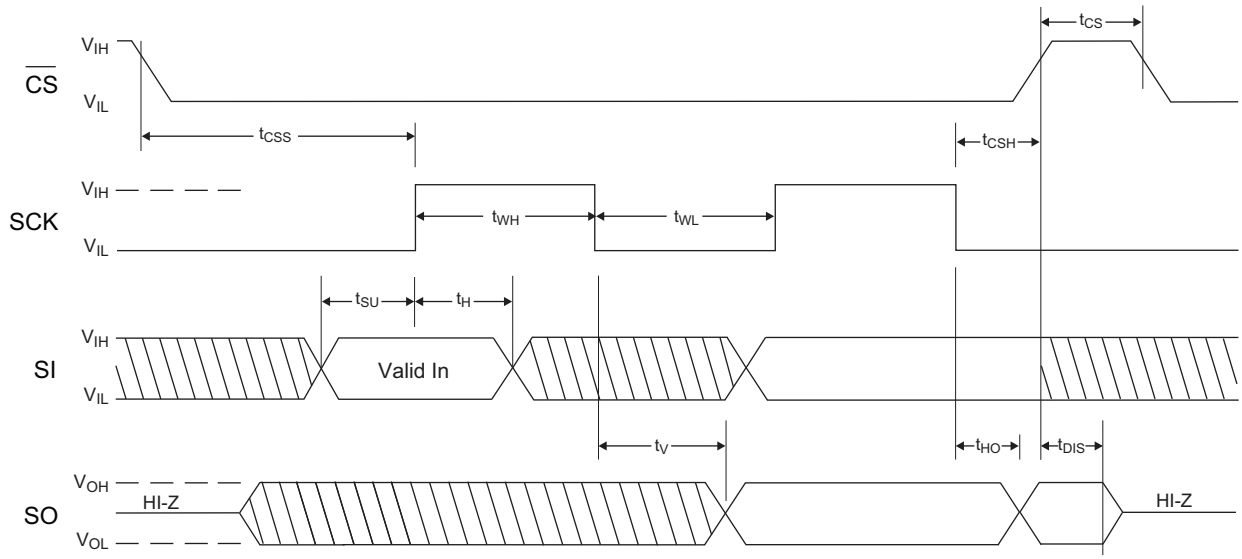


Figure 7-2. WREN Timing

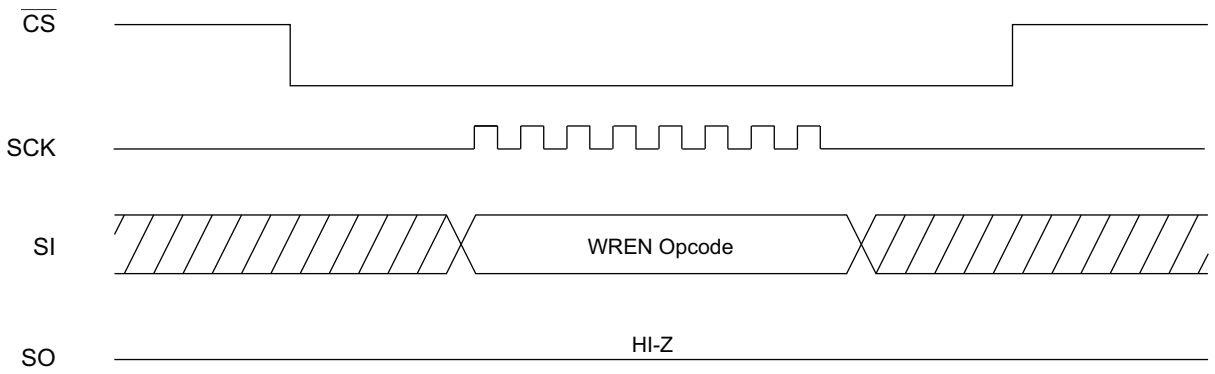


Figure 7-3. WRDI Timing

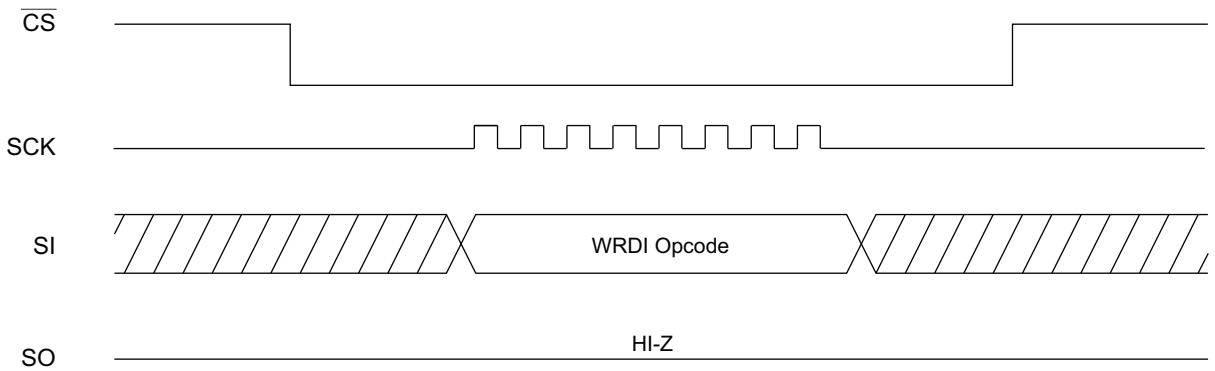


Figure 7-4. RDSR Timing

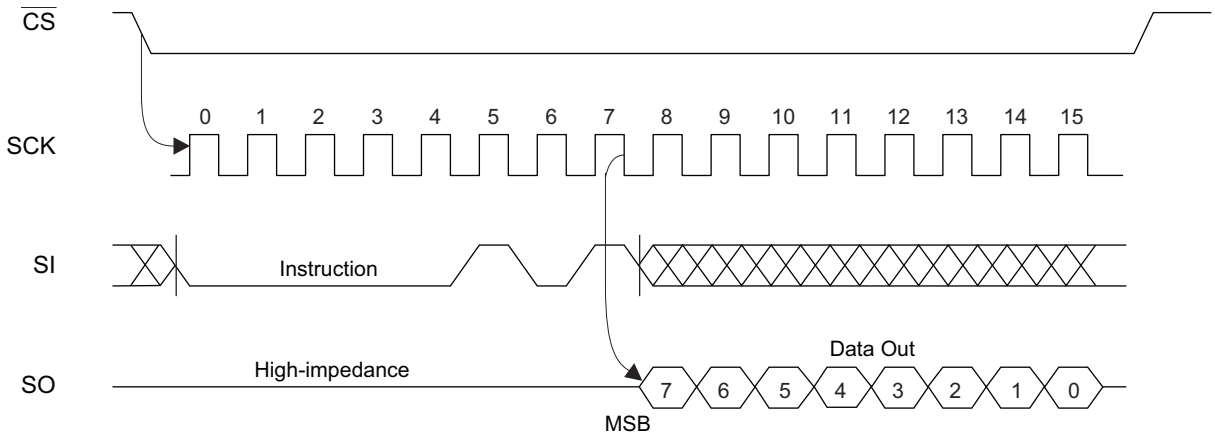


Figure 7-5. WRSR Timing

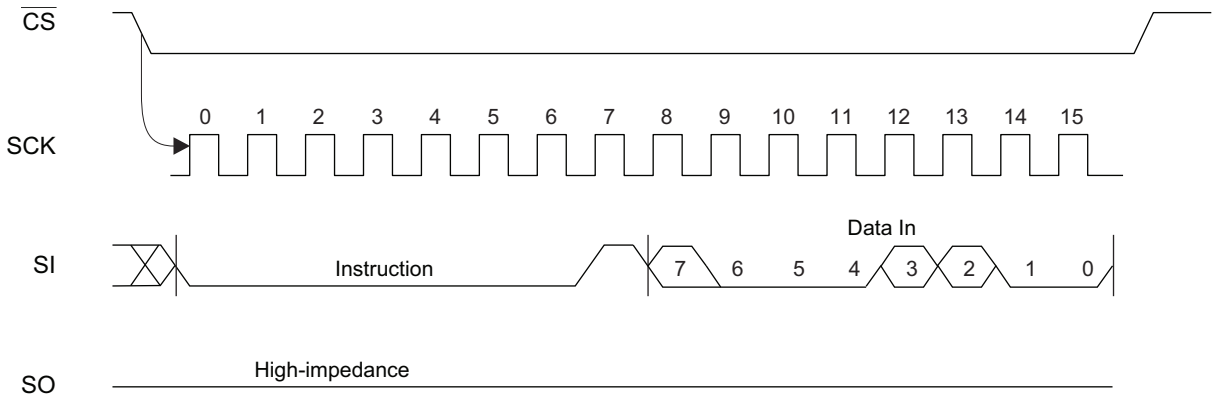


Figure 7-6. READ Timing

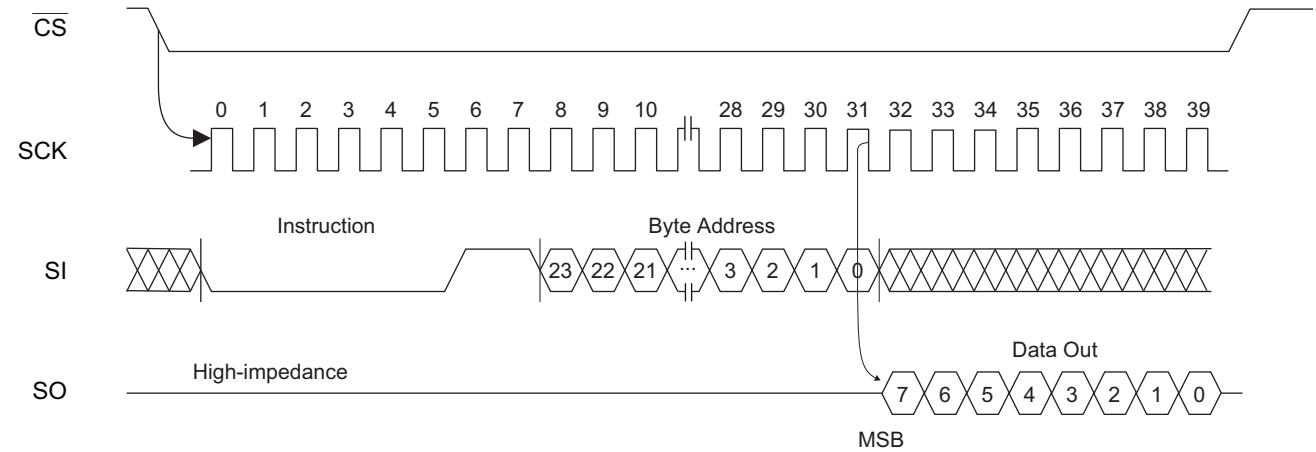


Figure 7-7. Write Timing

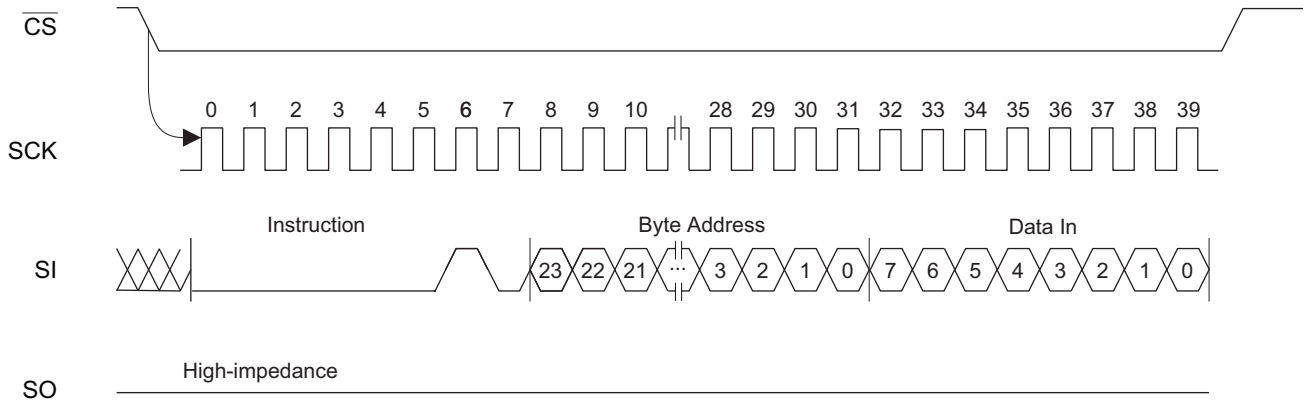
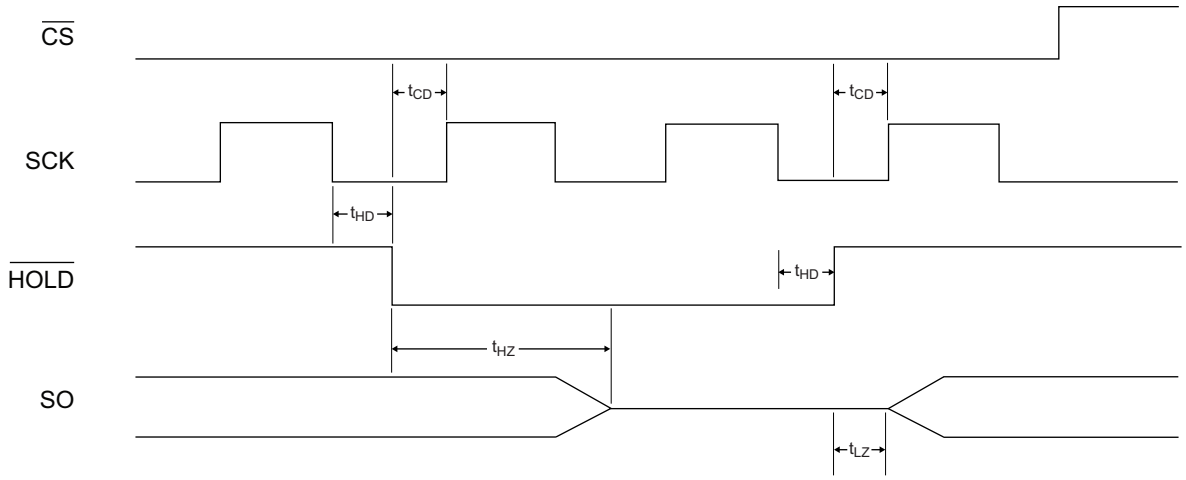
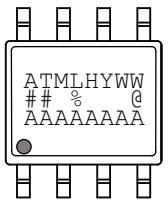
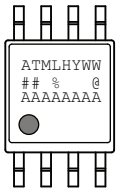
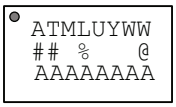


Figure 7-8. Hold Timing



8. Part Marking

AT25M01: Package Marking Information

8-lead SOIC	8-lead EIAJ	8-ball WLCSP
		

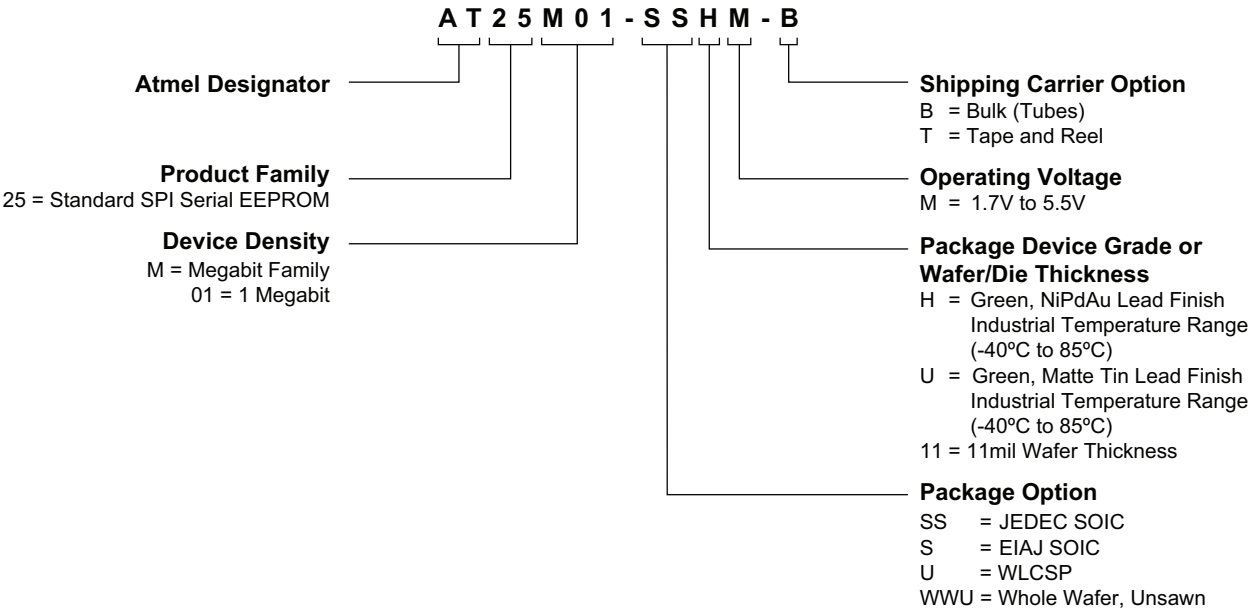
Note 1: ● designates pin 1
Note 2: Package drawings are not to scale

Catalog Number Truncation		
AT25M01	Truncation Code ##: 5G	
Date Codes		**Voltages**
Y = Year 5: 2015 9: 2019 6: 2016 0: 2020 7: 2017 1: 2021 8: 2018 2: 2022	WW = Work Week of Assembly 02: Week 2 04: Week 4 ... 52: Week 52	% = Minimum Voltage L: 1.8V min D: 2.5V min
Country of Assembly	**Lot Number**	**Grade/Lead Finish Material**
@ = Country of Assembly	AAA...A = Atmel Wafer Lot Number	U: Industrial/LeadFree Ball H: Industrial/NiPdAu
		Atmel Truncation
		ATML: Atmel

7/9/15

Atmel Package Mark Contact: DL-CSO-Assy_eng@atmel.com	**TITLE** **25M01SM**, AT25M01 Standard Package Marking Information	**DRAWING NO.** 25M01SM	**REV.** B

9. Ordering Code Detail



10. Ordering Information

Additional package types that are not listed below may be available for order. Please contact Atmel for availability details.

Atmel Ordering Code	Lead Finish	Package	Delivery Information		Operation Range
			Form	Quantity	
AT25M01-SSHM-B	NiPdAu (Lead-free/Halogen-free)	8S1	Bulk (Tubes)	100 per Tube	Industrial Temperature (-40°C to 85°C)
AT25M01-SSHM-T			Tape and Reel	4,000 per Reel	
AT25M01-SHM-B		8S2	Bulk (Tubes)	95 per Tube	
AT25M01-SHM-T			Tape and Reel	2,000 per Reel	
AT25M01-UUM-T(1)	SnAgCu (Lead-free/Halogen-free)	8U-7	Tape and Reel	5,000 per Reel	
AT25M01-WWU11M(2)	N/A	Wafer Sale	Note 2		

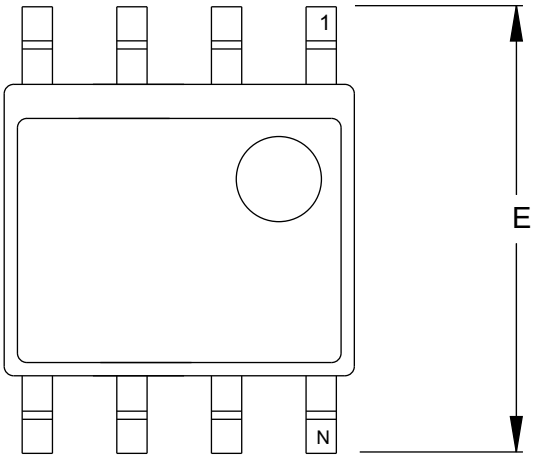
Notes: 1. WLCSP Package:
- This device includes a backside coating to increase product robustness.
- CAUTION: Exposure to ultraviolet (UV) light can degrade the data stored in the EEPROM cells. Therefore, customers who use a WLCSP product must ensure that exposure to ultraviolet light does ***not*** occur.

2. For wafer sales, please contact Atmel Sales.

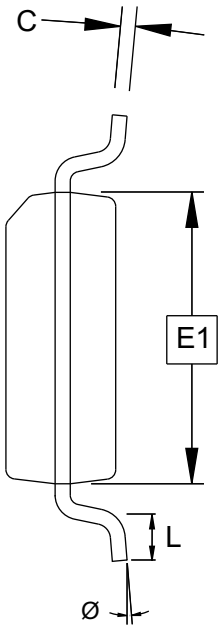
Package Type	
8S1	8-lead, 0.150" wide, Plastic Gull Wing Small Outline (JEDEC SOIC)
8S2	8-lead, 0.208" wide, Plastic Small Package Outline (EIAJ SOIC)
8U-7	8-ball, Wafer Level Chip Scale Package (WLCSP)

11. Packaging Information

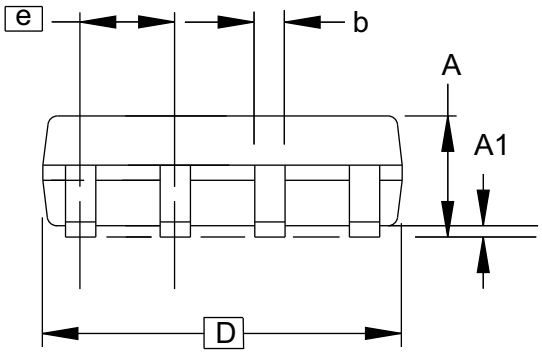
11.1 8S1 — 8-lead JEDEC SOIC



TOP VIEW



END VIEW



SIDE VIEW

Notes: This drawing is for general information only.
Refer to JEDEC Drawing MS-012, Variation AA
for proper dimensions, tolerances, datums, etc.

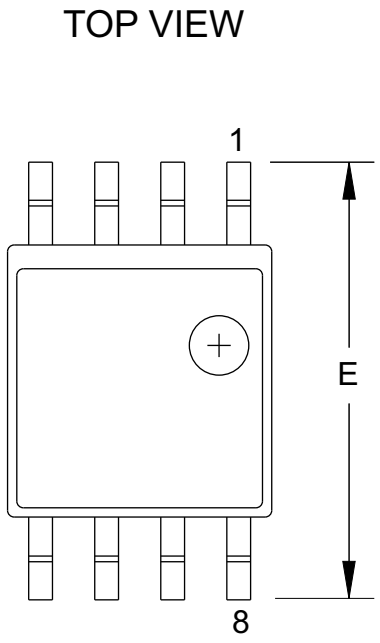
COMMON DIMENSIONS
(Unit of Measure = mm)

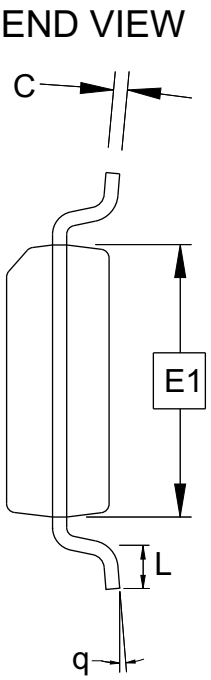
SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.75	
A1	0.10	–	0.25	
b	0.31	–	0.51	
C	0.17	–	0.25	
D		4.90 BSC		
E		6.00 BSC		
E1		3.90 BSC		
e		1.27 BSC		
L	0.40	–	1.27	
Ø	0°	–	8°	

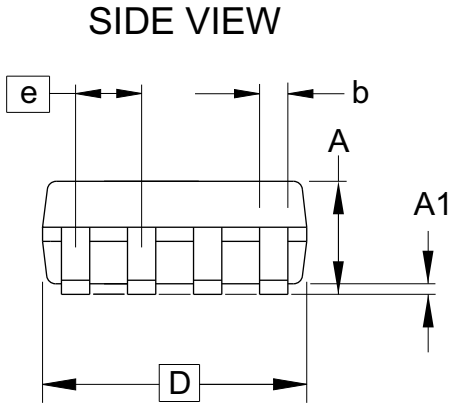
3/6/2015

Atmel Package Drawing Contact: packagedrawings@atmel.com	**TITLE** 8S1, 8-lead (0.150” Wide Body), Plastic Gull Wing Small Outline (JEDEC SOIC)	**GPC** SWB	**DRAWING NO.** 8S1	**REV.** H

11.2 8S2 — 8-lead EIAJ SOIC







Notes:
1. This drawing is for general information only; refer to EIAJ Drawing EDR-7320 for additional information.
2. Mismatch of the upper and lower dies and resin burrs aren't included.
3. Determines the true geometric position.
4. Values b,C apply to plated terminal. The standard thickness of the plating layer shall measure between 0.007 to .021 mm.

COMMON DIMENSIONS
(Unit of Measure = mm)

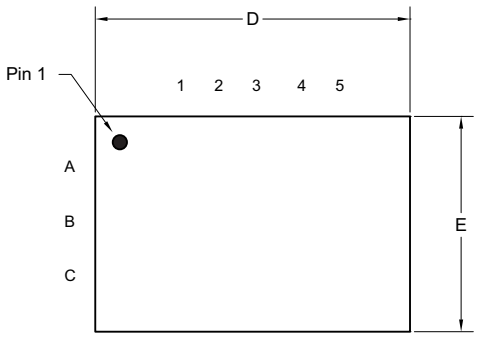
SYMBOL	MIN	NOM	MAX	NOTE
A	1.70		2.16	
A1	0.05		0.25	
b	0.35		0.48	4
C	0.15		0.35	4
D	5.13		5.35	
E1	5.18		5.40	2
E	7.70		8.26	
L	0.51		0.85	
q	0°		8°	
e	1.27 BSC			3

11/10/14

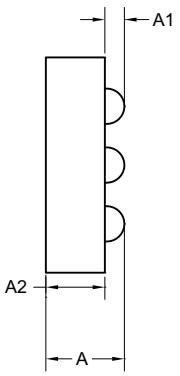
Atmel Package Drawing Contact: packagedrawings@atmel.com	TITLE **8S2**, 8-lead, 0.208” Body, Plastic Small Outline Package (EIAJ)	GPC STN	DRAWING NO. 8S2	REV. G

11.3 8U-7 — 8-ball WLCSP

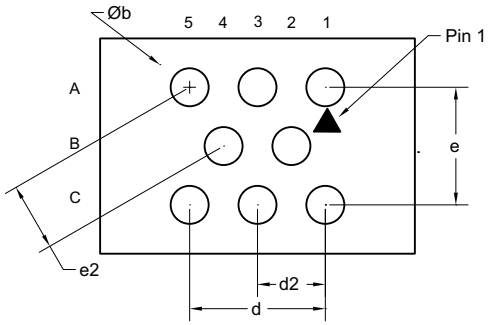
TOP VIEW



SIDE VIEW



BALL SIDE



Note: Dimensions are not to scale

PIN ASSIGNMENT MATRIX

	1	2	3	4	5
A	V_{CC}	n/a	$\overline{HOLD}$	n/a	$\overline{CS}$
B	n/a	SCK	n/a	SO	n/a
C	SI	n/a	$\overline{WP}$	n/a	GND

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	TYP	MAX	NOTE
A	0.460	0.499	0.538	
A1	0.164	-	0.224	
A2	0.280	0.305	0.330	
E	Contact Atmel for details			
e		0.867		
e2		0.500		
d		1.000		
d2		0.500		
D	Contact Atmel for details			
b	0.239	0.269	0.299	

07/19/2015

Atmel Package Drawing Contact: packagedrawings@atmel.com	**TITLE** 8U-7, 8-ball (5x3 Array) Wafer Level Chip-Scale Package (WLCSP)	**GPC** GXG	**DRAWING NO.** 8U-7	**REV.** D

12. Revision History

Doc. Rev.	Date	Comments
8823D	07/2015	Update the t_{RI} and t_{FI} maximum values, part markings page, and the 8S1 and 8U-7 package drawings.
8823C	01/2015	Correct the Write Timing figure. Update the 8S2 and 8U-7 package drawings, the ordering information section, and the disclaimer page.
8823B	03/2013	Add part marking. Update datasheet status from advance to complete. Update footers and Atmel fax number.
8823A	12/2012	Initial document release.

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