

## Atmel Serial EEPROM Products

Featuring the broadest array of product families and package offerings

## Serial EEPROMs: Flexible and Robust Nonvolatile Memory Devices

Atmel is a worldwide leader in the design and manufacture of microcontrollers, capacitive touch solutions, logic, mixed-signal, nonvolatile memory, and RF components.

Leveraging one of the industry's broadest intellectual property technology portfolios, Atmel is able to provide the electronics industry with complete system solutions focused on industrial, consumer, security, communications, computing, and automotive markets. Atmel® nonvolatile memory products offer our customers a broad range of memory densities and package styles and are accessed through the industry-standard serial interface bus architectures commonly used in today's electronic systems.

Serial EEPROM devices are by far the most popular vehicle utilized in today's modern electronic equipment to store personal preference and configuration data. Applications span a wide spectrum of consumer, automotive, telecommunication, medical, industrial, and computing applications.

This popularity stems from a unique combination of capabilities that cannot be found in any other memory solution. These features include byte-write alterability, nonvolatile data storage, 1 million cycles of write endurance, very low power supply voltage operation, 100 year data retention, low pin-count packages, low cost of ownership, and extremely low active and standby currents.

The Atmel Serial EEPROM portfolio supports industry-standard I<sup>2</sup>C, Microwire and SPI protocols. These devices are available in a variety of product versions, including industrial temperature range, automotive grade, CS Series (Serial Number), MAC Address, and Application-Specific.

### Key Features

- **Broad portfolio** — Atmel offers Serial EEPROM devices in densities ranging from 1-Kbits to 2-Mbits and with operating voltage ranges from 1.7V to 5.5V
- **Diverse packages options** — Atmel Serial EEPROM devices come in industry-standard PDIP, SOIC, and TSSOP package types, as well as space-saving UDFN, VFBGA, SOT23, and WLCSP packages
- **High performance** — Atmel Serial EEPROM devices offer low active and standby currents yet operate at fast clock frequencies and offer fast write cycle times
- **Automotive designs** — Atmel offers automotive-qualified Serial EEPROM devices in environmentally friendly "green" versions designed to withstand extended temperature ranges
- **Value added features** — The CS Series and MAC Series devices provide plug-and-play integration of 128-bit serial numbers and pre-programmed EUI/MAC addresses

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## Atmel Serial EEPROM Product Family Overview

Serial EEPROM memory devices are used to store a variety of information, including personal preference and system configuration data, critical data logs, and even low-level firmware boot code for today's advanced electronic systems and applications. Atmel Serial EEPROMs are flexible, low-cost nonvolatile memory devices that provide system designers with a variety of features and performance characteristics to improve their designs.

Atmel offers devices available with three different industry-standard serial interface protocols to give designers a wide range of choices to meet their particular system requirements.

### I<sup>2</sup>C-compatible (2-wire)

Simple interface, yet the most popular choice for various microcontroller, microprocessor, and system-on-a-chip (SoC) solutions. I<sup>2</sup>C devices support cascading of up to eight Serial EEPROMs on the same bus and offer varying types of write protection.

### SPI-compatible

High-speed interface with operation of up to 20MHz. SPI devices feature advanced hardware and software write protection schemes with operating voltages as low as 1.7 V.

### Microwire-compatible (3-wire)

Simple interface with support up to 2MHz. Microwire devices offer user-selectable x8 or x16 memory organization with software write protection to secure data integrity.

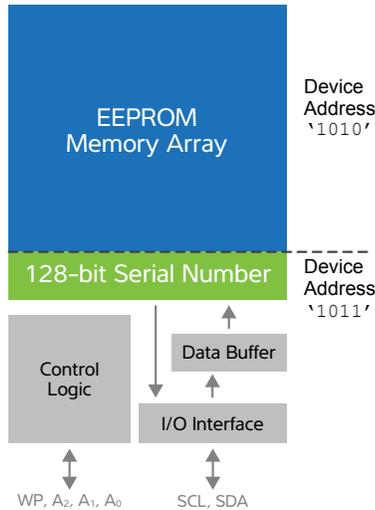
### Application specific

Addressing high-volume applications with unique requirements. These devices target support for the JEDEC required Serial EEPROM functions in the DIMM module market.

	I <sup>2</sup> C	SPI	Microwire
Device Family	AT24C/34Cxxx	AT25xxx	AT93Cxxx
Densities	1-Kbit to 2-Mbit	1-Kbit to 2-Mbit	1-Kbit to 16-Kbit
Voltage Range	1.7V to 5.5V	1.7V to 5.5V	1.7V to 5.5V
Clock Frequency	Up to 1MHz	Up to 20MHz	Up to 2MHz
Automotive Grade	Available	Available	Available
Package Options	PDIP, SOIC, TSSOP, SOT-23, DFN, BGA, WLCSP	PDIP, SOIC, TSSOP, DFN, BGA, WLCSP	PDIP, SOIC, TSSOP, DFN, BGA, WLCSP



## Atmel AT24CS Series Serial EEPROM



Almost every application in production today can benefit from or already requires a unique identifier or serial number. This number allows identification and tracking for multiple purposes, including node identity, build control, version control, customer tracking and authenticity check. Building and maintaining an infrastructure to assign and maintain the serialization of products—particularly in high-volume production lines across multiple locations—can be challenging.

The Atmel AT24CS series of devices helps resolve this problem by including a unique, factory-programmed, read-only 128-bit serial number that can help customers simplify inventory control of mass production lines and enhance product traceability. The CS family comes in multiple EEPROM array densities from 1Kb through 64Kb.

As an application's needs grow over time and greater memory densities are required, the 128-bit serial number contained within any Atmel CS series Serial EEPROM product remains unique, enabling the value to remain distinctive across the entire portfolio of customer applications.

The Atmel AT24CS series maintains all of the features that make serial EEPROMs a must-have element in most designs, including 1 million cycle write endurance, 100-year data retention, byte write capability, and very low active and standby current consumption.

Feature	Benefit
Pre-programmed 128-bit serial number	Enhanced product traceability
Serial number is read-only	Impossible to alter or change the serial number
Serial number is stored in a separate memory area	Does not reduce the user portion of memory array
Serial number is accessed via a separate device address	Product acts as two separate devices on the bus
Serial number is unique across all products regardless of density or family	Number uniqueness across all customer platforms or applications where the CS series product is used

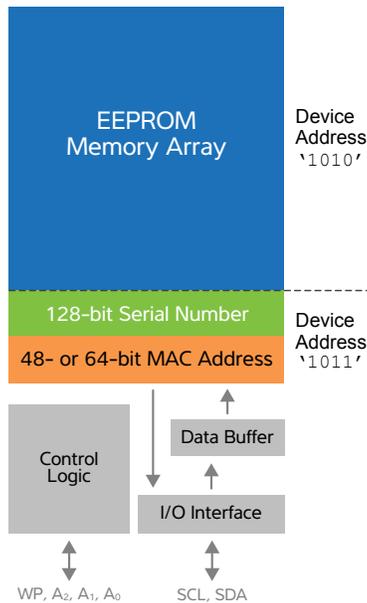
Learn more at the  
CS Series Serial  
EEPROM Website



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## Atmel AT24MAC Series Serial EEPROM



The Internet of Things is rapidly turning products that traditionally have been stand-alone devices into smart products that are accessible via the Internet or can interact with other similar devices on a local network. One can now find bathroom scales with integrated Wi-Fi connections that log and record your weight to track how closely you are towards meeting your goals. Refrigerators now have touch screens on their doors that effectively are integrated tablet computing devices. In order to successfully operate on the network, each device needs a unique identifying number, which is commonly referred to as a MAC address.

Acquiring and maintaining a database of MAC addresses, however, can be very tedious. The Atmel AT24MAC family alleviates this burden by providing a pre-programmed MAC address inside a Serial EEPROM device, without consuming any user memory area. By utilizing the new Atmel AT24MAC devices with globally unique hardware addresses embedded onboard, designers no longer need to absorb the management costs and time associated with acquiring, using and managing an allotment of MAC/EUI addresses. The Atmel AT24MAC series makes it simpler, faster and less expensive to develop Internet-connected products.

Based upon proven and robust Atmel Serial EEPROM technology, the Atmel AT24MAC series of products provide the same high levels of endurance and data retention that customers have come to expect from Atmel. The products also maintain byte-write capability and low power consumption so that customers need not sacrifice features and performance when choosing to add MAC address functionality to their design.

Feature	Benefit
Unique pre-programmed MAC/EUI address	No need to manage a database of MAC/EUI addresses
Permanent and reversible EEPROM write protection	Ability to store and protect other system-vital information such as lot number, revision, manufacturing location, etc.
Pre-programmed MAC/EUI address does not consume any of the user EEPROM area	Entire EEPROM array is available for use
Pre-programmed, true EUI-64 addresses available	True EUI-64 address available instead of converting a 48-bit value for use in a 64-bit system
Pre-programmed, read-only 128-bit serial number	Enhanced product traceability Unique serial number across all Atmel MAC and CS series devices

Learn more at the  
MAC Series Serial  
EEPROM Website



## Atmel Automotive-Grade Serial EEPROMs

The best way to build a zero defect automobile is to build it from the ground up with zero defect components. For nearly 20 years, Atmel has been supporting the automotive industry with robust designs and world-class quality targeting zero defect automotive-grade memory products. The Atmel Automotive Serial EEPROM portfolio offers a complete range of products designed for high reliability, qualified according to AEC-Q100 standards and supported with PPAP compliance.

## A Broad Range of Automotive Applications

Atmel Automotive Serial EEPROMs are used in a broad range of applications requiring varying densities and standard serial interfaces.

Application	2-wire (I <sup>2</sup> C)		3-wire (Microwire)		SPI	
	Part Number	Density	Part Number	Density	Part Number	Density
Airbags			93C46D 93C56B 93C66B 93C86A	1K - 16K	25010B to 25256B	1K - 256K
Anti-lock Brake System	24C01C to 24C04C	1K - 4K		1K - 16K	25040B to 25256B	4K - 256K
Audio	24C08C to 24C64D	8K - 64K		1K - 16K		
Dash Board	24C01C to 24C16C	1K - 16K		1K - 16K	25020B to 25128B	2K - 128K
Driver Information System	24C01C to 24C16C	1K - 16K		1K - 16K	25010B to 25160B	1K - 16K
Engine Control				2K - 16K	24040B to 25256B	4K - 256K
Multimedia	24C01C to 24C64D	1K - 64K		1K - 16K	25010B to 25256B	1K - 256K
Telematics/Navigation	24C08C to 24C256C	8K - 256K		1K - 16K	25010B to 25256B	1K - 256K
Tire Pressure	24C01C to 24C16C	1K - 16K		1K - 16K	25010B to 25040B	1K - 4K

## Key Features

- Operating temperature range from -40°C to 125°C
- Extended V<sub>CC</sub> from 2.5V to 5.5V
- High cycling endurance with up to one million write cycles at 25°C and data retention of 100 years
- High clock frequencies up to 20MHz for SPI and 1MHz for I<sup>2</sup>C
- Write protection (WP) and disable instructions for hardware and software data protection

Learn more at the  
Automotive Serial  
EEPROM Website



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## Atmel Serial EEPROMs Product Offering Matrix

	Atmel Part Number	Density	Voltage Range	Package Availability								
				PDIP	JEDEC SOIC	EIAJ SOIC	TSSOP	SOT-23	XDFN	UDFN	WLCSP	BGA
I <sup>2</sup> C Compatible Devices	AT24C01C/D	1-Kbit	1.7V – 5.5V	X	X	–	X	X	–	X	–	X
	AT24C02C/D	2-Kbit	1.7V – 5.5V	X	X	–	X	X	–	X	–	X
	AT24HC02C	2-Kbit	1.7V – 5.5V	X	X	–	X	–	–	–	–	–
	AT24C04C/D	4-Kbit	1.7V – 5.5V	X	X	–	X	X	–	X	*	X
	AT24C08C/D	8-Kbit	1.7V – 5.5V	X	X	–	X	X	–	X	X	X
	AT24C16C/D	16-Kbit	1.7V – 5.5V	X	X	–	X	X	X	X	X	X
	AT24C32D/E	32-Kbit	1.7V – 5.5V	X	X	–	X	X	X	X	X	X
	AT24C64D	64-Kbit	1.7V – 5.5V	–	X	–	X	–	X	X	X	X
	AT24C128C	128-Kbit	1.7V – 5.5V	–	X	–	X	–	X	X	X	X
	AT24C256C	256-Kbit	1.7V – 5.5V	–	X	–	X	–	–	X	*	X
	AT24C512C	512-Kbit	1.7V – 3.6V	–	X	X	X	–	–	X	X	X
	AT24C512C	512-Kbit	2.5V – 5.5V	–	X	X	X	–	–	X	X	–
AT24CM01	1-Mbit	1.7V – 5.5V	–	X	X	X	–	–	–	X	–	
AT24CM02	2-Mbit	1.7V – 5.5V	–	X	X	–	–	–	–	X	–	
SPI Compatible Devices	AT25010B	1-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25020B	2-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25040B	4-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25080B	8-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25160B	16-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25320B	32-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25640B	64-Kbit	1.8V – 5.5V	–	X	–	X	–	X	X	*	X
	AT25128B	128-Kbit	1.8V – 5.5V	–	X	–	X	–	–	X	*	X
	AT25256B	256-Kbit	1.8V – 5.5V	–	X	–	X	–	–	X	*	X
	AT25512	512-Kbit	1.8V – 5.5V	–	X	–	X	–	–	X	*	–
	AT25M01	1-Mbit	1.7V – 5.5V	–	X	X	–	–	–	–	X	–
AT25M017	1-Mbit	1.7V – 5.5V	–	X	X	–	–	–	–	X	–	
AT25M02	2-Mbit	1.7V – 5.5V	–	X	X	–	–	–	–	X	–	
Microwire	AT93C46E	1-Kbit	1.8V – 5.5V	X	X	–	X	–	–	–	–	–
	AT93C56B	2-Kbit	1.7V – 5.5V	–	X	–	X	–	X	X	–	X
	AT93C66B	4-Kbit	1.7V – 5.5V	–	X	–	X	–	X	X	–	X
	AT93C86A	16-Kbit	1.8V – 5.5V	X	X	–	X	–	–	X	*	–
App Specific	AT34C02D	2-Kbit	1.7V – 5.5V	–	X	–	X	–	–	X	–	–
	AT34C04	4-Kbit	1.7V – 3.6V	–	X	–	X	–	–	X	–	–

\* Contact Atmel for availability

## Atmel Serial EEPROMs Product Offering Matrix (Cont'd)

	Atmel Part Number	Density	Voltage Range	Package Availability								
				PDIP	JEDEC SOIC	EIAJ SOIC	TSSOP	SOT-23	XDFN	UDFN	WLCSP	BGA
CS and MAC Series	AT24CS01	1-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	–	–
	AT24CS02	2-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	–	–
	AT24CS04	4-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	*	–
	AT24CS08	8-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	*	–
	AT24CS16	16-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	*	–
	AT24MAC402	2-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	–	–
	AT24MAC602	2-Kbit	1.7V – 5.5V	–	X	–	X	X	–	X	–	–
Automotive I <sup>2</sup> C Compatible Devices	AT24C01C	1-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C02C	2-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24HC02B	2-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT34C02C	2-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C04C	4-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24HC04B	4-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C08C	8-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C16C	16-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C32D	32-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C64B	64-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT24C128C	128-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
AT24C256C	256-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–	
Automotive SPI Compatible Devices	AT25010B	1-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25020B	2-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25040B	4-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25080B	8-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25160B	16-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25320B	32-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25640B	64-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25128B	128-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT25256B	256-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
Auto Microwave	AT93C46E	1-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT93C56B	2-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT93C66B	4-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–
	AT93C86A	16-Kbit	2.5V – 5.5V	–	X	–	X	–	–	–	–	–

\* Contact Atmel for availability



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