



### **SPI Automotive Temperature Serial EEPROMs**

128k (16,384 x 8) and 256k (32,768 x 8)

#### **DATASHEET**

#### **Features**

- Serial Peripheral Interface (SPI) Compatible
- Supports SPI Modes 0 (0,0) and 3 (1,1)
  - Mode 0 Operation
- Low-voltage, Medium-voltage and High-voltage Operation
  - Grade 1,  $V_{CC}$  = 2.5V to 5.5V
  - Grade 2<sup>(1)</sup> and 3,  $V_{CC} = 1.7V$  to 5.5V
- Extended Temperature Range (Grade 1, 2<sup>(1)</sup>, and 3 as defined in AEC-Q100)
  - Grade 1 Temperature Range: -40°C to 125°C
  - Grade 2 Temperature Range<sup>(1)</sup>: -40°C to 105°C
  - Grade 3 Temperature Range: -40°C to 85°C
- 5MHz Clock Rate
- 64-byte Page Mode
- Block Write Protection
  - Protect 1/4, 1/2, or Entire Array
- Write Protect (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
- 8-lead JEDEC SOIC, 8-lead TSSOP, and 8-pad UDFN Packages

Note: 1. Contact Sales for Grade 2 Availability

#### **Description**

The Atmel® AT25128B/256B provides 131,072/262,144 bits of Serial Electrically Erasable Programmable Read-Only Memory (EEPROM) organized as 16,384/32,768 words of 8 bits each. The device is optimized for use in many automotive applications where low-power and low-voltage operation are essential. The AT25128B/256B is available in space-saving 8-lead JEDEC SOIC, 8-lead TSSOP, and 8-pad UDFN packages.

AT25128B/256B is enabled through the Chip Select pin  $(\overline{CS})$  and accessed via a 3-wire interface consisting of Serial Data Input (SI), Serial Data Output (SO), and Serial Clock (SCK). All programming cycles are completely self-timed, and no separate erase cycle is required before write.

Block write protection is enabled by programming the Status Register with one of four blocks of write protection. Separate program enable and program disable instructions are provided for additional data protection. Hardware data protection is provided via the  $\overline{\text{WP}}$  pin to protect against inadvertent write attempts to the Status Register. The  $\overline{\text{HOLD}}$  pin may be used to suspend any serial communication without resetting the serial sequence.

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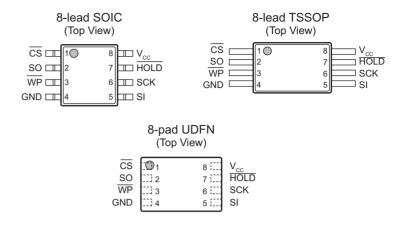
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## 1. Pin Configurations and Pinouts

Figure 1. Pin Configurations

Pin Name	Function
CS	Chip Select
SCK	Serial Data Clock
SI	Serial Data Input
SO	Serial Data Output
GND	Ground
V <sub>CC</sub>	Power Supply
WP	Write Protect
HOLD	Suspends Serial Input



Note: Drawings are not to scale.

## 2. Absolute Maximum Ratings\*

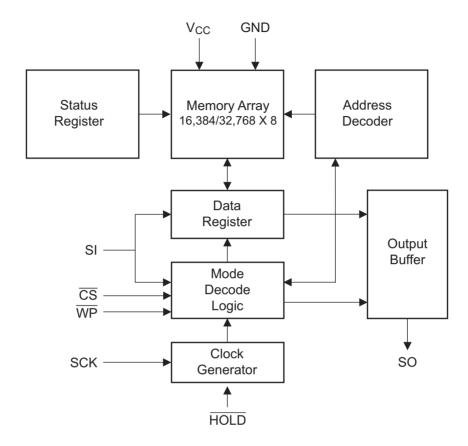
Operating Temperature40°C to +125°C
Storage Temperature65°C to +150°C
Voltage on any pin with respect to ground1.0V to +7.0V
Maximum Operating Voltage 6.25V
DC Output Current

\*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. Serial Interface Description

**Master:** The device that generates the serial clock.

Slave: Because the Serial Clock pin (SCK) is always an input, AT25128B/256B always operates as a slave.

**Transmitter/Receiver:** AT25128B/256B 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 AT25128B/256B, 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.

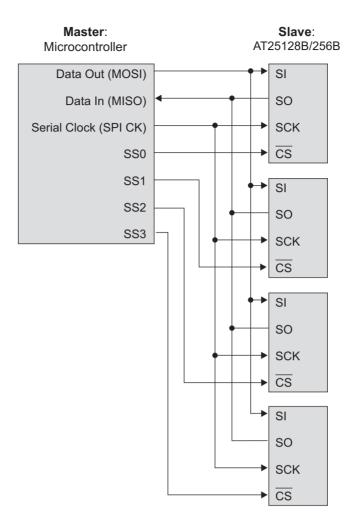
**Chip Select:** AT25128B/256B is selected when the  $\overline{CS}$  pin is low. When the device is not selected, data will not be accepted via the SI pin, and the Serial Output pin (SO) will remain in a high impedance state.

Hold: The HOLD pin is used in conjunction with the  $\overline{CS}$  pin to select AT25128B/256B. When the device is selected and a serial sequence is underway,  $\overline{HOLD}$  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 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 AT25128B/256B 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 4-1. SPI Serial Interface



## 5. Electrical Characteristics

## 5.1 Pin Capacitance

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

Applicable at these conditions, unless otherwise noted.  $T_A = 25$ °C, f = 1.0MHz,  $V_{CC} = +5.0$ V.

Symbol	Test Conditions	Max	Units	Conditions
C <sub>OUT</sub>	Output Capacitance (SO)	8	pF	V <sub>OUT</sub> = 0V
C <sub>IN</sub>	Input Capacitance (CS, SCK, SI, WP, HOLD)	6	pF	V <sub>IN</sub> = 0V

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:  $T_{A1}$  = -40°C to +125°C,  $V_{CC1}$  = 2.5V to 5.5V;  $T_{A2}$  = -40°C to 105°C,  $V_{CC2}$  = 1.7V to 5.5V.

Symbol	Parameter	Test Condition		Min	Тур	Max	Units
V <sub>CC1</sub>	Cumply Valtage	Grade 1		2.5		5.5	V
V <sub>CC2</sub>	Supply Voltage	Grade 2 <sup>(2)</sup> and 3		1.7		5.5	V
I <sub>CC1</sub>		V <sub>CC</sub> = 5.0V at 5MHz, SO :	= Open, Read			6	
I <sub>CC2</sub>	Supply Current	V <sub>CC</sub> = 5.0V at 1MHz, SO =	Open, Read, Write			3	mA
I <sub>CC3</sub>		V <sub>CC</sub> = 5.0V at 5MHz, SO =	Open, Read, Write			7	
I <sub>SB1</sub>		V <sub>CC</sub> = 1.7V			0.1	9	
I <sub>SB2</sub>	Standby Current	V <sub>CC</sub> = 2.5V	CS = V <sub>CC</sub>		0.2	10	μA
I <sub>SB3</sub>		V <sub>CC</sub> = 5.0V			2.0	13	
I <sub>IL</sub>	Input Leakage	V <sub>IN</sub> = 0V to V <sub>CC</sub>		-3		3	
I <sub>OL</sub>	Output Leakage	V <sub>IN</sub> = 0V to V <sub>CC</sub>		-3		3	μA
V <sub>IL</sub> <sup>(1)</sup>	Input Low-voltage			-0.6		V <sub>CC</sub> x 0.3	V
V <sub>IH</sub> <sup>(1)</sup>	Input High-voltage			V <sub>CC</sub> x 0.7		V <sub>CC</sub> + 0.5	V
V <sub>OL1</sub>	Output Low-voltage	25///////55//	I <sub>OL</sub> = 3.0mA			0.4	V
V <sub>OH1</sub>	Output High-voltage	$2.5V \le V_{CC} \le 5.5V$	I <sub>OH</sub> = -1.6mA	V <sub>CC</sub> - 0.8			V
V <sub>OL2</sub>	Output Low-voltage	17\/<\/ < 5.5\/	I <sub>OL</sub> = 0.15mA			0.2	V
V <sub>OH2</sub>	Output High-voltage	1.7V ≤ V <sub>CC</sub> ≤ 5.5V	I <sub>OH</sub> = -100μA	V <sub>CC</sub> - 0.2			V

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

2. Contact Sales for Grade 2 Availability



#### 5.3 AC Characteristics

Table 5-3. AC Characteristics

Applicable over recommended operating range from  $T_A$  = -40°C to +125°C,  $V_{CC}$  = As Specified, CL = 1 TTL Gate and 100pF (unless otherwise noted).

Symbol	Parameter	Voltage	Min	Max	Units
f <sub>SCK</sub>	SCK Clock Frequency	1.7 to 5.5	0	5.0	MHz
t <sub>RI</sub>	Input Rise Time	1.7 to 5.5		2	μs
t <sub>FI</sub>	Input Fall Time	1.7 to 5.5		2	μs
t <sub>wH</sub>	SCK High Time	1.7 to 5.5	40		ns
t <sub>wL</sub>	SCK Low Time	1.7 to 5.5	40		ns
t <sub>cs</sub>	CS High Time	1.7 to 5.5	80		ns
t <sub>css</sub>	CS Setup Time	1.7 to 5.5	80		ns
t <sub>CSH</sub>	CS Hold Time	1.7 to 5.5	80		ns
t <sub>su</sub>	Data In Setup Time	1.7 to 5.5	5		ns
t <sub>H</sub>	Data In Hold Time	1.7 to 5.5	20		ns
t <sub>HD</sub>	Hold Setup Time	1.7 to 5.5	40		ns
t <sub>CD</sub>	Hold Hold Time	1.7 to 5.5	40		ns
t <sub>v</sub>	Output Valid	1.7 to 5.5	0	40	ns
t <sub>HO</sub>	Output Hold Time	1.7 to 5.5	0		ns
t <sub>LZ</sub>	Hold to Output Low Z	1.7 to 5.5	0	40	ns
t <sub>HZ</sub>	Hold to Output High Z	1.7 to 5.5		80	ns
t <sub>DIS</sub>	Output Disable Time	1.7 to 5.5		80	ns
t <sub>wc</sub>	Write Cycle Time	1.7 to 5.5		5	ms
Endurance <sup>(1)</sup>	5.0V, 25°C, Page Mode		1,000	0,000	Write Cycles

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

## 6. Functional Description

AT25128B/256B is designed to interface directly with the synchronous Serial Peripheral Interface (SPI) of the 6805 and 68HC11 series of microcontrollers.

AT25128B/256B utilizes an 8-bit instruction register. The list of instructions and their operation codes are contained in the table below. All instructions, addresses, and data are transferred with the MSB first and start with a high-to-low CS transition.

Table 6-1. AT25128B/256B Instruction Set

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 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	RDY

Table 6-3. Read Status Register Bit Definition

Bit	Definition				
Bit 0 (RDY)	Bit $0 = 0$ ( $\overline{RDY}$ ) indicates the device is ready. Bit $0 = 1$ indicates the write cycle is in progress.				
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 10.				
Bit 3 (BP1) See Table 6-4 on page 10.					
Bits 4 – 6 are zeros when device is not in an internal write cycle.					
Bit 7 (WPEN) See Table 6-5 on page 10.					

Note: 1. Bits 0 - 7 are ones during the internal write cycle.



**Write Status Register (WRSR):** The WRSR instruction allows the user to select one of four levels of protection. AT25128B/256B is divided into four array segments. One-quarter, one-half, 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 the table below.

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

	Status Register Bits				Array Addres	sses Protected	
Level	BP1	BP0	AT25128B	AT25256B			
0	0	0	None	None			
1 (1/4)	0	1	3000 – 3FFF	6000 – 7FFF			
2 (1/2)	1	0	2000 – 3FFF	4000 – 7FFF			
3 (All)	1	1	0000 – 3FFF	0000 – 7FFF			

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 that are not block-protected.

Note: When the WPEN bit is hardware write protected, it cannot be changed back to zero as long as the 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	Writeable	Writeable
1	Low	0	Protected	Protected	Protected
1	Low	1	Protected	Writeable	Protected
X	High	0	Protected	Protected	Protected
X	High	1	Protected	Writeable	Writeable

Read Sequence (READ): Reading the AT25128B/256B via the Serial Output (SO) pin requires the following sequence. After the  $\overline{CS}$  line is pulled low to select a device, the read opcode is transmitted via the SI line followed by the byte address to be read (A15–A0, see the table below). 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 AT25128B/256B, two separate instructions must be executed. First, the device *must be write enabled* via the WREN instruction. Then a Write (WRITE) instruction may be executed. Also, the address of the memory location(s) to be programmed must be outside the protected address field location selected by the block write protection level. During an internal write cycle, all commands will be ignored except the RDSR instruction.

A Write instruction requires the following sequence. After the  $\overline{\text{CS}}$  line is pulled low to select the device, the WRITE opcode is transmitted via the SI line followed by the byte address (A15–A0) and the data (D7–D0) to be programmed (See the table below). Programming will start after the  $\overline{\text{CS}}$  pin is brought high. The low-to-high transition of the  $\overline{\text{CS}}$  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 = one, the write cycle is still in progress. If Bit 0 = zero, the write cycle has ended. Only the RDSR instruction is enabled during the write programming cycle.

AT25128B/256B is capable of a 64-byte page write operation. After each byte of data is received, the six bits will resolve 64 address; low-order address bits are internally incremented by one; and the high-order bits of the address will remain constant. If more than 64 bytes of data are transmitted, the address counter will roll over and the previously written data will be overwritten. AT25128B/256B 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 reinitiate the serial communication.

Table 6-6. Address Key

Address	AT25128B	AT25256B
A <sub>N</sub>	A <sub>13</sub> –A <sub>0</sub>	A <sub>14</sub> –A <sub>0</sub>
Don't Care Bits	A <sub>15</sub> -A <sub>14</sub>	A <sub>15</sub>



# 7. Timing Diagrams

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

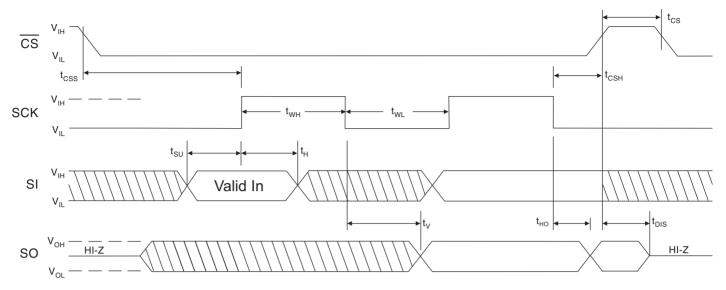


Figure 7-2. WREN Timing

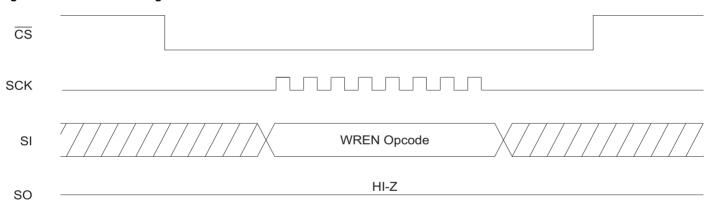
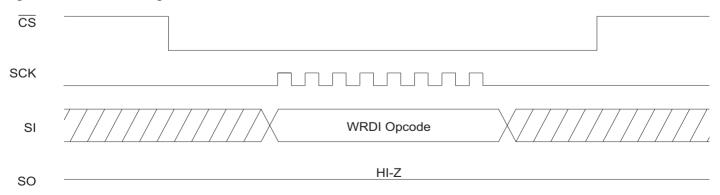
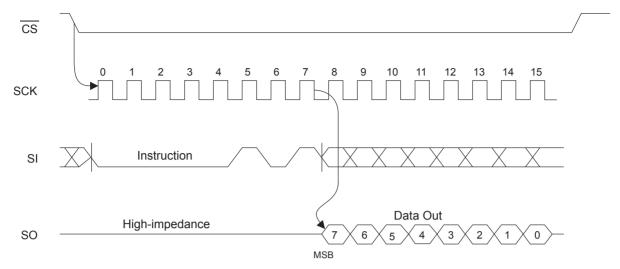


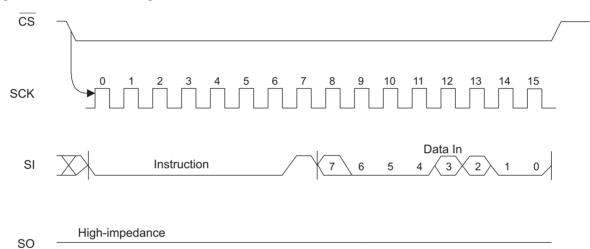
Figure 7-3. WRDI Timing







#### Figure 7-5. WRSR Timing



#### Figure 7-6. Read Timing

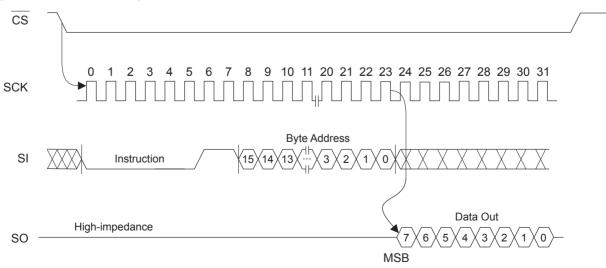
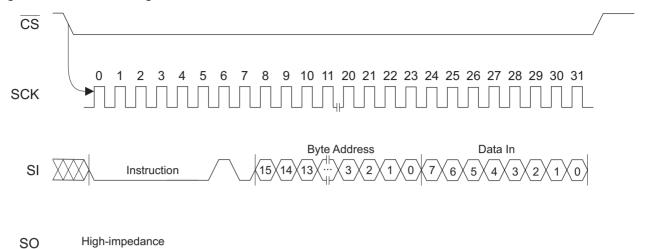
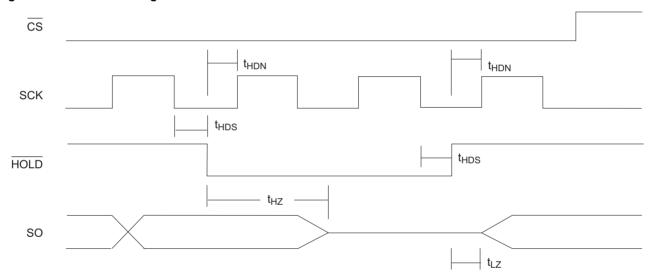




Figure 7-7. Write Timing



## Figure 7-8. HOLD Timing



#### 7.1 Power Recommendation

The device internal POR (Power-On Reset) threshold is just below the minimum device operating voltage.

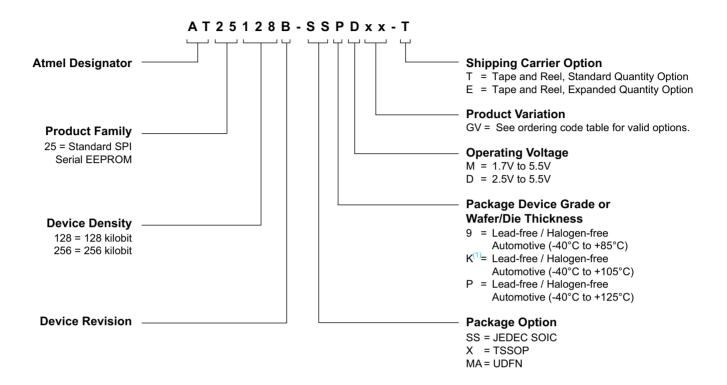
Power shall rise monotonically from 0.0Vdc to full  $V_{CC}$  in less than 1ms. Hold at full  $V_{CC}$  for at least 100 $\mu$ s before the first operation. Power shall drop from full  $V_{CC}$  to 0.0Vdc in less than 1ms. Power shall remain off (0.0Vdc) for 0.03ms minimum. Power dropping to a non-zero level and then slowly going to zero is not recommended, but if unavoidable the  $V_{CC}$  level supplied to the part must remain below 0.5V for at least 0.1ms to ensure a proper reset.

Please consult Atmel if your power conditions do not meet the above recommendations.



## 8. Ordering Information

#### 8.1 Ordering Code Detail



Note: 1. Contact Sales for Grade 2 Availability

# 8.2 Ordering Code Information

## 8.2.1 Automotive Grade 1, $V_{CC}$ = 2.5V to 5.5V

			Delivery Information		
Atmel Ordering Code	Lead Finish	Package	Form	Quantity	Operation Range
AT25128B-SSPDGV-T		8S1		4,000 per Reel	
AT25128B-XPDGV-T	128B-MAPDGV-T (Lead-free/Halogen-free) Tape and Reel	Tana and Daal	5,000 per Reel	Automotive	
AT25128B-MAPDGV-T		9144.2	·	5,000 per Reel	Temperature (-40°C to 125°C)
AT25128B-MAPDGV-E		8MA2		15,000 per Reel	
AT25256B-SSPDGV-T		8S1		4,000 per Reel	Automotive
AT25256B-XPDGV-T	5256B-MAPDGV-T (Lead-free/Halogen-free) Tape and Reel	8X	T	5,000 per Reel	
AT25256B-MAPDGV-T		5,000 per Reel	Temperature (-40°C to 125°C)		
AT25256B-MAPDGV-E		OIVIAZ		15,000 per Reel	

	Package Type
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-pad, 2.00mm x 3.00mm body, 0.50mm pitch, Ultra Thin, Dual No Lead (UDFN)



# 8.2.2 Automotive Grade 3, $V_{CC}$ = 1.7V to 5.5V

			Delivery Information		
Atmel Ordering Code	Lead Finish	Package	Form	Quantity	Operation Range
AT25128B-SS9MGV-T	25128B-X9MGV-T NiPdAu 25128B-MA9MGV-T (Lead-free/Halogen-free)	8S1	Tana and Daal	4,000 per Reel	Automotive Temperature (-40°C to 85°C)
AT25128B-X9MGV-T		8X		5,000 per Reel	
AT25128B-MA9MGV-T		8MA2	Tape and Reel	5,000 per Reel	
AT25128B-MA9MGV-E				15,000 per Reel	
AT25256B-SS9MGV-T		8S1		4,000 per Reel	Automotive
AT25256B-X9MGV-T	NiPdAu	8X		5,000 per Reel	
AT25256B-MA9MGV-T	(Lead-free/Halogen-free)	01440	Tape and Reel	- 000 B	Temperature (-40°C to 85°C)
AT25256B-MA9MGV-E	256B-MA9MGV-E 8MA2	OIVIAZ		15,000 per Reel	

	Package Type
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-pad, 2.00mm x 3.00mm body, 0.50mm pitch, Ultra Thin, Dual No Lead (UDFN)



### 8.2.3 Legacy Ordering Code Information (Not Recommended for New Designs, NRND)

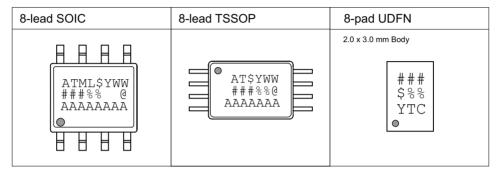
			Delivery Information			
Atmel Ordering Code	Lead Finish	Package	Form	Quantity	Operation Range	
AT25128B-SSPD-T	NiPdAu {	8S1	T	.,	Automotive	
AT25128B-XPD-T	(Lead-free/Halogen-free)	8X	Tape and Reel	5,000 per Reel	Temperature (-40°C to 125°C)	
AT25256B-SSPD-T	NiPdAu	8S1	Tone and Deal	4,000 per Reel	Automotive	
AT25256B-XPD-T	(Lead-free/Halogen-free)	8X	Tape and Reel	5,000 per Reel	Temperature (-40°C to 125°C)	

	Package Type
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-pad, 2.00mm x 3.00mm body, 0.50mm pitch, Ultra Thin, Dual No Lead (UDFN)



## 8.3 Part Markings

## AT25128B and AT25256B: Automotive Package Marking Information



Note 1: designates pin 1

Note 2: Package drawings are not to scale

Catalog Nu	mber Trunca	tion				
AT25128B				Truncation Code ###:	5DB	
AT25256B				Truncation Code ###:	5EB	
Date Codes	3					%% = Voltages
Y = Year		M = Month		WW = Work Week of Ass	embly	M: 1.7V minimum
6: 2016	0: 2020	A: January		02: Week 2		D: 2.5V minimum
7: 2017	1: 2021	B: Februar	y	04: Week 4		GV: GV Product Variation
8: 2018	2: 2022					
9: 2019	3: 2023	L: Decemb	er	52: Week 52		
Country of Assembly Lot Number		mber		\$ = Grade/Lead Finish Material		
@ = Country	y of Assembly		AAAA = Atmel Wafer I		eΓ	P: Automotive Grade 1/NiPdAu K: Automotive Grade 2/NiPdAu 9: Automotive Grade 3/NiPdAu
Trace Code				Atmel Truncation		
TC = Trace Code (Atmel Lot Numbers Correspond Example: AA, AB YZ, ZZ			d to Code)		AT: Atmel ATM: Atmel ATML: Atmel	

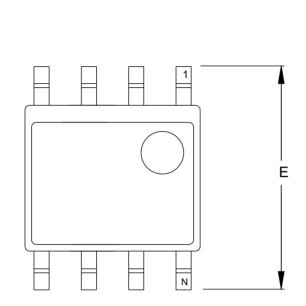
4/12/2016

Atmel	1tmel TITLE		REV.
Package Mark Contact: DL-CSO-Assy_eng@atmel.com	25128-256BAM, AT25128B and AT25256B Automotive Package Marking Information	25128-256BAM	E

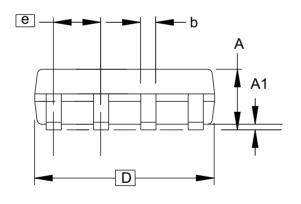


# 9. Packaging Information

#### 9.1 8S1 — 8-lead JEDEC SOIC

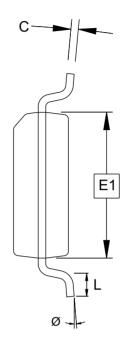


**TOP VIEW** 



SIDE VIEW

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



**END VIEW** 

COMMON DIMENSIONS (Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE		
Α	_	_	1.75			
A1	0.10	_	0.25			
b	0.31	_	0.51			
С	0.17 –		0.25			
D	4.90 BSC					
Е	(	6.00 BSC				
E1	;	3.90 BSC				
е						
L	0.40	_	1.27			
Ø	0°	_	8°			

SWB

3/6/2015

**Atmel** 

Package Drawing Contact: packagedrawings@atmel.com

TITLE

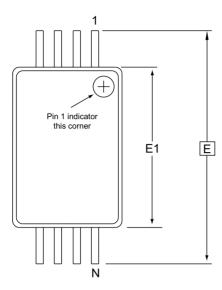
8S1, 8-lead (0.150" Wide Body), Plastic Gull Wing Small Outline (JEDEC SOIC)

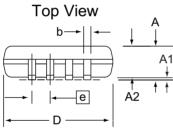
GPC DRAWING NO. REV.

8S1 H



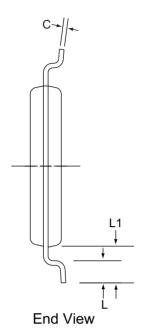
#### 9.2 8X — 8-lead TSSOP





Side View

- Notes: 1. This drawing is for general information only. Refer to JEDEC Drawing MO-153, Variation AA, for proper dimensions, tolerances, datums, etc.
  - 2. Dimension D does not include mold Flash, protrusions or gate burrs. Mold Flash, protrusions and gate burrs shall not exceed 0.15mm (0.006in) per side.
  - 3. Dimension E1 does not include inter-lead Flash or protrusions. Inter-lead Flash and protrusions shall not exceed 0.25mm (0.010in) per side.
  - 4. Dimension b does not include Dambar protrusion. Allowable Dambar protrusion shall be 0.08mm total in excess of the b dimension at maximum material condition. Dambar cannot be located on the lower radius of the foot. Minimum space between protrusion and adjacent lead is 0.07mm.
  - 5. Dimension D and E1 to be determined at Datum Plane H.



**COMMON DIMENSIONS** (Unit of Measure = mm)

	(0		,		
SYMBOL	MIN	NOM	MAX	NOTE	
Α	-	-	1.20		
A1	0.05	-	0.15		
A2	0.80	1.00	1.05		
D	2.90	3.00	3.10	2, 5	
E					
E1	4.30	4.40	4.50	3, 5	
b	0.19	0.25	0.30	4	
е	0.65 BSC				
L	0.45	0.60	0.75		
L1					
С	0.09	-	0.20		

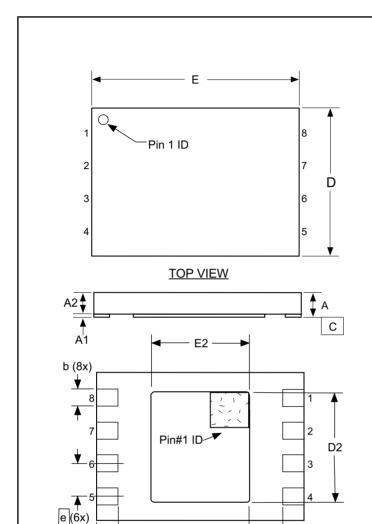
2/27/14

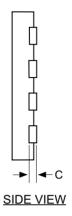
Package Drawing Contact: packagedrawings@atmel.com

TITLE
8X, 8-lead 4.4mm Body, Plastic Thin
Shrink Small Outline Package (TSSOP)

GPC	DRAWING NO.	REV.
TNR	8X	Е

#### 9.3 8MA2 — 8-pad UDFN





**COMMON DIMENSIONS** (Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
Α	0.50	0.55	0.60	
A1	0.0	0.02	0.05	
A2	-	-	0.55	
D	1.90	2.00	2.10	
D2	1.40	1.50	1.60	
E	2.90	3.00	3.10	
E2	1.20	1.30	1.40	
b	0.18	0.25	0.30	3
С	0.152 REF			
L	0.35	0.40	0.45	
е	0.50 BSC			
K	0.20	-	-	

11/2/15

#### Notes:

1. This drawing is for general information only. Refer to Drawing MO-229, for proper dimensions, tolerances, datums, etc.

**BOTTOM VIEW** 

- 2. The Pin #1 ID is a laser-marked feature on Top View.
- 3. Dimensions b applies to metallized terminal and is measured between 0.15 mm and 0.30 mm from the terminal tip. If the terminal has the optional radius on the other end of the terminal, the dimension should not be measured in that radius area.
- 4. The Pin #1 ID on the Bottom View is an orientation feature on the thermal pad.

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Package Drawing Contact: packagedrawings@atmel.com

**←** L (8x)

**TITLE** 

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

**GPC** YNZ

DRAWING NO. REV. 8MA2 Η



# 10. Revision History

Doc. Rev.	Date	Comments
8810E	09/2016	Added the Automotive Grade 2 and 3 options and UDFN options.
8810D	06/2015	Updated ordering codes tables and Section 7.1, part marking information, 8S1 and 8X package drawings, and footers.
8810C	12/2012	Updated ordering code tables and the 8X package drawing.
8810B	08/2012	Removed preliminary status. Updated Atmel logos and disclaimer/copy page.
8810A	04/2012	Initial document release.













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