C-RAM™ 4M radiation-hardened non-volatile RAM

Non-volatile memory product
The 256K × 8 radiation-hardened non-volatile RAM with a single-bit error correction (SEC) is a high-performance, 266,144-word × 8-bit random-access, non-volatile memory with industry-standard functionality.

It is fabricated with BAE Systems’ radiation-hardened, 0.25 μm bulk CMOS technology, and is designed for use in systems operating in radiation environments. This NVRAM operates over an extended temperature range and requires a single 3.3 V ± 10 percent power supply.
System definitions

A:0-18 Address input pins that select a particular 8-bit word within the memory array.

DQ:0-7 Bi-directional data pins that serve as data outputs during a read operation and as data inputs during a write operation.

CS Negative-active chip select when low level allows normal read or write operation. When high, CS forces the NVRAM to a precharge condition, holds the data output drivers in a high-impedance state, and disables write operations. If this signal is not used, it must be connected to GND.

WE Negative-active write-enable. When low (and WRT-DISABLE inactive), WE activates a write operation and holds the data output drivers in a high-impedance state. When high, WE allows normal-read operation.

OE Negative-active output-enable. When high, OE holds the data output drivers in a high-impedance state. When low, the data output driver state is defined by CS and WE. If this signal is not used, it must be connected to GND.

WRT-DISABLE Negative-active write-disable. When low (power-on reset, PROM mode, etc.), disables write operations while maintaining read-operation availability. When high, WRT-DISABLE permits write operations. If this signal is not used, it must be connected to VDD.

C-RAM family of products

- **4 Mb single chip**
  - 256K x 8 C-RAM
  - 40-lead flatpack (0.640 x 1.006 inches)

- **Also available**
  - 2 Mb (256K x 8 with ECC) monolithic and 20 Mb (512K x 40) MCM configurations

Key features

- **Minimum read cycle times**
  - ≤ 70 ns

- **Minimum write-cycle times**
  - <1000 ns

- **Single power supply**
  - 3.3 V ±10 percent

- **Operating temperature range**
  - -40 to 110 degrees Celsius

- **Low operating power**
  - 155 mW (typical) active read (70 ms)
  - 105 mW (typical) active write (1000 ns)
  - 60 mW (typical) standby (maximum)

- **Write cycle endurance**
  - > 1e5 cycles

- **Data retention**
  - 0.1 years at 90 degrees Celsius
  - 0.3 years at 85 degrees Celsius
  - 0.9 years at 80 degrees Celsius
  - 3.1 years at 75 degrees Celsius
  - 11.6 years at 70 degrees Celsius

Radiation levels

- **Total ionizing dose:**
  - > 5 x 10⁵ rad (Si)

- **Single event upset:**
  - < 1 x 10⁻¹¹ upsets/bit day

- **Neutron fluence:**
  - > 1 x 10¹³ particles/cm²

- **Latchup-immune:**
  - ≤ 120 MeV-cm²/mg

For more information contact:

BAE Systems
9300 Wellington Road
Manassas, Virginia 20110-4122

T: 571 364 7777
E: space.contact@baesystems.com
W: baesystems.com

Cleared for open publication by the
U.S. Air Force Research Laboratory (AFRL) (Det 8), 02/12

Disclaimer and copyright

BAE Systems reserves the right to restrict component sales based on application and volume. Please contact the factory for more information.

This document gives only a general description of the product(s) and service(s) and, except where expressly provided otherwise, shall not form any part of any contract. From time to time, changes may be made in the products or the conditions of supply.

BAE SYSTEMS is a registered trademark of BAE Systems plc.
©2017 BAE Systems. All rights reserved.
CS-17-A28-05