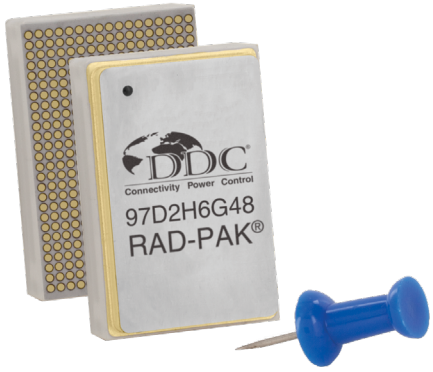
# DDR2 SDRAM
# CCGA Memory For Space

Product Brief

**Models: 97D2H**




DDC's DDR2 SDRAM is the 1st and only hermetically sealed ceramic DDR2 Memory for space, and features high speed operation with up to 8 Gbits of memory. Optional RAD-PAK® shielding provides greater total dose tolerance, to support missions with greater radiation exposure. Since inception more than 20 years ago, DDC's electronic components and single board computers have experienced zero failures in space!

## Key Features

*Performance*

- Up to 8 Gb of SDRAM memory in a single, small footprint and low-profile CCGA package
- High Speed Operation – Clock frequency up to 400MHz
  - 8 internal banks for concurrent operation
  - 4-bit pre-fetch architecture
- Refresh interval: 7.8 µs (8192 cycles/64 ms)
- Programmable access parameters
  - CAS latency: 3, 4, 5, 6 and 7
  - Write latency = read latency -1
  - Additive latency: 0, 1, 2, 3, 4, 5 and 6
  - Burst sequence: sequential or interleave
  - Burst length: 4 and 8
- A variety of data interfaces for FPGA's and processors: x8, x16, x32, x48, x64 and x80

*Operating & Environmental Specifications*

- RAD-PAK® radiation shielding provides greater than 100 krads (Si) Total Ionizing Dose (TID) Tolerance
  - Excellent SEU tolerance (report available)
  - Latchup threshold > 57 MeV $cm^2/mg$
- Radiation screening available up to DDC Microelectronics self-defined Class K (www.ddc-web.com/Product-Flow)
- Temperature range: -40°C to 105°C

## Benefits

*Greater Performance*

- Provides higher speed SDRAM (400 MHz) to increase memory throughput and maximize application efficiency

*High Reliability*

- Hermetically sealed ceramic CCGA package enables long dependable use and ease of design
- Optional DDC RAD-PAK® shielding guarantees radiation shielding throughout the life of the space mission
- Full die lot traceability and die lot TID testing ensures consistent, reliable performance from every part
- 5 screening flows from "Engineering" to "Flight Class" provide multiple options to match your budget to your needs and mission requirements

*Flexibility & Ease-of-Design*

- Universal compact package for multiple density and data width options
- Wide data bus options, for simple connectivity to Rad-Hard FPGAs and processors, with support for implementation of various error correction schemes

## Applications

- Space grade processor based systems and FPGA boards
- LEO, MEO, GEO, HEO, and deep space missions
- Satellites
- Launch vehicles
- Space systems and vehicles

**For more information:** www.ddc-web.com/DDR2

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## Overview

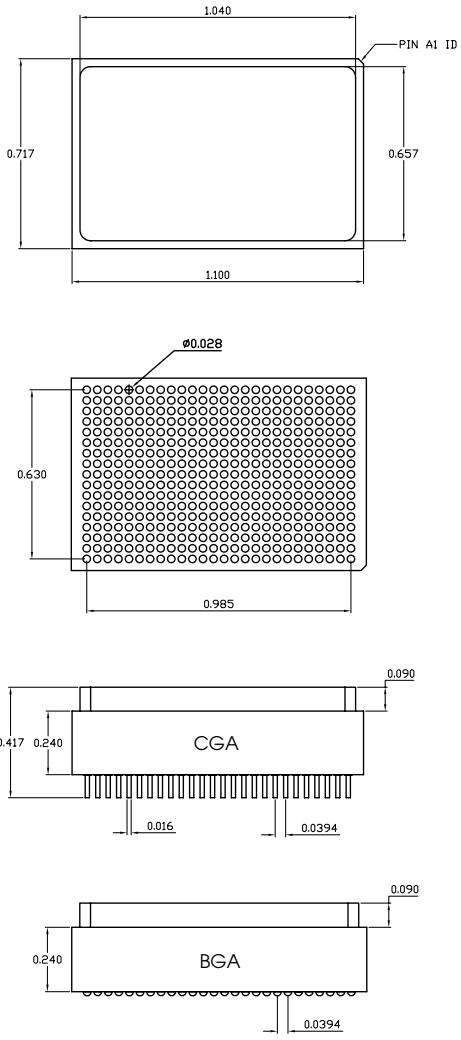
DDC's DDR2 SDRAM is the latest addition to our wide range of high density space grade ceramic hermetic memories, ranging from Flash (NAND/NOR), SDRAM, SRAM and EEPROM solutions.

The DDR2 memory is offered with the option of DDC's patented RAD-PAK® packaging technology, guaranteeing a greater than 100 Krads (Si) Total Ionizing Dose (TID) tolerance, to support space missions with greater radiation exposure. This product is available with screening up to DDC Microelectronics self-defined Class K.

## Additional Features

- Voltage: VDD and VDDQ = 1.8V ± 0.1V
- Auto refresh and self refresh
- Automatic and controlled pre-charge command
- ODT (On-Die Termination)
- Weak strength data-output driver option
- On-Chip DLL aligns DQ and DQs transitions with CK transitions
- Differential clock inputs CK and CK#

## Mechanical Outline




Note: All Dimensions in Inches

## Ordering Information

97D2HXGXX-RP-C-X

**Screening Flow**[1]
**K** = DDC Microelectronics Class K
**H** = DDC Microelectronics Class H
**A** = DDC Microelectronics Class A
**I** = Industrial
**E** = Engineering (testing @ +25°C only)

**Ceramic Package**
**C** = CGA (not available for E Screening Flow)
**B** = BGA (E Screening Flow only)

**Radiation Feature**
**RP** = RAD-PAK® Package Shielding
**RT** = Rad Tolerant

**Data Width**
**16** = 16 Bits Wide
**32** = 32 Bits Wide
**48** = 48 Bits Wide
**64** = 64 Bits Wide
**80** = 80 Bits Wide

**Memory**
**2** = 2 Gb
**4** = 4 Gb
**5** = 5 Gb
**6** = 6 Gb
**8** = 8 Gb

Example Configurations[2]:

| | Size | Organized as | DDC Model Number |
|---|---|---|---|
| 2 Gb x 16 | 2048Mb | 128Mx16 | 97D2H2G16 |
| 4 Gb x 32 | 4096Mb | 128Mx32 | 97D2H4G32 |
| 5 Gb x 80 | 5120Mb | 64Mx80 | 97D2H5G80 |
| 6 Gb x 48 | 6144Mb | 128Mx48 | 97D2H6G48 |
| 8 Gb x 64 | 8192Mb | 128Mx64 | 97D2H8G64 |

Notes:
1. DDC standard product flow specifications are available at www.ddc-web.com/Product-Flow
2. A variety of data width variants can be connected in parallel to support narrow data busses.

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