

ASIC Technology

Product Letter

EA-9HD
0.35 μm Embedded Array

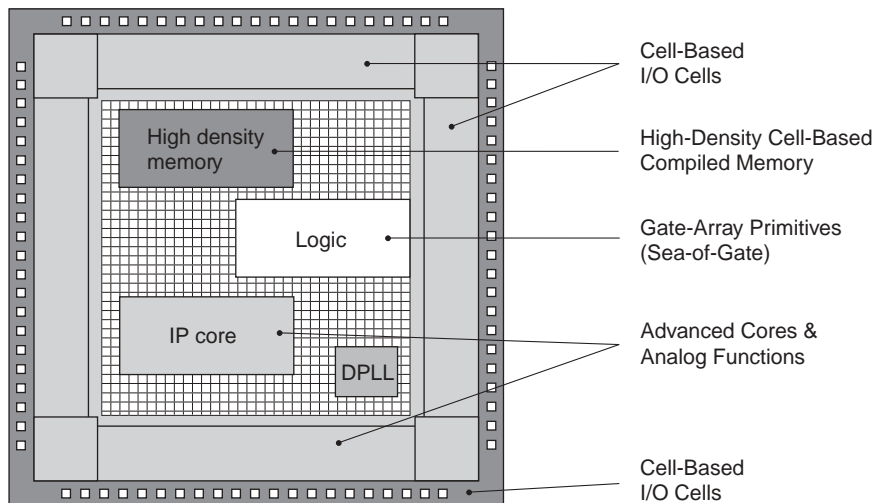
Description

The high performance density-enhanced 0.35 μm (0.25 μm effective) EA-9HD embedded array family offers support for embedded high density macros combined with a short TAT of a gate array resulting in a time-to-market advantage. NEC Electronics combines high performance CMOS gate array primitives with diffused embedded mega functions such as RAM, ROM, and analog macros.

Features

- 0.35 μm process Si-gates, 3-layer metal wiring, 4-layer metal wiring
- 10 base arrays with 76 k to 1.6 M gates
- Optimised 3.3 V architecture
- Low power dissipation of 0.16 $\mu\text{W}/\text{MHz}/\text{gate}$
- High speed with 94 ps internal gate delay
- Very high pin count by using 60 μm pad pitch
- 5 V tolerant I/O buffers
- Cell based I/O structure incl. LVDS, HSTL, GTL+, PCI, ...
- Embedding of memory macros
- Very short TAT after specification of mega-macros

Block Diagram



Product Outline

Integration level	Row gates (max.)	2,521,344
	Usable gates (max.)	1,386,739
	I/O ports (max.)	876
Toggle frequency (min.)	670 MHz	
Delay time	internal	94 ps (F/O = 1, l = 0 mm); 108 ps (F/O = 2, l = 0 mm)
	input	222 ps
	output	1.3 ps ($C_L = 15$ pF) ^(9 mA type)
Power consumption	0.16 μ W/MHz/gate	
Power supply voltage	3.3 V \pm 0.3 V	
Operating temperature	-40°C to +85°C	
Interface support	3 V/5 V CMOS, LVTTTL level, Fail Safe GTL, GTL+, 3.3 V/5 V PCI 66 MHz, HSTL, SSTL, AGP, USB, PECL, LVDS	
Technology	Channelless (Sea-of-Gates) 0.35 μ m silicon gate CMOS, 3 Al-metal layers, 4 Al-metal layers	

Data is given for SOG-section of EA-9HD

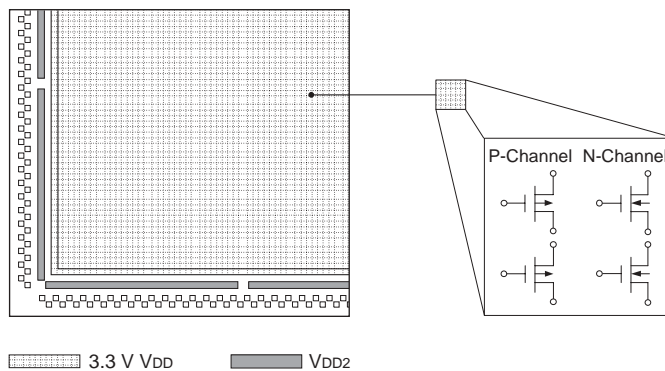
Architecture

Description

The EA-9HD gate array family is built within a 0.35-micron (drawn) channelless array architecture and NEC's I/O and Power Rail Structure.

Core Region

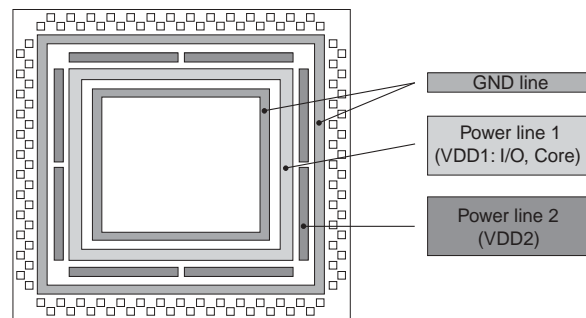
The core region consists of an array of gates (sea-of-gates). Each gate contains 2 n-channel and 2 p-channel MOS logic transistors. One core gate is equivalent to one 2-input NAND gate.



Interfacing

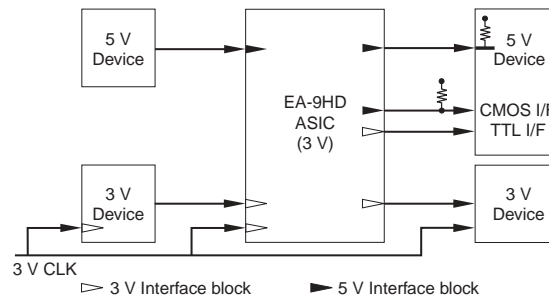
I/O Region

The I/O region contains input and output buffers. The EA-9HD gate array's architecture provides extra flexibility for high performance system designs. As shown in the figure, the arrays contain two power rails: a 3.3 V rail and a second power rail (V_{DD2}) for special I/O types. The V_{DD2} rail may be separated into sections to allow one device to support two or more buses requiring special I/O voltages. Examples of spread I/O cells that may use this V_{DD} rail are HSTL and 5 V PCI. Each section can operate as an independent voltage zone, and sections can be linked together to form common voltage zones.



5 V tolerant I/Os

EA-9HD supports 5 V interfacing which enables a mixed system using 3.3 V and 5 V devices. As the figure shows, NEC's interface library allows direct interfacing to 5 V devices. Output levels are compatible to 5 V TTL specification, input levels are compatible to 5 V CMOS and TTL specification. Both are internally protected against damaging and no additional 5 Volt supply voltage is necessary.



HSTL/PCI Interfacing

For designs using HSTL or PCI I/O blocks, the power rail structure described above supports the additional supply voltage of 1.4 to 1.6 V (V_{DDQ} for HSTL) or 3.3 Volt (for PCI) in different power rails and pin assignment. All four classes of HSTL buffer are supported.

NEC Offices

NEC Electronics (Europe) GmbH

Arcadiastr. 10, 40472 Düsseldorf, Germany

Tel. 0211 65030, Fax 0211 6503-1327

- Podbielskistr. 164, 30177 Hannover, Germany

Tel. 0511 33402-0, Fax 0511 33402-34

- Arabellastr. 17, 81925 München, Germany

Tel. 089 921003-0, Fax 089 921003-15

- Industriestr. 3, 70565 Stuttgart, Germany

Tel. 0711 99010-0, Fax 0711 99010-19

- **Sucursal en España**, Juan Esplandiu 15, 28007 Madrid, Spain

Tel. 091 504-2787, Fax 091 504-2860

- **Succursale Française**, 9, rue Paul Dautier, B.P. 52, 78142 Vélizy-Villacoublay Cédex, France

Tél. 01 306758-00, Fax 01 306758-99

- **Filiale Italiana**, Via Fabio Filzi, 25A, 20124 Milano, Italy

Tel. 02 66754-1, Fax 02 66754-299

- **Branch The Netherlands**, Boschdijk 187a, 5612 HB Eindhoven, The Netherlands

Tel. 040 265 4010, Fax 040 244 4580

- **Tyskland Filial**, Täby Centrum, Entrance S (7th floor), 18322 Täby, Sweden

Tel. 08 6380-820, Fax 08 6380-388

- **United Kingdom Branch**, Cygnus House, Sunrise Parkway, Linford Wood,

Milton Keynes, MK14 6NP, United Kingdom

Tel. 01908 691133, Fax 01908 670290

Web: www.ee.nec.de

Offices world-wide: www.ee.nec.de/global

Distributors in Europe: www.ee.nec.de/distributors

© Published by NEC Electronics (Europe) GmbH, Printed in Germany, December 2004

Document No. A14305EE2V0PL00

With compliments

NEC makes no warranty with respect to this documentation and disclaims any implied warranties of merchantability or fitness for particular purpose.

NEC does not assume any responsibility for circuits shown or claim that they are free from patent infringement. Product specifications are subject to change without notice. To ensure that you have the latest product data, please contact your local NEC sales office.

© NEC Electronics (Europe) GmbH