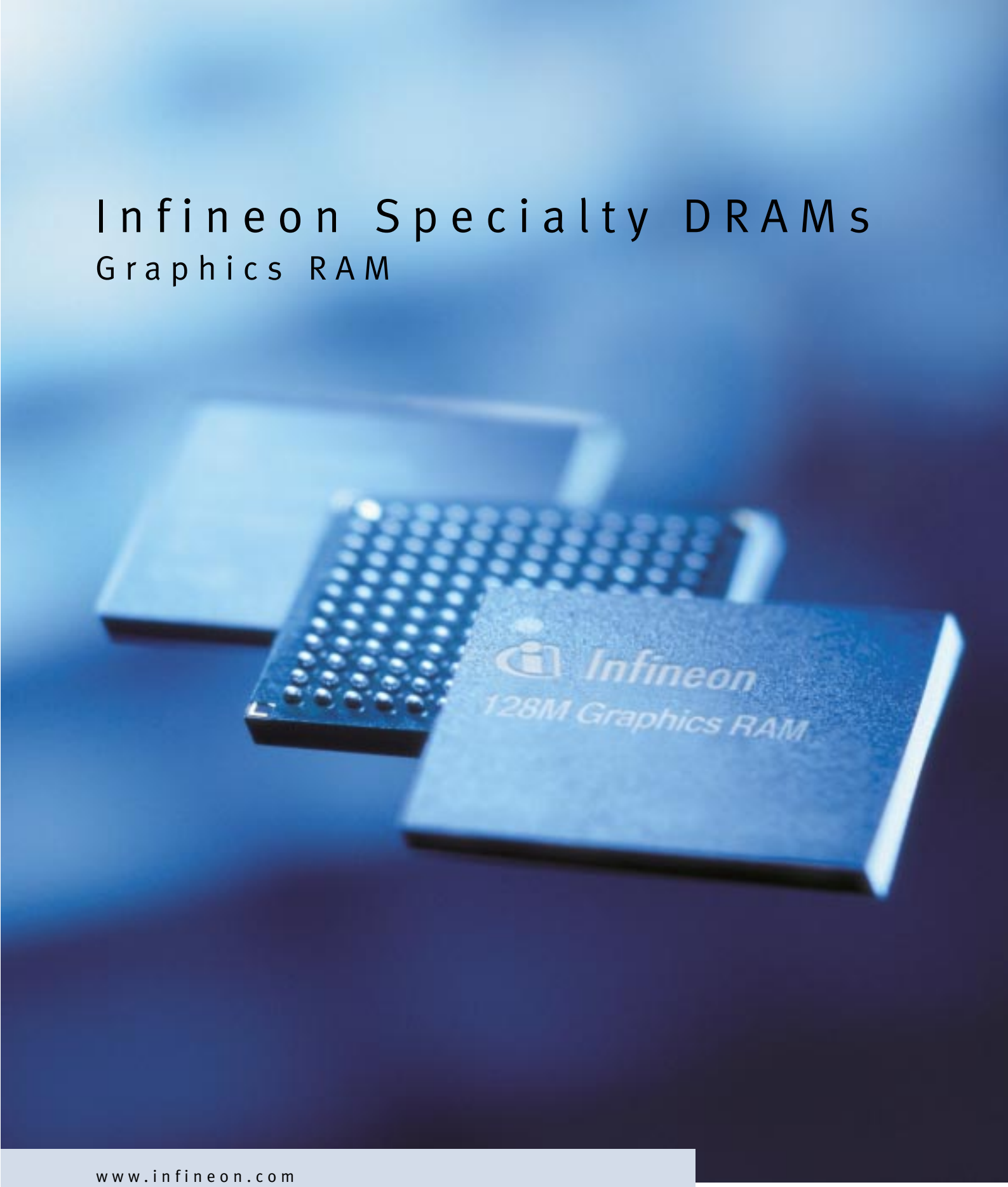
Infineon Specialty DRAMs

Graphics RAM



www.infineon.com

Infineon technologies

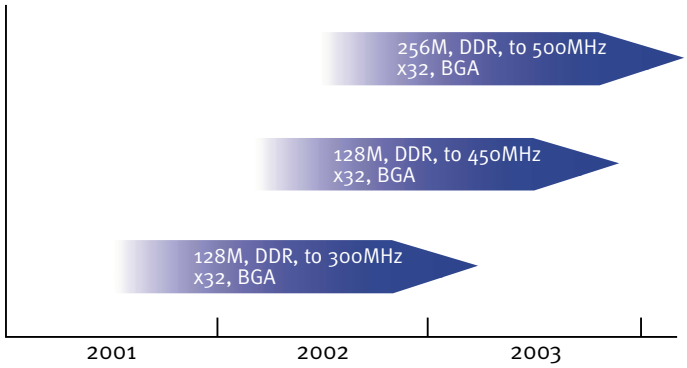
Never stop thinking.

GRAPHICS MEMORIES

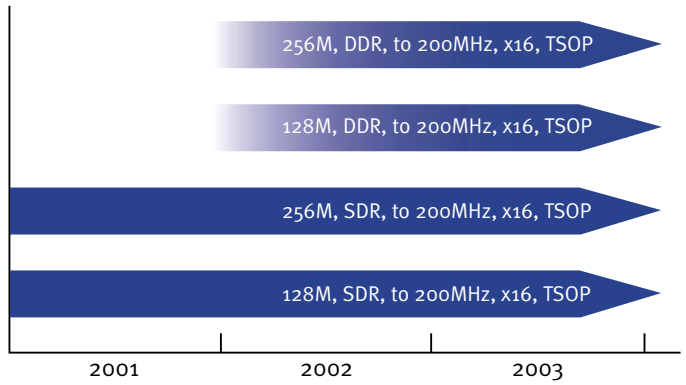
The dominant main memory architectures (SDR, DDR) started out as graphics memories. Infineon's 1Mx32 DDR SDRAM established DDR as the new standard for bandwidth-hungry 3D graphics. It featured in leading add-in graphics cards for PC games enthusiasts and established a new performance benchmark for graphics memory.

3D Graphics never waits!

3D graphics is a compelling feature of the desktop PC and offers the opportunity for product distinction in the PC market. The leading 3D graphics processors are now programmable and support advanced texturing techniques which enable lifelike realization of complex visuals. Games developers will take full advantage of this to produce games with amazing imagery. Frame buffers will need to grow in bandwidth and size to accommodate the new software features. The demand for bandwidth and memory density plus a clear desire for 3D graphics to become available to a wider range of platforms are the drivers behind specialist graphics memories.



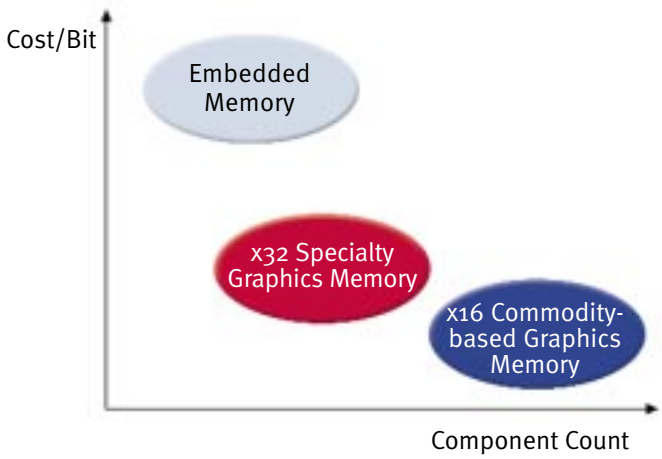
Graphics RAM Product Roadmap



Commodity DRAM for Graphics Roadmap

A Complete Portfolio

In addition to specialist x32 graphics memories, Infineon offers main memory components 8x16 and 16x16, SDR and DDR, in fast speed grades of 166, 183 and 200MHz memory clock as cost effective graphics memories. Of course underneath the surface lurks the innovative design and engineering expertise synonymous with the name Infineon in 3D graphics memory.

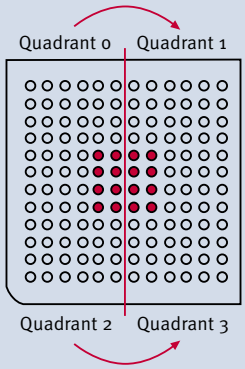


4M X 32 DDR GRAPHICS RAM

Infineon continues to drive memory technology aggressively, launching the 4M x 32 DDR SDRAM in 2001 with a range of novel and technology-leading features. This is followed with a higher bandwidth product in 2002.

BGA Package

Critical issues of electrical performance, power dissipation, case temperature and form factor are addressed by BGA packaging. The 128Mbit SDRAM has a 4M x 32 organization and features a JEDEC-standard Ball Grid Array (BGA) package supporting clock frequencies up to 300MHz, breaking bandwidth barriers imposed by TSOP and TQFP packages. Additionally, the BGA package ball-out of 12 x 12 incorporates 16 “thermal” balls for cooling.

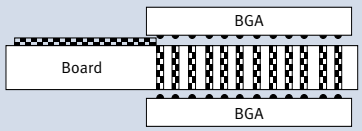


Ball Count: 144, Dimension: 11 x 11 mm, Height: 1.5 mm

Matched Impedance Interface

The 128Mbit Graphics RAM introduces a 2.5 V “Matched Impedance” interface. This will be critical to reach the high performance levels required of 3D graphics cards and can reduce the termination bill of materials (BOM).

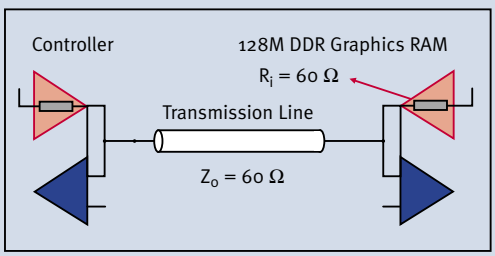
- **Minimise routing issues** self-mirrored symmetrical ball-out for DQ, DQS, Address
- **Shorter traces** through-board connection
  → matched signal flight times from memories
- **Reduced PCB form factor**, buffer/cache is extended on reverse side



Mirror Ball-out

Single-version mirror-mounting is introduced. The new mirrored ball-out means “thru-via” connections can be achieved with the same device on both sides of the PCB. The result is minimal routing efforts with best signal integrity for high speed applications.

Matched Impedance Mode



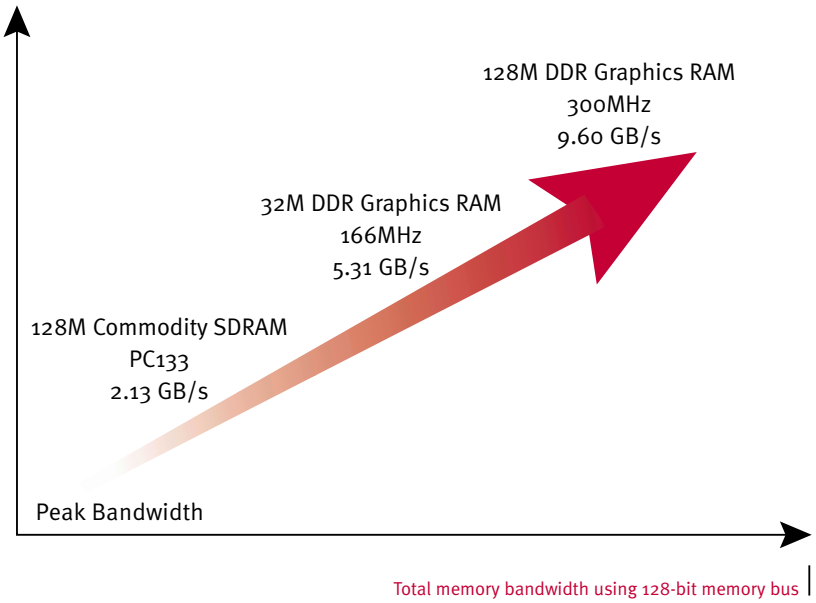
Application: Point-to-Point System

4M X 32 DDR APPLICATIONS

3D graphics is a great technology and cost driver for performance memory applications.

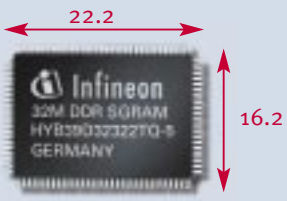
Desktop PC

Desktop PC graphics is constrained by memory bandwidth. Infineon continues to attack this barrier, 4Mx32 DDR BGA offers up to 9.6GB/s in a typical graphics frame buffer. Novel small form factors for DT PC require a reduction in the space taken up by graphics boards. The increasing prevalence of fully featured multimedia boards with TV capabilities places further pressure on available video card space. 4Mx32 DDR BGA has the smallest form factor available.

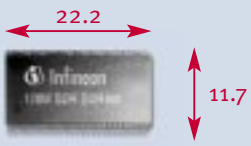


Notebook PC

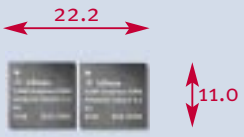
Notebook PC is viewed as a desktop PC replacement, but graphics capability is compromised in performance and size to meet power and form factor budgets. Infineon's 4Mx32 DDR SDRAM offers high bandwidth, low power and a small form factor. Compared to standard TSOP or TQFP graphics memories, the form factor of the 4Mx32 DDR BGA memory is reduced by more than a factor of two. Compact graphics solutions enabled with 4Mx32 DDR BGA memory mean jaw-dropping 3D graphics will be possible across a range of Notebooks from performance to light.



32M DDR SGRAM
TQFP 100



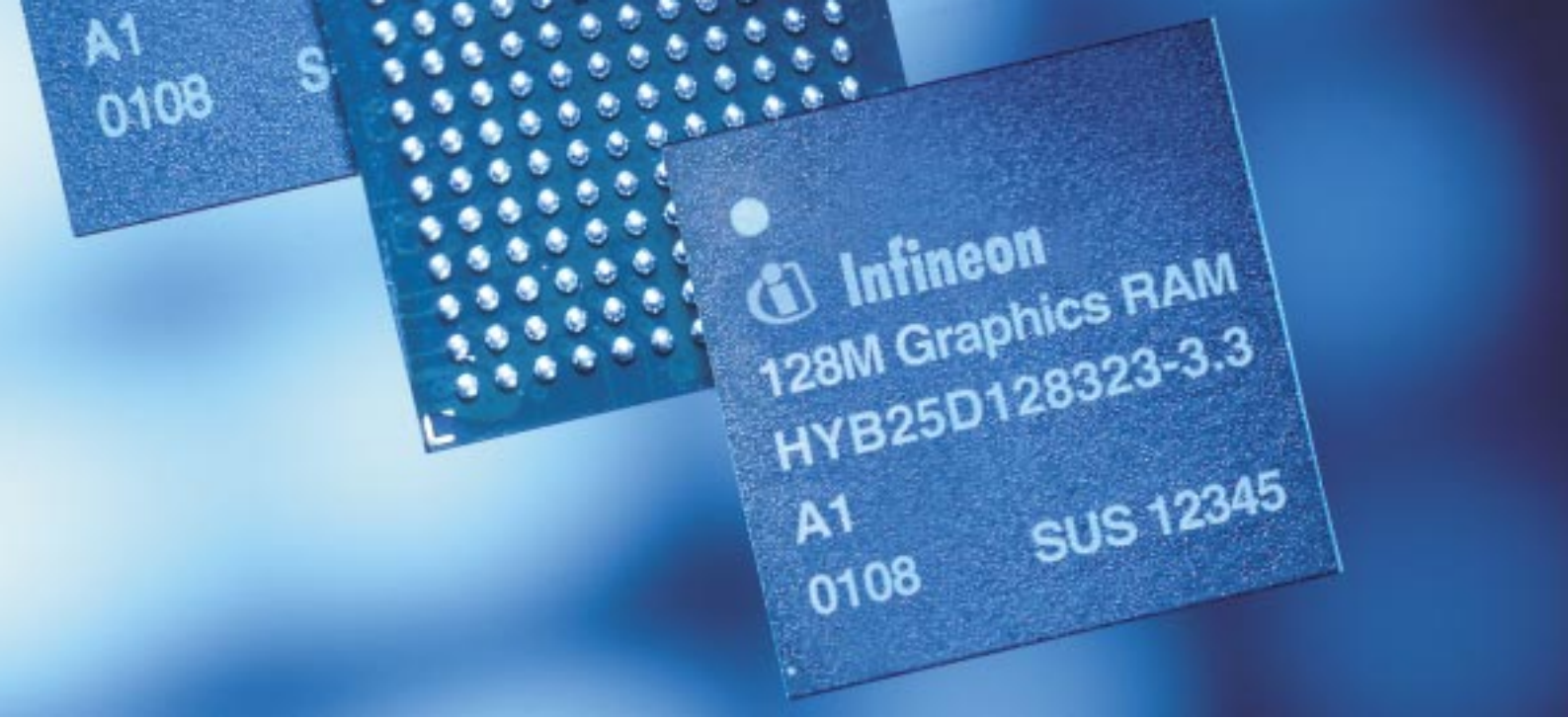
128M SDR SDRAM
TSOP 54



128M DDR Graphics RAM
TF-XBGA 144

Bandwidth is not limited to 3D Graphics

Fast data buffers or caches can utilize specialist graphics memories resulting in excellent cost-performance optimization. The available bandwidth, with up to 300MHz memory clock, will satisfy bandwidth-intensive applications, and x32 organization means wide bus coverage with low component count.



INFINEON GRAPHICS MEMORIES – AVAILABLE PRODUCTS

Available Products	Example part number
4M x 32 DDR, -5, -3.7, -3.3	HYB 25D128323C - 3.3
8M x 16 SDR, -6, -5.5, -5	HYB 39S128160CT - 6
8M x 16 DDR, -6	HYB39D128160AT - 6
16M x 16 SDR, -6	HYB39S256160CT - 6
16M x 16 DDR, -6	HYB39D256160BT - 6

Key Features

- 128 Mbit (1M x 4 Banks x 32 Bits)
- 300 MHz DDR → 600Mbit/s/pin
- Programmable CAS latency of 2, 3 and 4
- Programmable Burst Length of 2, 4 and 8
- Integrated DLL
- TF-XBGA 144 Package (128 electrical plus 16 thermal balls)
- Self mirrored symmetrical ball-out for DQ, DQS, Addresses
- 2.5 V_{DD} and 2.5 V_{DDQ} Matched Impedance Mode

4 M x 32 DDR SGRAM Applications

- 3D graphics Add-in Card (AIC) for Desktop PC (64MB, 128MB)
- Low-profile AIC for small form-factor PC
- Multimedia AIC (including TV tuner)
- 3D graphics for Notebook
- Networking
- Applications with space restriction
- Applications without cooling

Datasheed are available at: www.infineon.com/memory

Published by Infineon Technologies AG

Ordering No. B166-H7962-X-X-7600
Printed in Germany
WS 07015.

Z+P 2002181