

1. Features

- Low-voltage and Standard-voltage Operation
 - 1.8 (V_{CC} = 1.8V to 5.5V)
- Internally Organized 2048 x 8 (16K)
- Two-wire Serial Interface
- Schmitt Trigger, Filtered Inputs for Noise Suppression
- Bidirectional Data Transfer Protocol
- 1 MHz (5V, 2.5V), 400 kHz (1.8V) Compatibility
- Write Protect Pin for Hardware Data Protection
- 16-byte Page (16K) Write Modes
- Partial Page Writes Allowed
- Self-timed Write Cycle (5 ms max)
- High-reliability
 - Endurance: 1 Million Write Cycles
 - Data Retention: 100 Years
- 8-lead PDIP, 8-lead JEDEC SOIC, 8-lead Ultra-Thin Mini-MAP (MLP 2x3), 5-lead SOT23, 8-lead Ultra Lead Frame Land Grid Array (ULA), 8-lead TSSOP and 8-ball dBGA2 Packages
- Lead-free/Halogen-free
- Die Sales: Wafer Form, Tape and Reel, and Bumped Wafers

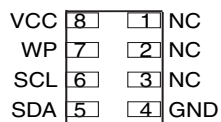
2. Description

The AT24C16B provides 16384 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 2048 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 AT24C16B is available in space-saving 8-lead PDIP, 8-lead JEDEC SOIC, 8-lead Ultra Thin Mini-MAP (MLP 2x3), 5-lead SOT23, 8-lead Ultra Lead Frame Land Grid Array (ULA), 8-lead TSSOP, and 8-ball dBGA2 packages and is accessed via a Two-wire serial interface. In addition, the AT24C16B is available in 1.8V (1.8V to 5.5V) version.

Table 2-1. Pin Configuration

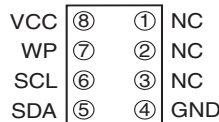
Pin Name	Function
NC	No Connect
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
GND	Ground
VCC	Power Supply

8-lead Ultra Thin Mini-MAP (MLP 2x3)



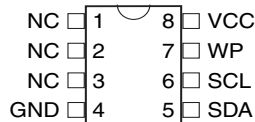
Bottom View

8-ball dBGA2

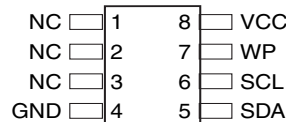


Bottom View

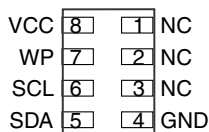
8-lead TSSOP



8-lead SOIC

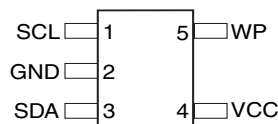


8-lead Ultra Lead Frame Land Grid Array (ULA)

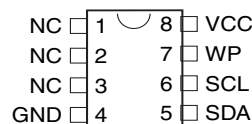


Bottom View

5-lead SOT23



8-lead PDIP



Two-wire Serial EEPROM

16K (2048 x 8)

AT24C16B



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.....	5.0 mA

***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.

Figure 2-1. Block Diagram

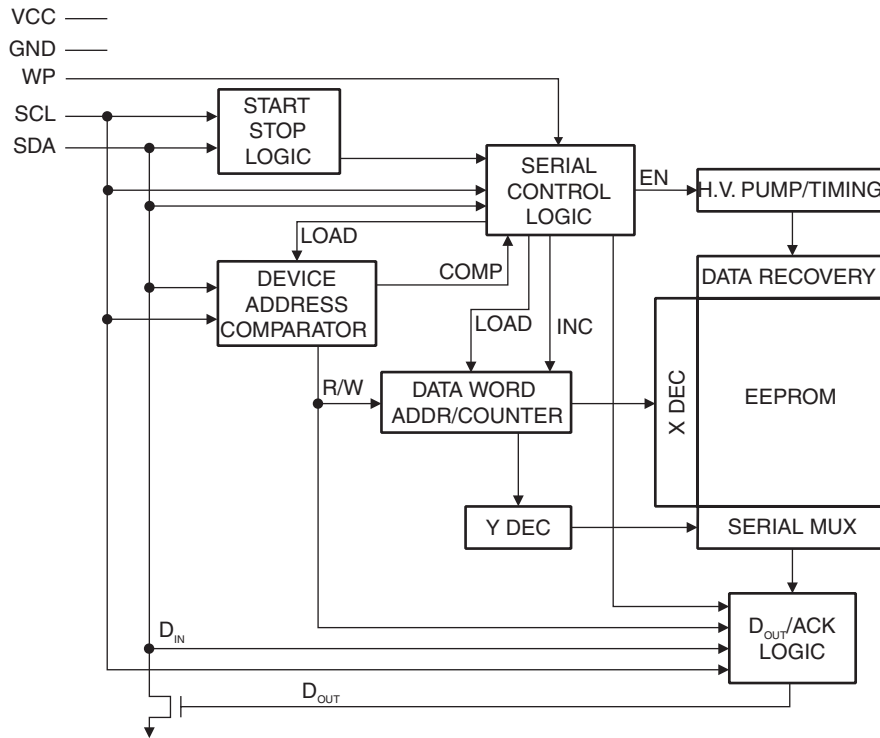


Table 4-1. Pin Capacitance⁽¹⁾

 Applicable over recommended operating range from $T_A = 25^\circ\text{C}$, $f = 1.0\text{ MHz}$, $V_{CC} = +1.8\text{V}$

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 (SCL)	6	pF	$V_{IN} = 0\text{V}$

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

Table 4-2. DC Characteristics

 Applicable over recommended operating range from: $T_{AI} = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = +1.8\text{V}$ to $+5.5\text{V}$ (unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Units
V_{CC1}	Supply Voltage			1.8		5.5	V
I_{CC1}	Supply Current	$V_{CC} = 5.0\text{V}$	READ at 400 kHz		1.0	2.0	mA
I_{CC2}	Supply Current	$V_{CC} = 5.0\text{V}$	WRITE at 400 kHz		2.0	3.0	mA
I_{SB1}	Standby Current (1.8V option)	$V_{CC} = 1.8\text{V}$	$V_{IN} = V_{CC}$ or V_{SS}			1.0	μA
		$V_{CC} = 5.0\text{V}$				6.0	
I_{LI}	Input Leakage Current $V_{CC} = 5.0\text{V}$	$V_{IN} = V_{CC}$ or V_{SS}			0.10	3.0	μA
I_{LO}	Output Leakage Current $V_{CC} = 5.0\text{V}$	$V_{OUT} = V_{CC}$ or V_{SS}			0.05	3.0	μA
V_{IL}	Input Low Level ⁽¹⁾			-0.6		$V_{CC} \times 0.3$	V
V_{IH}	Input High Level ⁽¹⁾			$V_{CC} \times 0.7$		$V_{CC} + 0.5$	V
V_{OL1}	Output Low Level	$V_{CC} = 1.8\text{V}$	$I_{OL} = 0.15\text{ mA}$			0.2	V
V_{OL2}	Output Low Level	$V_{CC} = 3.0\text{V}$	$I_{OL} = 2.1\text{ mA}$			0.4	V

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

Table 4-3. AC Characteristics (Industrial Temperature)

Applicable over recommended operating range from $T_{AI} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = +1.8\text{V}$ to $+5.5\text{V}$, $CL = 100\text{ pF}$ (unless otherwise noted). Test conditions are listed in Note 2.

Symbol	Parameter	1.8-volt		2.5, 5.0-volt		Units
		Min	Max	Min	Max	
f_{SCL}	Clock Frequency, SCL		400		1000	kHz
t_{LOW}	Clock Pulse Width Low	1.3		0.4		μs
t_{HIGH}	Clock Pulse Width High	0.6		0.4		μs
t_{AA}	Clock Low to Data Out Valid	0.05	0.9	0.05	0.55	μs
t_{BUF}	Time the bus must be free before a new transmission can start ⁽¹⁾	1.3		0.5		μs
$t_{HD.STA}$	Start Hold Time	0.6		0.25		μs
$t_{SU.STA}$	Start Set-up Time	0.6		0.25		μs
$t_{HD.DAT}$	Data In Hold Time	0		0		μs
$t_{SU.DAT}$	Data In Set-up Time	100		100		ns
t_R	Inputs Rise Time ⁽¹⁾		0.3		0.3	μs
t_F	Inputs Fall Time ⁽¹⁾		300		100	ns
$t_{SU.STO}$	Stop Set-up Time	0.6		0.25		μs
t_{DH}	Data Out Hold Time	50		50		ns
t_{WR}	Write Cycle Time		5		5	ms
Endurance ⁽¹⁾	25°C, Page Mode, 3.3V	1,000,000				Write Cycles

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

2. AC measurement conditions:

R_L (connects to V_{CC}): 1.3 k Ω (2.5V, 5.0V), 10 k Ω (1.8V)

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}

AT24C16B Ordering Information

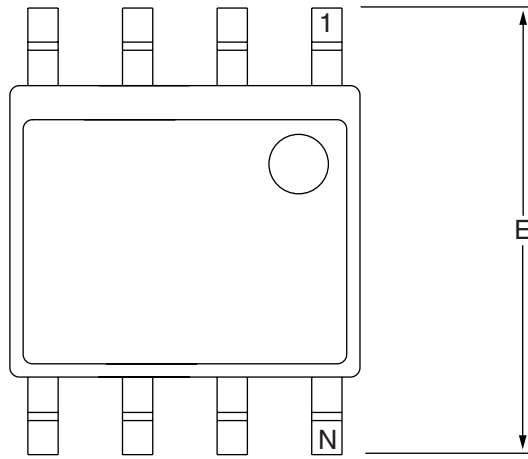
Ordering Codes	Voltage	Package	Operating Range
AT24C16B-PU (Bulk Form Only)	1.8	8P3	Lead-Free/Halogen-Free Industrial Temperature (-40°C to 85°C)
AT24C16BN-SH-B ⁽¹⁾ (NiPdAu Lead Finish)	1.8	8S1	
AT24C16BN-SH-T ⁽²⁾ (NiPdAu Lead Finish)	1.8	8S1	
AT24C16B-TH-B ⁽¹⁾ (NiPdAu Lead Finish)	1.8	8A2	
AT24C16B-TH-T ⁽²⁾ (NiPdAu Lead Finish)	1.8	8A2	
AT24C16BY6-YH-T ⁽²⁾ (NiPdAu Lead Finish)	1.8	8Y6	
AT24C16BD3-DH-T ⁽²⁾ (NiPdAu Lead Finish)	1.8	8D3	
AT24C16BTSU-T ⁽²⁾	1.8	5TS1	
AT24C16BU3-UU-T ⁽²⁾	1.8	8U3-1	
AT24C16B-W-11 ⁽³⁾	1.8	Die Sales	Industrial Temperature (-40°C to 85°C)

- Notes:
1. "-B" denotes bulk.
 2. "-T" denotes tape and reel. SOIC = 4K per reel. TSSOP, Ultra Thin Mini MAP, SOT23, dBGA2 = 5K per reel.
 3. Available in tape and reel, and wafer form; order as SL788 for inkless wafer form. Bumped die available upon request. Please contact Serial Interface Marketing.

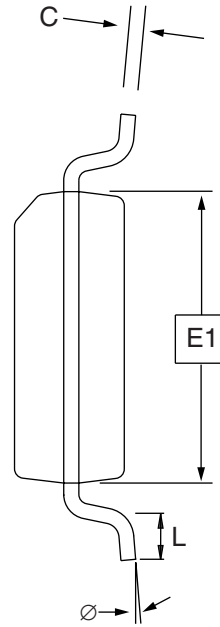
Package Type	
8P3	8-lead, 0.300" Wide, Plastic Dual Inline Package (PDIP)
8S1	8-lead, 0.150" Wide, Plastic Gull Wing Small Outline (JEDEC SOIC)
8A2	8-lead, 4.4 mm Body, Plastic Thin Shrink Small Outline Package (TSSOP)
8Y6	8-lead, 2.0 mm x 3.00 mm Body, 0.50 mm Pitch, Ultra Thin Mini-MAP, Dual No Lead Package (DFN), (MLP 2x3 mm)
5TS1	5-lead, 2.90 mm x 1.60 mm Body, Plastic Thin Shrink Small Outline Package (SOT23)
8U3-1	8-ball, die Ball Grid Array Package (dBGA2)
8D3	8-lead, 1.80 mm x 2.20 mm Body, Ultra Lead Frame Land Grid Array (ULA)
Options	
-1.8	Low-voltage (1.8V to 5.5V)



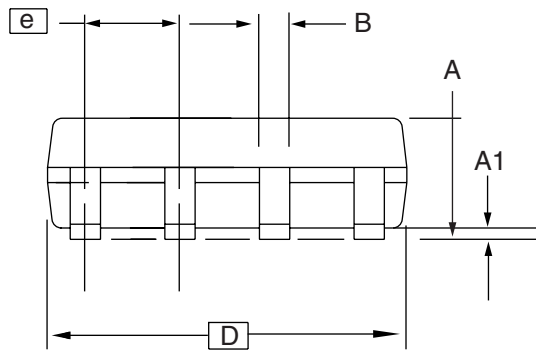
12.2 8S1 – JEDEC SOIC



Top View



End View



Side View

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	1.35	–	1.75	
A1	0.10	–	0.25	
b	0.31	–	0.51	
C	0.17	–	0.25	
D	4.80	–	5.00	
E1	3.81	–	3.99	
E	5.79	–	6.20	
e	1.27 BSC			
L	0.40	–	1.27	
Ø	0°	–	8°	

Note: These drawings are for general information only. Refer to JEDEC Drawing MS-012, Variation AA for proper dimensions, tolerances, datums, etc.



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

DRAWING NO.
8S1

REV.
B