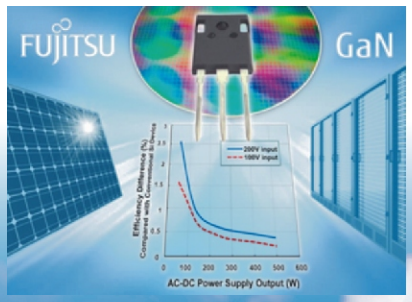
Semiconductor Technologies

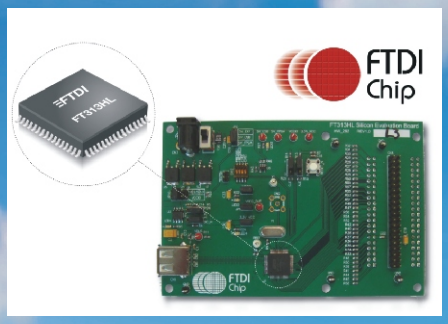
Leading innovations to pave the way for future advances

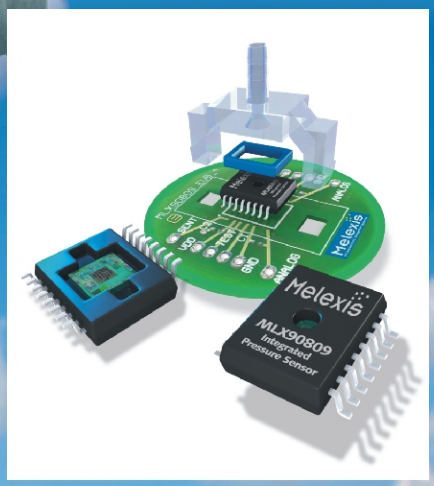
Innovation drives business. For more than four decades, the semiconductor industry has rapidly improved chip performance in terms of integration level, cost, power, speed as well as functionality. New technologies have enabled significant innovation and value creation in existing markets, but also sparked new markets.

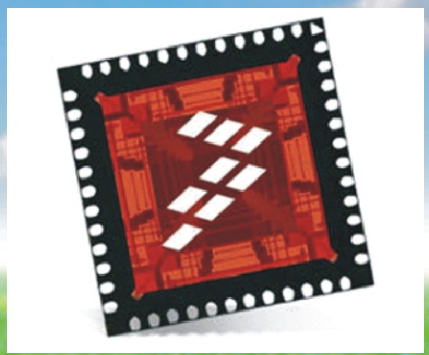
We leverage semiconductor latest technologies from leading companies to develop innovative solutions for future applications.

SHIKHA NAGPAL









FREESCALE SEMICONDUCTOR

ARM® Cortex™-M Microcontrollers

Freescale is the leader in 32-bit embedded control and offers one of the industry's most comprehensive portfolios of solutions based on ARM® technology. Freescale's portfolio of Kinetis microcontrollers (MCUs) offers the highest level of integration, the most comprehensive software and hardware enablement and the broadest range of performance within the ARM community today.

Kinetis Microcontrollers: Over 300 compatible ultra-low power ARM Cortex-M0+ and high-performance ARM Cortex-M4 MCUs with scalable performance, memory and feature integration.

Integration

Huge peripheral choice with high-precision mixed-signal, FlexMemory (EEPROM), wired & wireless connectivity, HMI and security features for consumer and industrial applications

Scalability

- Entry-level to feature-rich
- 8 KB-1MB, 24 pin to 256 pin
- Low power & 5V/high EMC
- Standard & application-specific

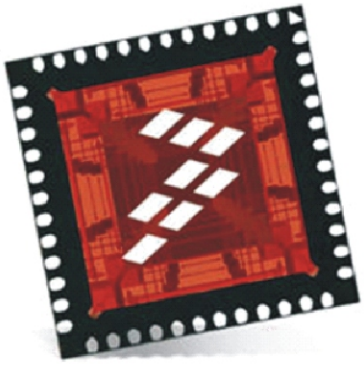
Enablement Freescale Tower System, bundled MQX RTOS and CodeWarrior IDE with Processor Expert auto code generator. Broad third-party support from IAR, KEIL, Green Hills and others

Kinetis K:

- ARM Cortex-M4 (DSP/FPU)
- Precision Mixed-Signal, FlexMemory (EEPROM), HMI, Connectivity & Security
- 50-150MHz, 32KB-1MB, 32-256pin
- Starting from $<1.00

Kinetis L:

- ARM Cortex-M0+ Core – up to 15% lower power than Cortex-M0 with single cycle peripheral accesses
- Compatible with Kinetis 'K' Series
- Easy to design & debug



- 32-50MHz, 8-256KB, 16-100pin
- Starting from $0.50

Applications

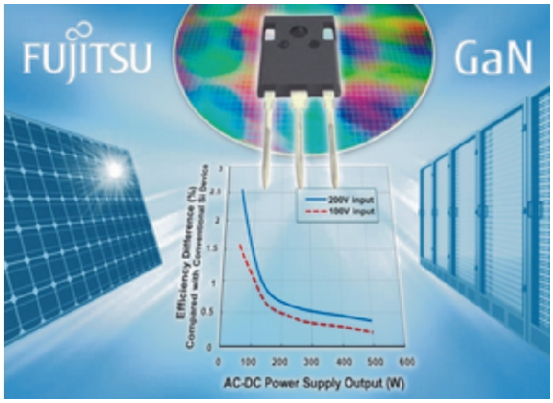
- Building Control
  - Security & access control
  - Lighting
- Factory Automation
- Medical
  - Heart rate monitors
  - Blood glucose monitors
- Consumer
  - Gaming systems
  - Printers
  - Portable media players
- Appliance
- Solar Inverters
- Point of Sale
- Motor Control
- Portable Instrumentation
- Remote Sensing
- Audio & Video Controllers

FUJITSU SEMICONDUCTOR

GaN Power Devices

Fujitsu Semiconductor Asia Pte Ltd (FSAL) announced that it successfully achieved high output power of 2.5kW in server power supply units equipped with gallium-nitride (GaN) power devices built on a silicon substrate. Fujitsu Semiconductor aims to start volume production of the GaN power devices in the second half of 2013. These devices will enable Fujitsu Semiconductor to propose their use in a wide variety of value-enhancing power supply applications, significantly contributing to the realization of a low-carbon society. Fujitsu Semiconductor is aiming to achieve approximately 10 billion yen in sales of GaN power devices in fiscal 2015.

compared to conventional silicon-based power devices, GaN-based power devices feature



characteristics such as lower on-resistance and the ability to perform high-frequency operations. These characteristics are expected to contribute to improvements in the conversion efficiency of power supply units and make them more compact. Fujitsu Semiconductor is aiming to commercialize GaN power devices on a silicon substrate, which, with increases in the diameters of silicon wafers, enables low-cost production.

These results have enabled Fujitsu Semiconductor, in a test circuit using a GaN power device, to succeed in achieving conversion efficiency that exceeds the performance of conventional silicon devices. Fujitsu Semiconductor also prototyped a power supply unit for servers equipped with a GaN power device for the power factor correction circuit and successfully achieved output power of 2.5kW.

Applications

By offering GaN power devices optimized for customer applications and technology support for circuit designs, Fujitsu Semiconductor will support the development of low-loss, highly-compact power supply units suited to a wide range of uses.

MICROCHIP

3D Gesture Controller

Microhip's patented GestIC® technology, which enables the next dimension in intuitive, gesture-based, non-contact user interfaces for a broad range of end products. The newly launched MGC3130 utilizing GestIC is the world's first electrical-field (E-field)-based, configurable 3D gesture controller, offering low-power, precise, fast and robust hand position tracking as well as free-space gesture recognition.

GestIC utilizes an electric near field (E-field) for advanced proximity sensing. Using low cost sensing electrodes GestIC determines E-field variations inflicted by a user free-space hand motion. The MGC3130 processes these electrode signals on-chip into x/y/z hand tracking and 3D gestures

With power consumption as low as 150 microwatts in an active sensing state, the MGC3130 enables always-on 3D gesture recognition – even for battery-powered products where power budgets are extremely tight. In fact, the MGC3130's low-power design and variety of configurable power modes provide the lowest power consumption of any 3D sensing technology – up to 90 per cent lower than camera-based gesture systems.

GestIC technology provides designers with a

reliable set of intuitive 3D hand and finger gestures that can be easily employed in their products.

GestIC technology utilizes thin sensing electrodes made of any conductive material, such as Printed Circuit Board (PCB) traces or a touch sensor's Indium Tin Oxide (ITO) coating, to enable invisible integration behind the device's housing. This allows for visually appealing industrial designs at very low total system costs. Additionally, the technology provides 100 per cent surface coverage, eliminating "angle of view" blind spots found in other technologies. With a detection range of up to 15 cm, the MGC3130 is the ideal technology for products designed to be used in close proximity for direct user-to-device interaction. With its range of configurable, smart features, the MGC3130 uniquely enables the next breakthrough in human-machine-interface design across various industries.

Features

- 150 DPI, mouse-like resolution
- 200 Hz sampling rate to sense even the fastest hand and finger motions
- Super-low-noise analog front end for high-accuracy interpretation of electrode sensor inputs
- Configurable Auto Wake-Up on Approach at 150 microwatts current consumption, enabling always-on gesture sensing in power-constrained mobile applications
- Automated self calibration, for continued high accuracy at any time
- 32-bit digital signal processing, for real-time processing of the on-chip Colibri Suite
- Integrated Flash memory for the easy upgrading of deployed products, in the field
- 70-130 kHz E-field with automated frequency hopping to eliminate noise sources
- resistance to ambient light and sound interference

Initial MGC3130 Applications

- Win 8 Control
- Notebooks/ Keyboards/ Peripherals
- Mobile phones
- Electronic readers
- Remote controls
- Game controllers
- Lighting
- Docking stations

LSI CORPORATION

Axxia platform

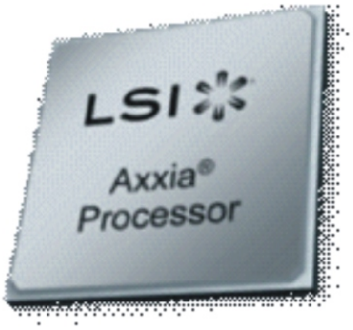
Embedding smart silicon throughout the network is required to deal with the deluge of data coursing through mobile and enterprise networks. Today's mobile and enterprise networks are more complex than ever, delivering rich media such as video alongside data and voice traffic, with users demanding their content at any time, in any place and on any device.

Next-generation system-on-chip (SoC) devices need to be able to integrate multiple types of processors, from specialized processors for security and traffic management to high-performance microprocessors from companies like ARM. Those SoCs need to include high-performance interconnects to keep up with the demands of the data deluge.

LSI's Axxia platform is a high-performance communications processor that gives customers the ability to recognize and prioritize the kinds of data moving through networks. Axxia is unique in its ability to meet customer needs with both standard product and customized solutions, allowing customers to integrate their IP for deep differentiation. Axxia delivers deterministic performance through a combination of general-purpose processors and specialized hardware accelerators.

Features

The main benefits that Axxia provides are reliable, deterministic performance and power efficiency. Our design approach, built around a unique on-chip Virtual Pipeline interconnect, allows our customers to recognize and prioritize traffic to deliver the right content to the right user at the right time. Axxia also delivers leading performance-per-watt, which is critical for both datacenters and mobile networks that have power constraints. The latest silicon technology allows much greater integration in next-generation network SoCs, reducing overall system cost and delivering more



capabilities. The integration of multiple general-purpose CPU processors together with more specialized processors for networking functions like security to form a heterogeneous solution requires significant design innovations to guarantee deterministic and meet cost and power targets. Particular problems are cache coherency across cores and low-latency, high-bandwidth access to external memory, hardware acceleration engines and network I/O.

Another unique feature of the Axxia platform is the ability for customers to integrate their own IP blocks, allowing developers to integrate their own hardware accelerators or programmable engines as required and delivering deeply differentiated solutions to the marketplace.

Applications

Axxia is targeted at mobile base stations, mobile infrastructure such as backhaul, and datacenter switches.

ON SEMICONDUCTOR

NCP185x high current switching battery charging solutions

The NCP185x high current switching battering charging solutions from ON Semiconductor improve smart phone and tablet user experience by significantly reducing charging time for high-

capacity Li-ion battery, extending battery life with automatic battery disconnect at end of charge, turning on portable systems instantly at cable insertion with dual-path management, and enabling USB On-the-Go (OTG) accessories, without compromising on safety. Nowadays, portable devices like smart phone tend to use larger display size (up to 5-inches) and larger battery capacity (up to 2,000 or even 2,500 mAh for a smart phone) to meet users' expectation. On the other hand, traditional linear battery charger solutions feature limited charge current (usually no more than 500 mA), and hence need longer charging time.

As a comparison, switching battery charging solutions such as the NCP185x from ON Semiconductor feature much higher charging current and higher operating voltage, and can charge 30 percent faster than linear chargers. In many portable systems, battery life is impacted after just a few months due to the charge being on hold and is to resume after end of charge. The NCP185x series automatically disconnects the battery at the end of a charge and only reconnects in for few seconds in case of peak current activity (GSM activity for instance), and hence improves battery life.

Thirdly, when the battery is weak, even the most recent devices require about 5 minutes of initial charging before the portable system is allowed to boot to be used. Unfortunately, when you connect it, you usually need it! So a technology that enables instant system turn-on at cable insertion will be welcome by consumers.

The NCP185x is a series of fully integrated Li-ion switching battery charger. The series includes the NCP1850, the NCP1851, and the NCP1852, with a maximum charging current of 1.5 A, 1.6 A and 1.8 A respectively, and the same maximum operating voltage of 7 V.

Features

The NCP185x series of switching battery charging solutions features key benefits as below:

• Charge faster and more efficiently with automatic input current limit (AICL).

For example, the NCP1851 enables charging of a 1,650 mAh batter pack at 1.6 A current only in 1 hour and 32 minutes, much faster than using traditional linear charging solutions which usually feature no more than 500 mAh charging current.

• Increase battery life with automatic battery disconnect at the end of battery charging.

• Enable instant system turn-on at cable insertion with dual path management (DPM). So, when the battery is weak, a user can use the portable system instantly once the cable is inserted to charge the battery, without having to wait about 5 minutes.

• Enable USB On-The-Go (OTG) accessories.

• Provide a variety of protections such as positive and negative over voltage protection (OVP), internal junction temperature sensor and management, external battery Negative Temperature Coefficient (NTC) and JEITA management, and reporting events.

Applications

Smart phones, handheld devices, tablets, PDAs

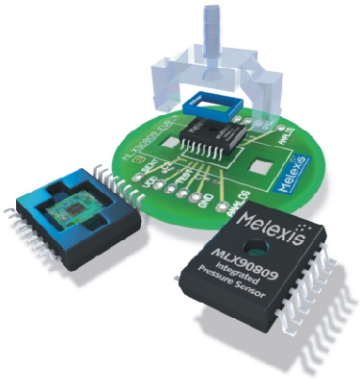
MELEXIS

MLX90809 MEMS pressure sensor

Micro-electro-mechanical system (MEMS) technology that is compatible makes it possible to produce monolithic sensors where the signal conditioning can be integrated onto the same substrate. This enhances these sensors' ability to deal with electro-magnetic interference (EMI), as well as allowing them to have greater functionality, be offered in more compact packages and have lower unit costs.

Advanced functions in automotive and industrial systems are calling for pressure sensors which can meet increasing performance demands. These are difficult to achieve using established sensing technologies, so utilization of MEMS technology is now becoming advantageous.

The MLX90809 MEMS pressure sensor, from Melexis, can be incorporated into a wide variety of automotive pressure sensing tasks – reducing package size by around 55% compared to current integrated pressure sensors, while adding extra functionality. Performance has been maximized by combining the MEMS sensing element with a low noise analog front end and high resolution data



converter. A 16-bit microcontroller unit (MCU) is also included, to carry out sensing element temperature compensation, as well as enabling the diagnostic functions needed in safety critical systems. 32 Bytes of fully programmable EEPROM memory can be used to store sensor compensation and configuration settings.

Features

- High accuracy relative pressure sensor
- Ratiometric analogue output or digital SENT output
- Large automotive temperature range (-40°C to 150°C)
- Automotive qualified and automotive diagnostic features
- Programmable through the connector
- Robust package

Applications

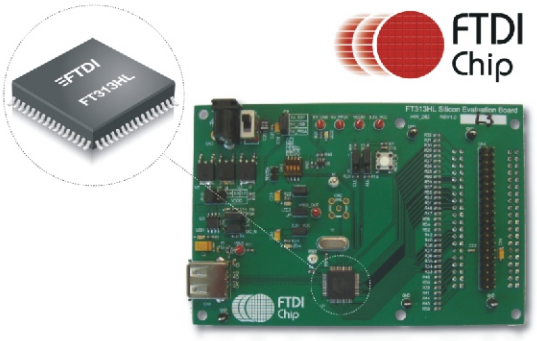
- Automotive vacuum measurements (brake booster, etc.)
- Automotive filter clog detection
- Industrial process monitoring

FTDI

FT313 High Speed USB Host

As the importance of mobility increases, the need for more sophisticated Host functionality to allow interaction between different items of hardware is becoming apparent. The popularity of the USB interface makes it highly suited to transferring data between portable products and external equipment. USB Hosts therefore have to be incorporated into a greater spectrum of electronic products, as systems designs become less PC-centric. With the need to increase data transfer rates, the wide proliferation of USB across all market segments and the decreasing importance of the PC platform, there is a growing demand to have a USB Host in end systems. Advanced Host ICs with broad feature sets are now required by engineers so that hi-speed USB functionality can be added easily into system designs.

The FTDI FT313H USB 2.0 hi-speed host controller IC supports 480 Mbits/s operation. It runs off a 3.3 V supply, with IO levels configurable between 1.8 V and 3.3 V drawing approximately 78 mA when in full operation and just under 200 μA while in suspend mode. The built-in 24 kByte high speed RAM memory executes data transfer and buffering. The multiplexed interface provides for board level interconnect through either a general purpose 16-bit bus, NOR, or SRAM interfaces, while minimizing



pins on the chip. With the capacity for direct memory access (DMA) operation, the IC can easily be combined with the system microcontroller in order to enhance connectivity, so that data transfer rates can be increased. For example, a set top box can gain wireless functionality by attaching a wireless USB dongle via a FT313H host port. The device is targeted at providing easy integration of hi-speed USB connectivity into modern system designs, so that faster data transfer rates can be supported.

Features

- Single chip USB 2.0 hi-speed compatible
- Compatible to Enhanced Host Controller Interface Specification Rev 1.0
- The USB 1.1 host is integrated into the USB 2.0 EHCI compatible host controller
- Single USB host port.
- Supports data transfer at high-speed (480 Mbit/s), full-speed (12 Mbit/s), and low-speed (1.5M bit/s)
- Supports isochronous, interrupt, control and bulk transfers
- Supports the split transaction for high-speed Hub and the preamble transaction for full-speed Hub
- Supports multiple processor interfaces with 8-bit or 16-bit bus: SRAM, NOR Flash, and General multiplex
- Single configurable interrupt (INT) line for host controller
- Integrated 24 kByte high speed RAM memory
- Supports DMA operation
- Integrated phase-locked loop (PLL) supports external 12 MHz, 19.2 MHz, and 24 MHz crystal, and direct external clock source input

Applications

Industrial equipment, Medical instrumentation, TV/TV box, Printer, Instrumentation, Media player, Tablet, Set-top box