

# Integrated Circuits for Embedded Applications



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

**Microcontrollers**  
**Analog Products**

**Graphics Solutions**  
**Imaging Solutions**

**Wireless ICs**  
**Memory ICs**

For more information, please visit <http://us.fujitsu.com/semi>.

## Microcontrollers

The Fujitsu MCUs are widely used in automotive, home, industrial and consumer applications. Development kits, in-circuit emulators, and compiler and debugger IDEs accelerate software development. To learn more, visit <http://us.fujitsu.com/semi/mcu>.

### Fujitsu ARM® Cortex™-M3 MCUs

The Fujitsu FM3 family of 32-bit, general-purpose, ARM-based microcontrollers provides a scalable platform for a variety of industrial and consumer applications.

#### Features

- Operating speed up to 144 MHz
- Reliable, high-speed and secure embedded Flash memory
- Low-power, low-leak products for a wide voltage range: 1.8V to 5.5V
- Built-in 1 MSPS high-performance multiple 12-bit ADCs
- CAN 2.0B, LIN, USB 2.0 (host and function) full-speed, dual Ethernet MAC that supports IEEE-1588
- Multifunction high-speed serial interfaces – SPI, I<sup>2</sup>C and UART up to 10Mbps
- Multifunction timer for motor control, reload timer, PPG, PWM and PW timers
- Integrated safety functions to meet IEC60730 requirements

## Applications

- Industrial automation, motor control, power tools
- Home/consumer appliances and white goods
- Home automation and sensor control
- Handheld digital, medical and healthcare products

### Fujitsu FR Family MCUs

The 32-bit MCUs in the Fujitsu FR family serve many markets and are especially strong in the automotive industry. These MCUs are based on Fujitsu's proprietary 32-bit RISC CPU core. The newest series, the FR81A group, supports the most demanding automotive applications.

#### Features

- Operating speed up to 128 MHz, 160 DMIPS performance
- FPU integration for higher calculation performance
- Highly reliable, high-speed and secure embedded Flash memory technology with ECC
- Up to 3ch 64 message buffers CAN2.0B, hardware-assisted LIN, FlexRay I/F, multifunctional serial I/O capable of supporting high-speed SPI, I<sup>2</sup>C, or UART with FIFO buffer
- Timer-synchronized, high-performance, multiple 12-bit ADCs

- Multifunction timer for 3-phase motor control with RDC (Resolver-Digital Converter), up to 6 stepper motor control, reload timer, PPG, PWM and PW timers
- Integrated safety functions to meet ASIL requirements

## Applications

- Automotive motor/inverter control, meter cluster, body control
- Industrial and factory automation, motor/inverter control

## Fujitsu F<sup>2</sup>MC-16FX Family MCUs

Fujitsu's flexible and scalable 16-bit RISC microcontroller 16FX family is designed for a variety of automotive, consumer and industrial applications.

### Features

- 48-pin to 144-pin packaged products
- 5-stage pipeline RISC CPU operating speed up to 56 MHz, minimum instruction cycle 17.8 ns
- Wide operating voltage range from 2.7V to 5.5V
- On-chip RC OSC and on-chip debug unit
- Embedded dual-operation Flash memory
- Hardware watchdog timers, alarm comparator and brownout detect
- Inverter motor control, up to 6ch stepper motor control and LCD control
- Up to 3ch CAN with 32 message buffers
- USB, LIN-UART, SPI, and I<sup>2</sup>C interfaces
- Selectable GPIO port levels for CMOS, TTL and automotive levels

## Applications

- Automotive
- Industrial

## Fujitsu F<sup>2</sup>MC-8FX Family MCUs

The Fujitsu F<sup>2</sup>MC-8FX family of 8-bit RISC MCUs features high-performance, low-voltage, embedded Flash; a precision on-chip RC oscillator; and on-chip debug capability.

### Features

- 8-pin to 80-pin packaged products
- CPU operating speed up to 16.25 MHz
- Embedded dual-operation Flash memory
- Flash memory with 100K erase cycles, 20-year data retention
- Hardware and software watchdog timers, clock supervisor and brownout detection
- Wide operating voltage range: 2.4V to 5.5V
- Motor/inverter control and LCD control
- Analog peripherals such as an ADC and comparator
- LIN-UART, SPI, I<sup>2</sup>C interfaces

## Applications

- Home appliances and electrical tools
- Metering
- Consumer healthcare products
- After-market consumer and car accessories

## Analog Products

### Power Management ICs

The Fujitsu PMICs meet customer requirements for compact design, high performance and low power consumption. An online design simulator, the Easy DesignSim™, facilitates design of circuit diagrams. For more information visit <http://us.fujitsu.com/semi/pmic>.

### Features

- DC/DC converters with low power consumption, low-voltage operation, multiple channels, high efficiency, fast response time and built-in FET
- Battery-charger ICs and reset ICs with low power consumption and high-precision voltage detection
- Power-switching ICs with low on-state resistance
- Comprehensive online design simulation tool

## Applications

- PCs
- Digital TVs
- Mobile products

### Spread Spectrum Clock Generators

The Fujitsu SSCGs reduce the electromagnetic interference that results from system clock operation, and minimize the need for other shielding components like bypass capacitors, choke coils and ferrite beads. Visit <http://us.fujitsu.com/semi/sscg> for more information.

### Features

- Digital frequency modulation
- Multiple output clocks
- Programmability
- Several package options
- Low voltage and low power

## Applications

- Computers
- Printers

### Digital-to-Analog Converters

The Fujitsu high-speed, high-resolution DACs combine leading-edge CMOS technology and patented architectures. Visit <http://us.fujitsu.com/semi/dac> for more information.

## Features

- High-performance data converters that enable direct IF digitization and direct IF synthesis
- 14-bit DACs include dual 1GSa/s, single 1GSa/s and 12GSa/s resolution
- Low-power consumption that eliminates costly heat sink
- Triple-well technology that assures superior analog/digital noise isolation

## Applications

- Communication infrastructure
- Test equipment
- Wireless systems (e.g., base stations)

## Phase Locked Loops

The Fujitsu BiCMOS single and dual PLL frequency synthesizers range from 100MHz to 3GHz, and support many communication standards. Both integer-N and sigma-delta architecture are available to suit customer applications and requirements. Visit <http://us.fujitsu.com/semi/pll> for more information.

## Features

- Low power consumption
- Ultra-fast frequency-acquisition times
- Excellent spurious, phase noise performance
- High frequency resolution

## Applications

Clock generation for a wide array of wireless systems including:

- Base stations
- Audio-visual equipment
- Security cameras

## Graphics Solutions

### Graphics Display Controllers

The Fujitsu GDCs, which offer different levels of integration for various applications, are optimized for embedded graphics applications and feature low power consumption. The Fujitsu GDCs have either comprehensive interfaces to external host processors or an embedded ARM CPU. Visit <http://us.fujitsu.com/semi/gdc> for more information.

## Features

- 2D and 3D rendering functions
- Flexible layer concept
- Support for screen resolutions up to SXGA (1280x1024)
- Alpha-blending and anti-aliasing
- HMI tools support
- OpenGL for selected GDCs

## Applications

- Automotive, marine and avionics
- Medical
- Industrial

## Imaging Solutions

### Image Processing ICs

The Fujitsu image processing ICs integrate the various functions necessary for image processing—such as color interpolation, compression, and a variety of interfaces—into a single chip.

Equipped with a Fujitsu high-performance, 32-bit ARM9 CPU core, the ICs can easily perform complex color processing independently from the host. High-speed processing and low power consumption make the IC suitable for battery-powered products.

## Features

- Sensor interfaces: MIPI (CSI-2) 4 lanes, subLVDS x 2 lanes or 12-bit parallel
- Host interfaces: MIPI (CSI-2) x 4 lanes or 8/16-bit parallel
- Command communication via I2C and SPI
- Wide range of resolution options: 3M to 20M pixels
- Integrated image stabilizer for moving and still pictures
- Advanced noise-reduction functions
- Face detection
- Wide-dynamic-range camera

## Applications

- Digital cameras
- Mobile phone cameras

## H.264 Video Processing

The latest Fujitsu video-processing IC includes transcoder devices that convert between High-Definition (HD) H.264 video data and HD MPEG-2 video data.

The low-power-consumption LSI module also includes a 1-Gbit FCRAM unit, USB 2.0/PCI Express connect, audio-transcoding function, security functions (AES, MULTI2-decryption), and video scaling. Visit <http://us.fujitsu.com/semi/h264> for more information.

## Features

- Built-in bi-directional H.264/MPEG-2 transcoding, H.264 transrating, and audio-transcoding functions
- Industry-leading low power consumption with built-in memory
- Small form factor for compact products

## Applications

- Mobile products (e.g., smart phones, tablet PCs)
- Home recording equipment (e.g., TVs, PVRs, PCs)

# Wireless ICs

## RF Transceivers

The Fujitsu MB86Lxxx RF transceiver family features the industry's first commercial multimode transceivers to eliminate 3G and 4G interstage TX and RX SAW filters and LNAs. Fujitsu's single-chip transceivers enable cell-phone manufacturers to reduce power consumption, component count, board space and bill of materials for the most competitive solutions. Visit <http://us.fujitsu.com/semi-wireless> for more information.

### Features

- Multiband support from 700-2700 MHz
- Multimode support for 2G/3G/4G (LTE-FDD/LTE-TDD, HSPA+, WCDMA, TD-SCDMA, CDMA, EDGE, GSM)
- Low current architectures
- Open standard MIPI-baseband interface
- High-level simplified layer-one programming and embedded intelligence API
- Simplified factory calibration
- No TX and RX interstage SAW filters
- No LNAs in 3G and 4G paths
- MIPI RFFE to control PAs, switching regulators and antenna switch
- GPO ports available
- Support for future release 10 carrier aggregation configurations (MB86L11A)

## Applications

- Mobile phones and Internet devices
- Data cards
- Embedded modules
- Dongles for PCs, tablets

# Memory ICs

## Ferroelectric Memory (FRAM)

Fujitsu is a pioneer in the production of Ferroelectric Random Access Memory (FRAM), which is non-volatile but operates in other respects as a RAM. The Fujitsu FRAM outperforms existing non-volatile memories like EEPROM and Flash, consumes less power, and offers higher endurance to multiple read-and-write operations. Fujitsu provides standalone FRAMs and RFIDs as well as foundry and custom design services. Visit <http://us.fujitsu.com/semi/fram> for more information.







### Features

- 30 times faster than EEPROM
- 10 million times higher endurance than EEPROM
- 200 times lower power consumption than EEPROM
- Excellent tamper-resistance technology

## Applications

- Data logging (meter factory automation)
- RFID (including radiation-hardened RFID)
- Security

# Representative Applications and Products

<p><b>Home Appliances</b></p> 	<p><b>Applications</b> Washing machines, dishwashers, LED lighting, microwave ovens, and home automation</p> <p><b>Products</b> Microcontrollers, graphics display controllers, and power management ICs</p>	<p><b>Digital AV Equipment</b></p> 	<p><b>Applications</b> Recorders, and digital cameras</p> <p><b>Products</b> Microcontrollers, power management ICs, H.264, and image processing ICs</p>
<p><b>Industrial Equipment</b></p> 	<p><b>Applications</b> Factory automation, inverters, distributed control systems and meters</p> <p><b>Products</b> Microcontrollers, graphics display controllers, analog products, ASICs, and wafer foundry</p>	<p><b>Automotive</b></p> 	<p><b>Applications</b> HMI/GUI, clusters, body control, motor control, entertainment, navigation</p> <p><b>Products</b> Microcontrollers, graphics display controllers, and application specific products</p>
<p><b>Mobile/Communications</b></p> 	<p><b>Applications</b> Cell phones, mobile PCs, PC dongles, and broadband communications equipment</p> <p><b>Products</b> RF transceivers, power management ICs, analog solutions, H.264 and image processing ICs</p>	<p><b>Medical</b></p> 	<p><b>Applications</b> RFID, medical equipment</p> <p><b>Products</b> FRAM/RFID, graphics display controllers, and analog solutions</p>

## FUJITSU SEMICONDUCTOR AMERICA, INC.

Corporate Headquarters  
1250 E. Arques Avenue, M/S 333, Sunnyvale, CA 94085-5401  
Tel: (800) 866-8608 Fax: (408) 737-5999  
E-mail: [FSA\\_inquiry@us.fujitsu.com](mailto:FSA_inquiry@us.fujitsu.com) | Website: <http://us.fujitsu.com/semi>



©2012 Fujitsu Semiconductor America, Inc.  
All company and product names are trademarks or registered trademarks of their respective owners.  
Specifications subject to change without notice.

Printed in the U.S.A. SPBG-BR-21423-05/2012