

# NEC Electronics FB-DIMM Advanced Memory Buffer

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# NEC Electronics Corporation Overview

- ❑ November 1, 2002 (separated from NEC Corporation)
- ❑ Headquarters in Kawasaki, Kanagawa Prefecture, Japan
- ❑ Subsidiaries including NEC Electronics America and others
- ❑ 24,000+ employees worldwide
- ❑ Worldwide design, manufacturing and assembly in America, Asia, Europe and Japan
- ❑ 2003 net sales \$6.3 billion
- ❑ NEC Electronics (system LSI only) ranks no. 8 in 2003 Dataquest's "Worldwide Revenue from Shipments of Total Semiconductor" ranking
- ❑ 26,400 proprietary patents (top 4 in U.S. patents issued since 1995)

# NEC Electronics' Three-Solution Model



## Advanced Technology Solutions

for high-speed IP cores and other advanced applications  
(server, networking, storage, workstation, broadband, communications, game)

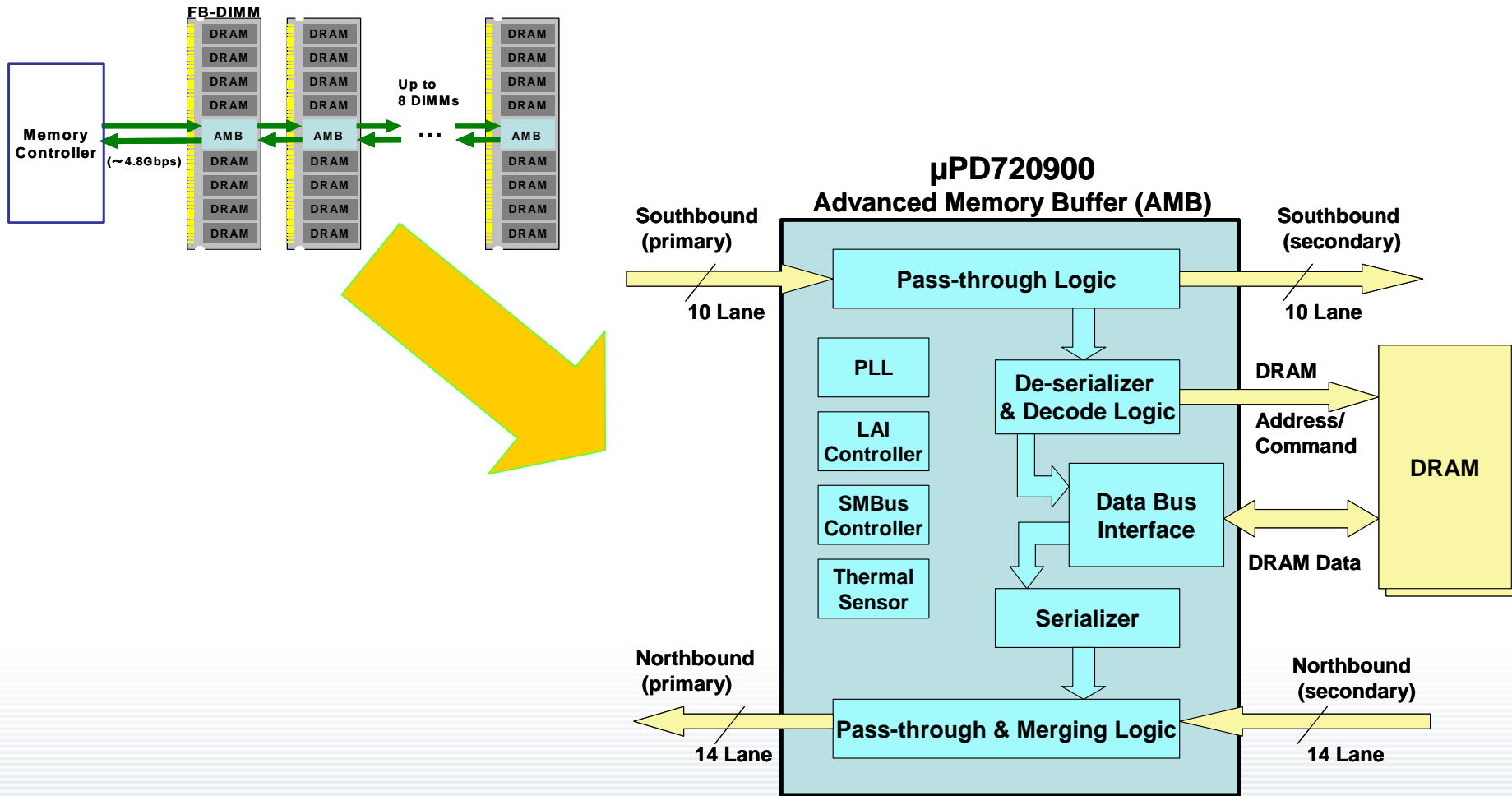
## System Solutions

for systems that need differentiation  
(cellular, PC peripherals, automotive, digital consumer)

## Platform Solutions

for ease of design and shorter design TAT  
(MCU, gate array, SRAM, discrete)

# NEC Electronics AMB Offering



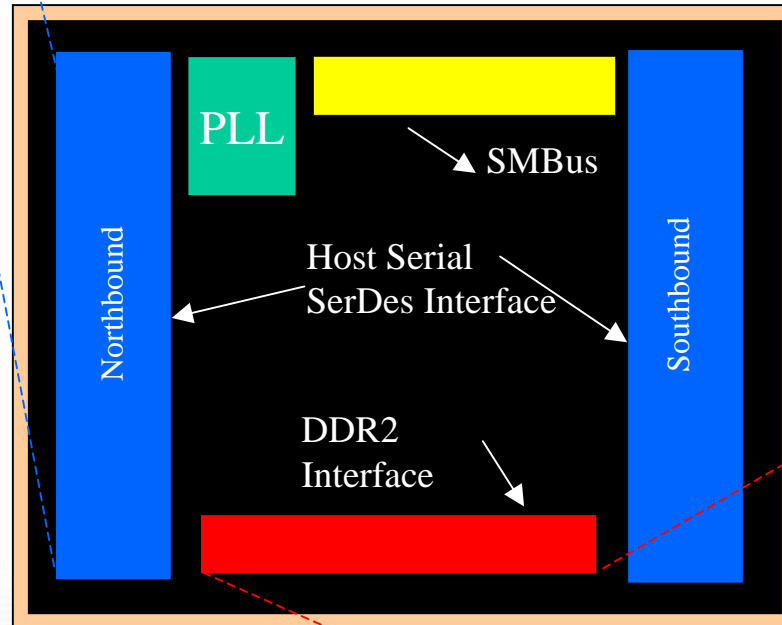
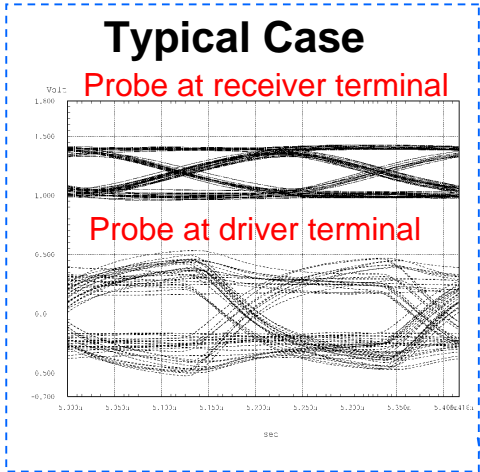
# AMB Specification

(NEC Electronics Part No.  $\mu$ PD720900)

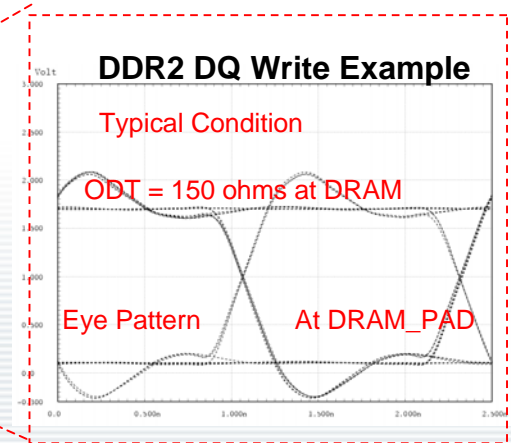
- 3.2, 4.0 or 4.8 Gbps FB-DIMM channel bit rate
- Direct connection to DDR2-533, DDR2-667 and DDR2-800
- Forwarding of southbound and northbound frames
- Fully Buffered DIMM (FB-DIMM) configuration register set
- All FB-DIMM failover modes to minimize system down time
- LAI (Logic Analyzer Interface) mode for debugging
- Transparent mode for DRAM testing
- Logic to support MEMBIST and IBIST design for test (DFT) functions
- Interface for the thermal sensor and status indicator
- Capability to function as a repeater to extend FB-DIMM links

# NEC Electronics High-Speed Interface Transmitter Waveform

**Part Number**  
**μPD720900**



**655 FCBGA**



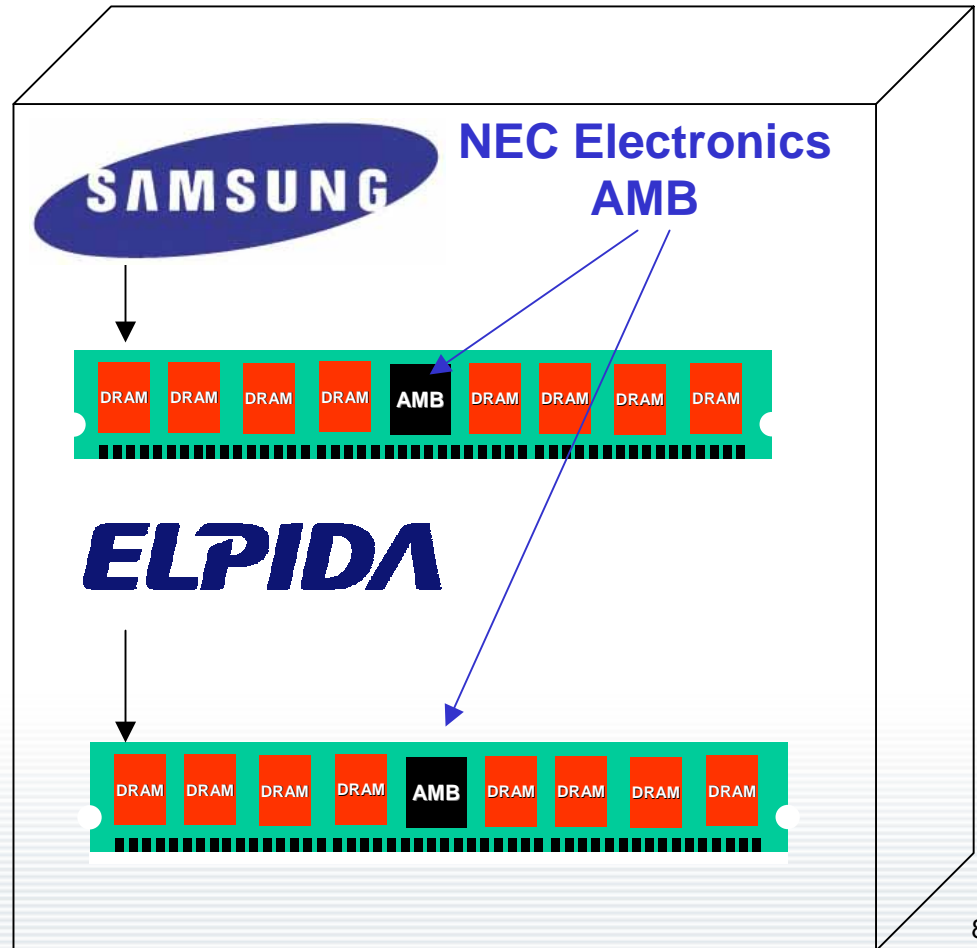
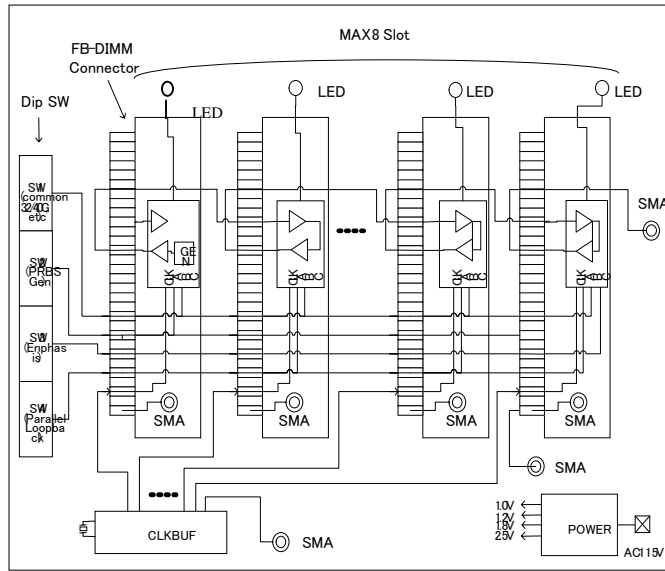
# Bottom Line: Quality, Reliability, Serviceability

- ❑ Consistent quality key to NEC Electronics' reputation
  - Component quality (ASIC, ASSP, ASCP, etc.)
  - Engineering expertise (GHz design, SerDes design, deep sub-micron design, compatibility)
  - High-volume manufacturing expertise
  - High-end ASIC and SerDes testing expertise (PCI Express, XAUI, USB)
- ❑ Good relationship with customers: OEM, ASIC, technology drivers
- ❑ Support for multiple platforms, including Intel's
- ❑ Will work with DIMM vendors for AMB technical support
  - Will support your DIMM validation
    - Validation on system board with host
    - Validation on DIMM board without host
  - Will support LAI mode for analyzing the high-speed signals

# NEC Electronics AMB Demo

*AMB with FB-DIMM (Samsung, Elpida)*

*AMB Northbound/Southbound  
Signal Integrity Demo*



## NEC Electronics AMB Summary

- ❑ NEC Electronics is a vendor-neutral provider of its AMB ASSP for major FB-DIMM suppliers.
- ❑ NEC Electronics has a lengthy, proven record of being a key member in working groups for industry-standard interface technologies such as PCI Express, USB, Wireless USB and Serial ATA.
- ❑ Mass production of NEC Electronics' AMB ASSP is scheduled for 1H 2005. Please contact us for engineering samples.
- ❑ Please visit us in the Memory Community, booth #710.

# NEC Electronics America, Inc.

[www.necelam.com](http://www.necelam.com)