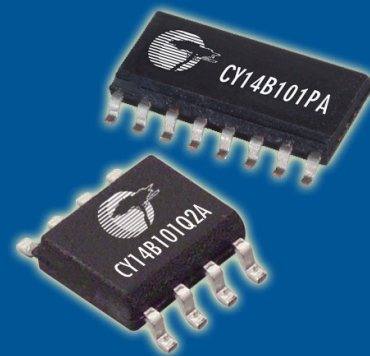


CYPRESS

SERIAL NON-VOLATILE SRAM (SERIAL nvSRAM)



PRODUCT OVERVIEW

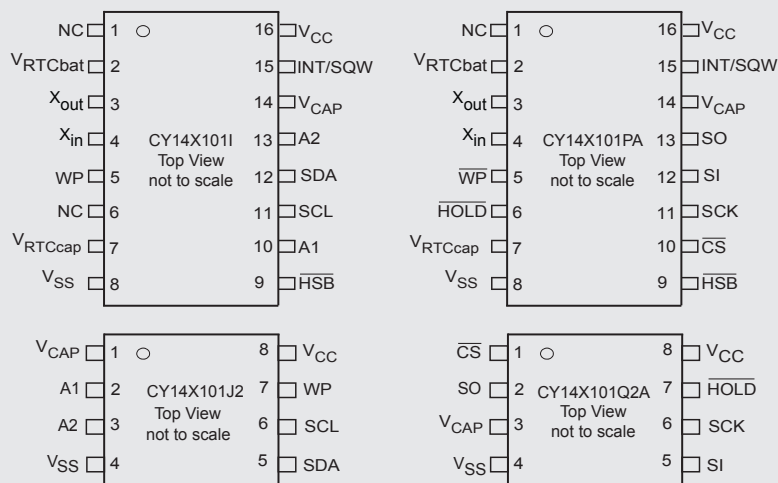
A BETTER MOUSETRAP – THE RIGHT WAY TO DO SERIAL NVRAM

Serial nvSRAM is an SRAM that retains its written data when power is turned off or disconnected. It easily replaces EEPROM, FRAM, battery-backed serial SRAM, or other hybrid solutions used to satisfy the need for non-volatile serial memory in densities from 64 Kbit up to 1 Mbit.

Cypress combines its world-leading CMOS technologies in SRAM and non-volatile (SONOS) EEPROM on a single monolithic IC to produce this remarkable solution.

In operation, the serial nvSRAM behaves just like a conventional serial (SPI/I²C) memory. All pin locations, command codes, and write sequences follow industry standards. When a power disruption occurs, the intelligence in the chip detects the threat and automatically saves a copy of the SRAM data into non-volatile memory, where it can stay unchanged for over 20 years. On power-up RECALL, the IC returns the data copy back to the SRAM and system operation can continue precisely from where it left last. Clearly this is the right way to do serial nvSRAM.

The transfers between SRAM and non-volatile cells inside the IC are completely parallel (cell for cell) allowing the STORE operation to complete in 8 ms or less. The IC family also provides user controlled software STORE and RECALL initiation commands, as well as a user controlled hardware STORE initiation command in some versions.



Serial nvSRAM Pinouts

ADVANTAGES

PERFORMS LIKE AN SRAM

- Random access
- Single or stream read/write
- Up to 104 MHz SPI/3.4 MHz I²C
- Infinite read/write to SRAM
- Works in SRAM/EEPROM emulation tools

SAVES LIKE A NON-VOLATILE MEMORY

- 1,000,000 store cycles to non-volatile elements (on power disruptions only)
- 20-year data retention with reliability better than ten failures in time (FIT)
- Automatic write protect
- Full array store on power-down using zero system time

NO BATTERIES; COMPLETELY GREEN

- RoHS compliant
- No mechanical battery contact issues
- No replacement or recharge cycles
- No end-of-life disposal problems
- No data loss from electrical noise or signal input undershoot
- No power monitoring required

PACKAGE OPTIONS

- 8 and 16 SOIC

NO WEAR LEVELING ROUTINES

NO FIRMWARE WAIT STATES AS FOUND IN OTHER NON-VOLATILE SOLUTIONS

APPLICATIONS

- Smart meters • Handheld industrial devices • Handheld medical equipment • Automotive • Military • Portable equipment
- Single-board computers • Gaming

REAL-TIME CLOCK TECHNOLOGY

Cypress's serial nvSRAMs are also offered with on-chip Real-Time Clock (RTC) functions that combine the high-performance of a monolithic non-volatile memory with a full-featured clock. The entire family is RoHS-compliant.

The RTC provides accurate time-keeping through a high-accuracy oscillator using an external crystal. RTC features include leap year tracking, alarm, and low-power operation. The alarm function is programmable for one-time alarms or periodic seconds, minutes, hours, or days. A programmable watchdog timer for process control is also included.

SONOS NON-VOLATILE TECHNOLOGY

Cypress non-volatile technology requires very low erase and programming currents, allowing full array STOREs from SRAM to non-volatile in just 8 ms following each power stop or brownout. Over one million STORE cycles into our SONOS non-volatile cells can occur without damaging the structure. If power is disrupted five times each day, this would allow over 500 years of non-volatile STORE's to your SRAM data.

OPERATING MODES

AutoSTORE performs STORE operations in the background during power-down, using zero system time. A small external capacitor guarantees sufficient energy to complete the STORE when the system power supply drops below the minimum specified operating range. When power returns to operating minimum, data is automatically RECALL'ed from the non-volatile elements into the SRAM once the supply reaches operating minimums.

Software STORE and Software RECALL may be initiated by executing special instructions. These functions can be used to store new code and data or to perform software reset after the SRAM has been written.

Hardware STORE may be initiated by asserting the $\overline{\text{HSB}}$ pin low.

SERIAL nvSRAM PRODUCT PORTFOLIO

Density	Interface	Real-Time Clock	Cycle Time (MHz)		Voltage (V)	Process	Package	Status
1 Mb	SPI/I ² C	Yes	40/3.4		2.5, 3, 5	130 nm	8, 16 SOIC	In production
512 Kb	SPI/I ² C	Yes	40/3.4		2.5, 3, 5	130 nm	8, 16 SOIC	In production
256 Kb	SPI/I ² C	Yes	40/3.4		2.5, 3, 5	130 nm	8, 16 SOIC	In production
64 Kb	SPI/I ² C	Yes	40/3.4		2.5, 3, 5	130 nm	8, 16 SOIC	In production

WORLDWIDE SALES AND DESIGN SUPPORT

For more information on nvSRAM go to www.cypress.com/go/nvsram or email nvsram@cypress.com.

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