

Graphics Display Controllers

Medical Applications Overview



Graphics Display Controllers for Medical Devices

Many medical devices rely heavily on visual displays. Products such as infant monitors, anesthesia systems, and ventilators use charts, graphs and icons to display vital statistics so that people can quickly and easily see what's happening.

In such applications, accuracy and reliability are key.

That's why medical device designers rely on Fujitsu for the sophisticated display technology that makes such products possible.

Market Leadership

Fujitsu is the market leader for embedded graphics display controllers (GDCs), which are increasingly being used to create accurate, easy-to-read, user-friendly displays in medical equipment.

Fujitsu has been active in the embedded graphics market for more than 10 years and in the graphics space for nearly 20. This proven track record provides developers of medical devices the assurance they need as they design equipment that literally can make the difference between life and death.

What's more, Fujitsu is committed to bringing the most advanced GDCs to market and to making those products available for 10 years or more, much longer than most applications require.

Graphics Display Technology

Fujitsu optimizes its products for embedded applications that require support for multiple, high-resolution display panels, such as are used in medical-screening or vital-signs monitors. The Fujitsu GDCs strike the right balance between performance and power, and between features and costs.

Fujitsu GDCs are unique in that they incorporate a graphics processing unit (GPU) and an equally powerful display controller unit (DCU) in a single device, giving designers a high degree of flexibility in how graphics are processed and displayed.

The core of the Fujitsu GDC is a powerful graphics engine capable of rendering realistic 2D and 3D graphics to screen sizes up to 1600 x 1200, while consuming little power (only two to three watts of power under normal conditions and up to four watts in the most extreme scenarios).



Layers for Flexible Display Options

Fujitsu incorporates many special features designed specifically for high reliability applications. A layered display structure provides six to eight separate frame buffer layers. This assures that information is where it needs to be and is easy to see—essential components when dealing with clinical information.

Each layer is capable of managing unique content that can be rendered, captured from one or more video sources, blitted from a bitmap library, or a combination of these options. These functions are carried out in the display controlled block where the processing has little or no impact on the GPU, which might be simultaneously processing the rendering.

At least four of the layers have separate color palettes. Each layer is independent, so that different information can be displayed differently and at different speeds. That means that, for example, critical vital-signs data can be displayed faster than less crucial information.



Add to the mix many other special features—such as direct and palletized color, video capture and scaling, and a wide range of alpha and transparency settings—and it's clear the Fujitsu DCs have no equal in the embedded market.

MEDICAL APPLICATIONS FOR FUJITSU GDCS



Infant monitors



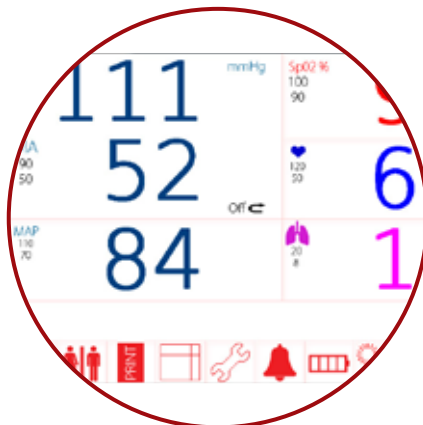
Ventilators



Patient monitors



Ambulatory monitors



Vital signs monitors



Anesthesia systems



Three Product Families

These capabilities are available in three product families, “Indigo,” “Jade” and “Emerald.” The families, which feature up to three variations, meet the needs of applications from the relatively simple to the most sophisticated 2D and 3D displays.

“Indigo” is a sprite-based, non-rendering GDC that includes many peripheral-support functions such as backlight control, an advanced sound generator, and six stepper motor controls. A high-speed, serial APIX® interface supports bi-directional communications.

“Jade,” which is based on the 330MHz ARM® 926 core, is designed for high-end, high-volume embedded graphics applications. The product line supports 2D and full 3D

rendering, and provides dual-display support, video capture and DDR2 interfaces.

The flagship “Emerald” family features the high-performance ARM Cortex™-A9 CPU operating at either 400MHz or 533 MHz. That processing power, together with four video inputs and up to three display outputs, enables high-speed image processing of data.

These GDCs have been used in a wide variety of industrial and commercial applications, including extensive use in automotive applications. Like medical applications, automotive displays need to be accurate, reliable and clear. In both cases, missing an important piece of information could mean the difference between life and death.

Product	Description	Embedded Processor
MB88F33x “Indigo”	Sprite-based GDC with an APIX interface designed to be used in conjunction with “Jade D” or MB86R1x “Emerald series”	No
MB86R03 “Jade -L”	2D/3D, DDR2, dual display/single capture. Interfaces: SD (1), I ² C (2), I ² S (3), PWM (2), UART (6), GPIO (24)	ARM926E
MB86R01 “Jade”	“Jade L” features plus USB, Media LB, IDE66	ARM926E
MB86R02 “Jade-D”	“Jade” plus an APIX (USB, IDE removed) dithering unit added to the display controller	ARM926E
MB86R11 “Emerald-L”	3D GDC core supporting OpenGL ES 2.0 plus new PixBlt engine for enhanced 2D processing. Four video-capture ports, with the ability to drive five displays. Interfaces include: Ethernet (1), SD (3), USB (2), I ² C (5), I ² S (4), PWM (12), UART (6), GPIO (125), CAN (2), SPI (2), QSPI (1)	Cortex-A9
MB86R12 “Emerald-P”	Faster CPU (533 MHz) and graphics core (266MHz). Four high-speed APIX 2.0 ports – three outputs and one input. Rated for an -40 to +105 degree C operating range	Cortex-A9

Support



To help designers, Fujitsu offers a comprehensive set of software and hardware tools, including the CGI Studio, a software development platform for the creation of 2D and 3D graphical interfaces. These authoring tools allow for easy design of human machine interface (HMI) and graphical user interfaces (GUI), essential for easy-to-read displays of timely, accurate medical data.

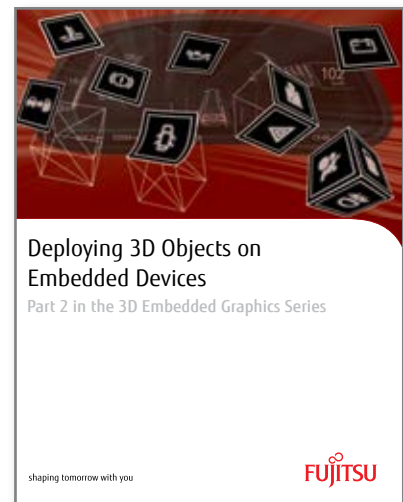
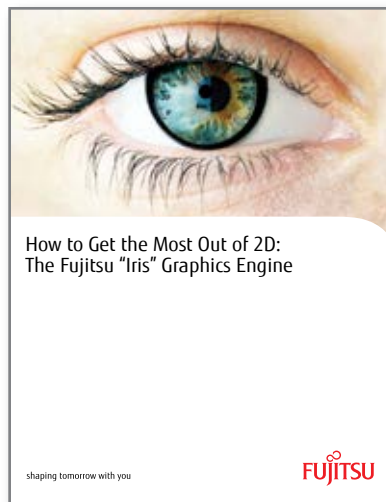
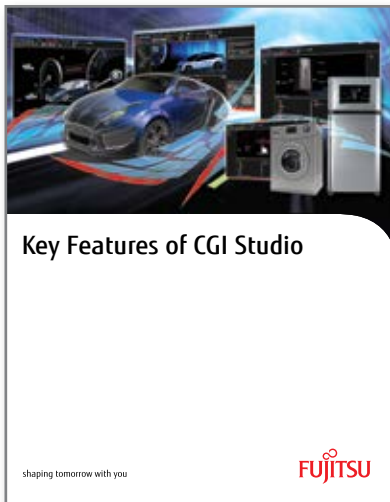
The company controls the entire GDC process from development through manufacturing. This helps assure constant quality, a stable supply and long-term support.

In short, sophisticated product technology known for its quality, accuracy and reliability. Product families with large feature sets. Extensive experience and a long-term commitment to the industry. It's no wonder Fujitsu is the leader in the graphics display controller market.

More information is available at <http://us.fujitsu.com/semi/gdc>.

Additional resources

You can learn more about Fujitsu GDCs, read our latest technical papers, and download product documentation by visiting <http://www.fujitsu.com/us/semiconductors/gdc/doc/>



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