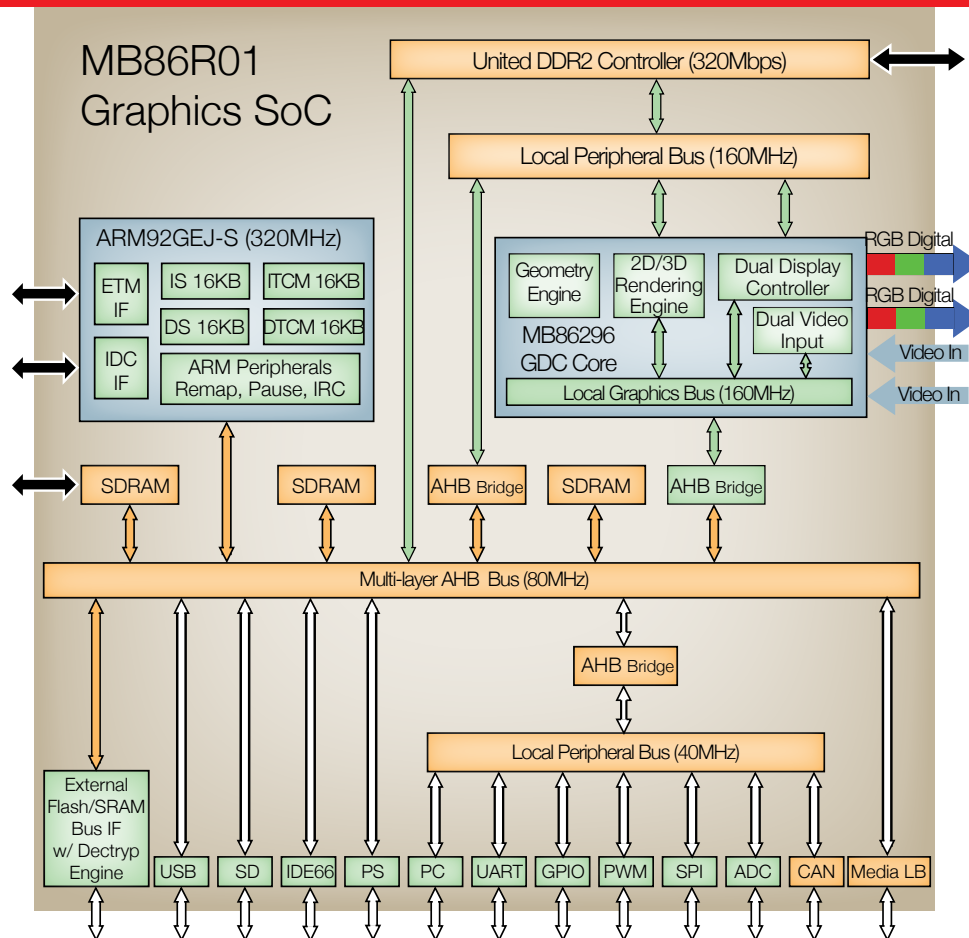


# MB86R01 Graphics SoC "Jade"



## Description

The new generation of Graphics Display Controllers (GDCs) from Fujitsu feature an SoC architecture based on the ARM926 core. The first offering in the new series, the MB86R01, incorporates Fujitsu's well established MB86296 3D graphics core that has been upgraded to support high speed DDR memory. Fabricated in Fujitsu's standard 90nm process, the MB86R01 SoC is targeted to provide the optimal balance of power (low leakage current) and performance.

The MB86R01 Graphics SoC features a hierarchical bus system that isolates high performance functions, such as 3D graphics processing, from routine operations such as low speed I/O. Fujitsu has designed the ARM processor to run at twice the rate of the graphics core to reduce memory bus contention between these two primary functions. (Note the ARM is running at 333 and the graphics core at 166MHz.)

Central to MB86R01's architecture is a full 3D geometry processing unit that is capable of performing all primary 3D operations including transformations, rotations, back face culling, view plane clipping and hidden surface management.

This device features a display controller that supports two capture sources (YUV/ITU656 or RGB) and enables both upscaling and downscaling of the video image. The video may also be mapped to any one of the six display layers and may be texture-mapped to polygons to create special effects. The display controller is also capable of dual digital outputs, supporting multiple monitor configurations in different resolutions. The content may either be the same or unique to each panel. For example, a single MB86R01 controller could support a 1024 x 768 resolution center console featuring a navigation system and an 800 x 480 resolution rear seat display for displaying video. The menu buttons or icons might be shared between the two displays.

The MB86R01's six display layers may be viewed as six individual frame buffers or individual canvases that may

each contain unique content. The layers can be optimally sized to save memory and improve system throughput and graphics performance. Consider a menu bar example. If the actual graphics area is only 60 x 400 pixels, the device allows the layer to be set to match the display area of 60 x 400 while underlying layers may be a full resolution of up to 1080 x 768. Once the layers have been created by either rendering or blting, the GDC blends the content in real time, eliminating the need for a final frame buffer which would impact performance and increase the amount of memory required.

In addition to multiple layers, the Fujitsu GDCs offer a variety of alpha blending and transparency options that designers can use to create special effects and to improve anti-aliasing of bitmaps and fonts.

The MB86R01 also features two hardware cursors and each cursor may be a bitmap of up to 64 x 64 pixels. Movement of the cursor is a simple process of specifying the address for only the upper left pixel in the cursor bitmap. The cursors do not consume layers or video memory; they are essentially free with respect to processing overhead and memory utilization.

In addition to graphics, the MB86R01 GDC device supports two CAN ports, FlexRay™, and a Media LB port to connect to a MOST INIC (Intelligent Network Interface Controller) chip such as the Oasis OS81050.

A wide variety of interfaces are also available: SD Card interface, IDE, USB, SPI, UARTS and a Flash/ SRAM port. ADC and DAC are also included.

## Key Features

### ARM926

- 16-bit data and instruction cache
- 320MHz operation
- 32-bit bus
- ICE interface for emulation

### 2D/3D GDC

- MB86296 GDC core
- Alpha blending
- Anti-aliasing (unweighed algorithm)
- Texture mapping
- Z-buffer (16-bit)
- Polygon drawing
- 8, 16 and 24 bpp color depths
- Bit blt (multiple options)
- Performance up to 500k polygon/sec and 75m pixel/sec
- Dual display (RGB)
- Dual capture (YUV)

### Special Features

- CAN (2 ports)
- FlexRay
- Media LB
- ADC
- DAC

### I/O

- SD card
- USB (H & F)
- IDE-66
- Flash/ SRAM
- UART(s)
- SPI
- PWM
- GPIO(s)

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