RICMOS™ SOI GATE ARRAYS

HX2000
HX2000r
FAMILY

FEATURES

- Fabricated on Honeywell's Radiation Hardened
  - 0.65 μm_{Leff} RICMOS™ IV SOI Process, HX2000
  - 0.55 μm_{Leff} RICMOS™ IV SOI Process, HX2000r
- Array Sizes from 40K to 390K Available Gates (Raw)
- HX2000 Supports 5V Core Operation
- HX2000r Supports 3.3V Core Operation
- HX2000r Supports Mixed Voltage I/O Buffers
- TTL (5V) or CMOS (5V/3.3V) Compatible I/O
- Configurable Multi-Port Gate Array SRAM
- Single or Dual Port Custom SRAM Drop-In Capability
- Supports Chip Level Power Down for Cold Sparing
- Supports System Speeds Beyond 100 MHz
- Total Dose Hardness $\geq 1x10^{6}$ rad(SiO_2)
- Dose Rate Upset Hardness:
  $\geq 1x10^{10}$ rad(Si)/sec, HX2000*
  $\geq 1x10^{9}$ rad(Si)/sec, HX2000r*

  Option Available for:
  $\geq 1x10^{11}$ rad(Si)/sec, HX2000*
  $\geq 1x10^{10}$ rad(Si)/sec, HX2000r*
- Dose Rate Survivability $\geq 1x10^{12}$ rad(Si)/sec*
- Soft Error Rate
  $\leq 1x10^{-11}$ Errors/Bit/Day, HX2000
  $\leq 1x10^{-10}$ Errors/Bit/Day, HX2000r
- Neutron Fluence Hardness to $1x10^{14}/cm^2$
- No Latchup

*Projected

GENERAL DESCRIPTION

The HX2000 and HX2000r gate arrays are performance oriented sea-of-transistor arrays, fabricated on Honeywell's RICMOS™ IV Silicon On Insulator (SOI) process. The HX2000 arrays are for 5V designs only. The HX2000r arrays support 5V and 3.3V operation. High density is achieved with the standard 3-layer metal or optional 4-layer metal process, providing up to 290,000 usable gates. The high density and performance characteristics of the RICMOS (Radiation Insensitive CMOS) SOI process make possible device operation beyond 100 MHz over the full military temperature range, even after exposure to ionizing radiation exceeding $1x10^{6}$ rad(SiO_2). Flip-Flops have been designed for a Soft Error Rate (SER) of less than $1x10^{-11}$ errors/bit/day in the Adams 90% worst case environment.

Each HX2000/HX2000r design is founded on our proven RICMOS ASIC library of SSI and MSI logic elements, configurable RAM cells, and selectable I/O pads. The gate arrays feature a global clock network capable of handling multiple clock signals with low clock skew between registers. This family is fully compatible with Honeywell's high reliability screening procedures and consistent with QML Class Q and V requirements.

Designers can choose from a wide variety of I/O types. Output buffer options include 8 drive strengths, CMOS/TTL levels, IEEE 1149.1 boundary scan, pull-up/pull-down resistors, and three-state capability. Input buffers can be selected for CMOS/TTL/Schmitt trigger levels, IEEE 1149.1 boundary scan and pull-up/pull-down resistors. Bi-directional buffers are also available.

An important feature of HX2000r is the dual voltage I/O capability in which the designer has complete flexibility in terms of placement of I/O buffers. This feature allows adjacent I/O buffers with different supply voltages.

The HX2000/HX2000r families provide options for configurable multi-port SRAMs. Word widths can be selected in single bit increments. A variety of SRAM read and write port options are available to serve most applications. Custom drop-in macrocells can also be implemented to further increase chip density. Word widths can be selected in two bit increments. Single port and two port options are available.

The HX2000/HX2000r families have a special feature to allow a chip level power down mode, in which the associated buses connected to the chip can remain active. This

HX2000 Characteristics		HX2040*	HX2080	HX2160	HX2300	HX2400
Total Core Gate Count		40K	85K	160K	295K	390K
Usable Gate Count	3-Layer Metal 4-Layer Metal (1)	27K 36K	53K 71K	91K 132K	156K 226K	200K 290K
Maximum Die I/O		132	176	240	336	372
Maximum Package I/O (2)		TBD	176	240	320	320
Typical Delay—2 Input NAND		270 ps at 5.0V, 290 ps at 3.3V				
Selectable I/O		Driver, Receiver, Bi-Directional, Three-State				
I/O Interface Levels		CMOS, TTL, Schmitt Trigger				
Typical Power Dissipation, µW/Gate/MHz		0.6 @ 5.0V, 0.22 @ 3.3V				
Operating Voltage	HX2000 HX2000r	5.0V ± 10% 3.3V ± 10% (Core & I/O) and/or 5.0V ± 10% (I/O)				
Operating Temperature		-55° C to 125° C				
Process Technology		RICMOS™ IV SOI				
Minimum Geometry	HX2000 HX2000r	0.65 µm Leff / 0.8 µm Drawn (5V) 0.55 µm Leff / 0.7 µm Drawn (3.3V)				

(1) Projected
(2) Design and package dependent.

* Planned Array

high impedance off-state buffer feature allows users to power down portions of their system for power savings or for cold sparing.

Logic designers need not have prior experience in radiation hardening. Honeywell's VDS™ Toolkit and RICMOS IV SOI libraries provide the necessary guidance to achieve first pass design success. The VDS Toolkit supports industry standard platforms including those offered by Mentor Graphics and Synopsys.

Honeywell can perform design translations to the HX2000 arrays from other CAD platforms. Our synthesis capabilities allow customers to use familiar CAD tools and libraries to map existing designs to Honeywell library components.

The HX2000 family of gate arrays is the right choice for your high reliability applications demanding high density and radiation performance. To learn more about Honeywell's variety of space components, call us at 612-954-2888.

To learn more about Honeywell Solid State Electronics Center, visit our web site at http://www.ssec.honeywell.com

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