Fujitsu offers an extensive family of application specific standard products and platform solutions:

**Graphics Display Controllers**         **Video and Image Processors**         **Memory Solutions**

For more information, please visit [http://us.fujitsu.com/semi](http://us.fujitsu.com/semi).

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**Graphic Display Controllers**

Fujitsu is the global leader in graphics display controllers (GDCs) designed specifically for embedded applications. Fujitsu combines advanced, proprietary display controller functionality with higher performance graphics-rendering capability to produce single-chip and chipset solutions that use TFT LCD panels. Fujitsu is a secure supplier for embedded graphics applications, with a GDC roadmap well-established through 2019.

Specifically, the Fujitsu GDCs combine powerful 2.5D/3D Graphics Processing Units (GPUs) with Fujitsu’s advanced Display Controller Unit (DCU) capability. DCUs provide a highly efficient, cost-effective way to blend 2D and 3D images onto multiple layers comprised of varying color depths and alpha settings. Offloading this function to the display controller frees up memory and the GPU for rendering-based tasks.

At the core of the Fujitsu GDCs is a powerful graphics engine capable of rendering realistic 2.5D and 3D graphics to a broad variety of screen sizes ranging from 240 x 320 (QVGA) to 1920 x 768 (for Fujitsu’s most powerful GDC, Triton).

**GDC Family**

**Jade Series** – This GDC is designed for high-end, high-volume embedded automotive graphics applications such as on-board navigation systems, graphical dashboard systems, head-up display (HUD) units and rear-seat entertainment systems.

**Emerald Series** – This SoC supports four video-capture ports and three display controllers. A dithering unit and ARM® Neon™ DSP core help enhance images and manage certain audio-video processing. To enable advanced graphical content, the Emerald-L DDR 2/3 controller can access up to 1GB of memory.

**Triton Series** – The high-performance Triton combines the latest ARM® Cortex™-A9 dual CPU core with state-of-the-art, embedded 2.5D and 3D graphics cores. The chip’s architecture has been optimized for the simultaneous use of all functional blocks, virtually eliminating performance gaps. Specifically, the device’s harmonized structure permits the simultaneous rendering of independent 2.5D and 3D graphics, the capturing of multiple video streams, and the display of content to multiple sources.

**GDC Applications**

**Automotive-Grade GDC** – The Fujitsu GDC product family includes graphics controllers optimized for automotive applications including instrument clusters, in-dash...
navigation, heads-up displays and rear-seat entertainment systems. The Fujitsu GDCs are designed from the ground up to operate under the harsh automotive environment.

GDCs for Medical and Industrial Equipment - Fujitsu's GDCs are helping meet the need for small-form-factor color LCDs in applications previously limited to simpler user interfaces. The GDCs are also ideally suited for new, low-cost medical, avionics and industrial systems, as well as for virtually any application needing a highly efficient display management system.


360° Degree Wrap-Around Video Imaging

The Fujitsu 360° Wrap-Around Video Imaging Technology synthesizes images from six cameras to create a true 3-D hemispheric view of a vehicle's surroundings. The technology enables flexible omnidirectional monitoring around a vehicle from a dynamically definable perspective or "free eye point."

The technology improves safety by providing visual assistance to the driver. The true, three-dimensional, 360° view enhances visibility while drivers are backing up or turning corners, and eliminates "blind spots" to a degree that cannot be matched by two-dimensional technologies.

Jade IdeaBoxx®

IdeaBoxx is a new platform to evaluate the far-reaching capabilities of Fujitsu's graphics display controllers (GDCs). The first IdeaBoxx, which is based on Jade, combines a feature-rich architecture with extensive graphic tools from Crank Software. Jade, Fujitsu's most cost-effective SOC-based display controller, is based on an ARM™ 926EJES processor running at 333MHz. This GDC has a fixed pipeline 3D graphics engine powerful enough to produce sharp, crisp graphics on screen sizes up to 1024 x 768. Jade can support two screens independently (along with dual capture ports), and can apply video images to 3D meshes via texture mapping. This combination of features makes Jade ideal for many industrial and medical applications where screen sizes of 4 to 10 inches are common. A Linux BSP, including the Linux kernel sources used, is also provided to allow the adventurous to develop more complex applications.

Visit http://ideaboxx.us.fujitsu.com for more information.

The Fujitsu 360° Wrap-Around Video Imaging Technology is available with a full set of authoring tools and library and device drivers for ready integration with the Fujitsu line of 3D graphics display controller LSIs.

360° Wrap-Around Applications

Originally developed for vehicle applications, the Fujitsu 360° Wrap-Around Video Imaging Technology is the world's first wrap-around video imaging ideal for security, surveillance, and situational awareness. The technology uses a highly integrated SoC and advanced 3D algorithms to synthesize images from several cameras, recreating a seamless, 3D omnidirectional view of the area around a building. The video-processing technology can show any perspective and any sightline, and instantaneously and smoothly transition from one view to another. The technology is unique in its ability to offer a dynamically definable "free eye point," which enables system designers to select the perspective that provides the viewer with detailed information.

Video and Image Processors

HEVC Video Processing IC

HEVC, the latest follow-on video compression standard, is a successor to H.264, which is widely used today to deliver 1080p (1920 x 1080) HD video content. HEVC enables ultra-high-definition 4K x 2K video data to be compressed into a small enough memory space that the 4K content can be streamed to 4K-capable displays. The jump from 1920 x 1080 pixels to 4096 x 2160 pixels is a fourfold increase in the number of pixels shown at one time for a frame (image) of video. To be able to stream 4 times the data, HEVC doubles the compression so that only twice the original amount of data is required for streaming.

HEVC is also backwards compatible, supporting lower resolutions. So today’s 1080p video can be streamed in about half the file size using HEVC instead of H.264. In fact, HEVC was designed with growth in mind and will be able to support up to 8K UHD (8192 x 4320 resolution). In addition to supporting high compression rates, HEVC also supports ultra-low-latency encoding, a wider color range with a standard 10-bit depth (with future support for 12-bit) and 4:4:4 chroma sampling. HEVC designs are underway at Fujitsu with high expectations for product availability in Q4 2014.

H.264/MPEG-2 Video Processing IC

These transcoder devices convert between HD and H.264 video data and MPEG-2 video data. The company’s bi-directional, single-chip H.264/MPEG-2 transcoders with integrated memory support full HD video (1920 x 1080) transcoding/transrating and audio data conversion. The devices combine industry-leading low-power consumption, high image quality, lower processing burden, and the audio transcoding and security functions necessary to protect digital broadcast content. This flexibility of format, bit rates and resolution makes the transcoders suitable for use in a variety of products worldwide.


Milbeaut™ Image Processor

Fujitsu’s image-processing ICs for cameras deliver high-definition imagery and fast processing speeds with low power consumption. The product line meets the requirements of widely used digital SLRs, compact DSCs and mobile phone cameras. The single-chip technology offers all the functions these cameras require including the image 3A’s (AWB, AE and AF), image and video compression, noise reduction, and memory-card processing.


FRAM Memory ICs

FRAM (Ferroelectric Random Access Memory) is a high-performance, low-power, non-volatile memory that combines the benefits of conventional non-volatile memories (Flash and EEPROM) and high-speed RAM (SRAM and DRAM).

This universal memory outperforms existing non-volatile memories like EEPROM and Flash, consumes less power, is many times faster, and has effectively infinite endurance to multiple read-and-write operations.

H.264 Encoder

Fujitsu’s H.264 encoder is designed for customers looking to add RAW video encode functionality to a variety of MCU applications. The dedicated H.264 compression processor analyzes and conforms incoming video content by deciphering an optimal encoding approach, while dynamically balancing requirements for HD video quality with low power consumption, latency and bitrates. The unique built-in memory architecture eliminates the need for routing or heat-sinks, permitting a small-form-factor product design with minimal BOM cost.

Demand for FRAM is rapidly growing, especially in low-power, data-logging applications where it is essential to prevent data loss, even in the event of a sudden power shutdown. FRAM is also used widely in applications like security and authentication, industrial systems, factory automation, aerospace and metering equipment. The ferroelectric material in FRAM is highly resistant to magnetic fields and radiation, making it ideal for medical, biopharmaceutical and food industries where gamma sterilization and autoclave are often required.

FRAM is also ideal for use in RFID products, where high speed and low power consumption are important. The Fujitsu family of high-density, FRAM-based RFID products enables robust tracking applications. High-radiation-tolerant FRAM RFID chips are well suited for authentication, re-use prevention and inventory management of disposable, gamma-ray-sterilized medical devices to help eliminate anti-counterfeit products, prevent user errors and ensure patient safety.


Samples of Applications and Products

<table>
<thead>
<tr>
<th>Home</th>
<th>Applications: Washing machines, dishwashers, LED lighting, microwave ovens, environmental controls, security, and home automation</th>
<th>Products: Graphics display controllers</th>
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<tbody>
<tr>
<td></td>
<td><strong>Digital AV Equipment</strong></td>
<td><strong>Applications:</strong> Recorders, and digital cameras</td>
</tr>
<tr>
<td></td>
<td><strong>Products:</strong> Image-processing ICs</td>
<td><strong>Products:</strong> Graphics display controllers</td>
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<table>
<thead>
<tr>
<th>Industrial Equipment</th>
<th>Applications: Factory automation, inverters, distributed control systems, security, and meters</th>
<th>Products: Graphics display controllers</th>
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<tbody>
<tr>
<td></td>
<td><strong>Automotive/Large Vehicles</strong></td>
<td><strong>Applications:</strong> HMI/GUI, clusters, body control, motor control, entertainment, navigation, image capture, and surround view</td>
</tr>
<tr>
<td></td>
<td><strong>Products:</strong> Graphics display controllers, image-processing ICs, and application specific products</td>
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<table>
<thead>
<tr>
<th>Mobile/Communications</th>
<th>Applications: Cell phones, mobile PCs, and broadband communications equipment</th>
<th>Products: Image-processing ICs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Medical</strong></td>
<td><strong>Applications:</strong> RFID, medical equipment</td>
</tr>
<tr>
<td></td>
<td><strong>Products:</strong> FRAM/RFID, graphics display controllers, and image-processing ICs</td>
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