STR7 and STR9 families

32-bit ARM®-based Flash microcontrollers

September 2007

www.st.com/mcu

Welcome to the world of STMicroelectronics' ARM-based microcontrollers

A leading MCU provider for more than 10 years, **STMicroelectronics** has a strong foothold in the embedded market and is an innovator in embedded Flash technology. Since 2004, STMicroelectronics has brought the power of 32-bit ARM® processor cores to the world of microcontrollers, opening endless opportunities to embedded system designers by making control and connectivity applications easy and affordable.

Product line		Key features	Major applications
STR710	ARM7 up to 45 MIPs @ 50 MHz 3.0 to 3.6 V -40 to 85 °C	■ STR7's biggest RAM (64 KB) ■ Most UARTs (4) ■ External memory interface ■ Peripherals include CAN, USB, 4xUARTs and SC interface (ISO7816)	**Consumer and industrial** GSM, GPS, Bluetooth®, DAB/DBM host processor, 3-phase power meters, circuit breakers, bank card readers, cash registers
STR730	ARM7 up to 32 MIPs @ 36 MHz 4.5 to 5.5 V -40 to 85 °C or up to 105 °C	■ Most timers (20) ■ Most CANs (3), UARTs (4) ■ Most I/Os (112) ■ Peripherals include 3xCANs, 4xUARTs, and up to 20 timers, 16 DMA	**Industrial and automotive related** Industrial power meter, UPS, ATM printer, ATM maintenance, datalogger, tachograph
STR750	ARM7 up to 54 MIPs @ 60 MHz 3.0 to 3.6 V or 4.5 to 5.5 V -40 to 85 °C or up to 105 °C	■ Best integration ■ Balanced control/communication ■ Safety and low power ■ Unique motor control peripherals ■ Peripherals include CAN, USB, 3xUARTs, advanced timers	**General purpose and vector drive** Appliance, brushless motor drive, USB peripheral, UPS, alarm systems, factory automation, circuit breakers, inverters, medical and portable equipment Suitable for many general purpose applications
STR910	ARM9E up to 96 MIPs @ 96 MHz 2.7 to 3.6 V I/O, 1.8 V core -40 to 85 °C	■ Highest performance (96 MHz ARM9E) ■ Largest Flash/RAM memory size (2.1 MB/96 KB) ■ Ethernet connectivity ■ Periphs include Ethernet, USB, CAN, 3xUARTs	**Performance and connectivity** Industrial network, building automation/alarm systems, cash registers, PLC, bar code scanners Designed to complement STR7 for bigger memory, higher performance and Ethernet connectivity Binary compatible with ARM7TDMI core code

The right core

Designed and supported by the renowned innovation company, ARM Ltd, ARM 32-bit RISC cores are licensed to the world's leading electronics companies. ARM develops tools, systems and services to support its architecture, directly and through partnership, and is rapidly becoming the volume global standard for applications requiring the best mix of price, performance and power efficiency.

The right choice

ST is leveraging the investment from ARM in its superior core technology by bringing its expertise in microcontrollers and embedded development to our ARM devices. With a wide range of embedded memories, peripherals and architectural enhancements, ST helps you scale your design and find the best fit for your application.

The ST ARM advantage

- Low power, high performance, scalable architecture
- Wide portfolio to cover all ranges
- Rapid time to market using readily available software
- Widest range of hardware and software tools support
- Widest range of RTOS and software components

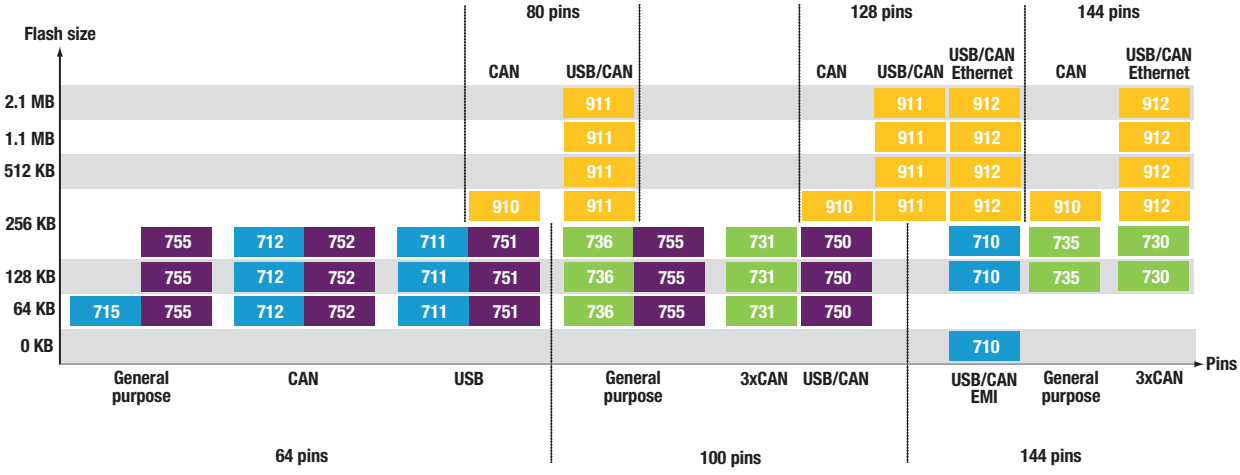
Not alone anymore

Once you have chosen STR7 and STR9, ST offers the highest level of support. Our extensive documentation and application notes, online support and user communities will provide assistance when required.

Take control of your development

Rationalize your development with ST ARM microcontrollers. The STR7 and STR9 series addresses all your needs, from low-end to the high-performance, with a common set of tools and software, helping you reduce your cost, shrink your time to market, and control your risks.

STR7/STR9 portfolio

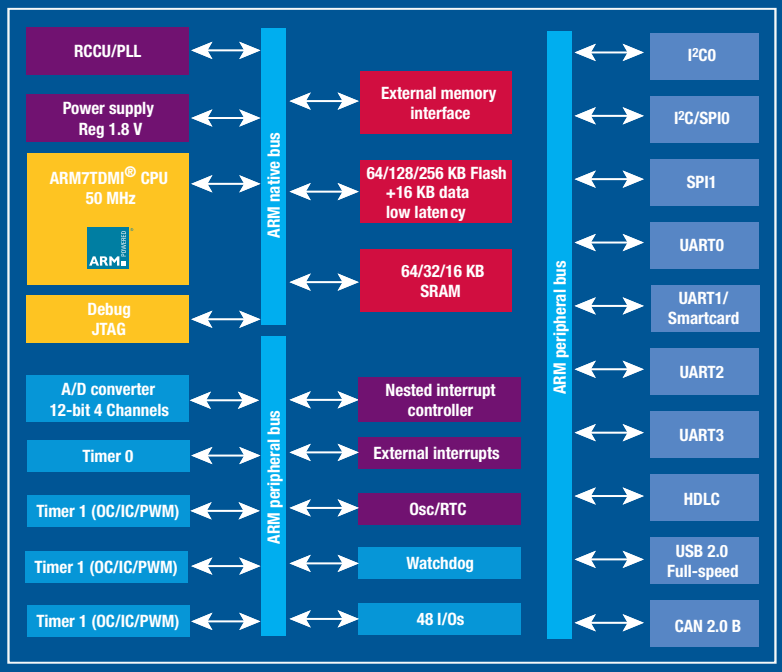


STR710F Flash microcontrollers from STMicroelectronics combine the industry standard ARM7TDMI® core with embedded Flash and powerful peripheral functions, including USB and CAN. They are ideal for embedded applications requiring a compact yet powerful MCU, or versatile, scalable solutions such as user interfaces, factory automation systems and consumer applications.

Built on the leading ARM architecture, the STR710F Flash series allows fast response to emerging requirements, enabling the rapid implementation of changes at low cost. This family of standard ARM microcontrollers will serve your needs for today and the future.

Applications

- Consumer and PC
  - GPS host processor
  - DAB/DBM, Bluetooth
  - USB security token
  - USB card reader
  - Various USB peripherals
- Industrial
  - Circuit breaker
  - Factory automation
  - Industrial network
  - PLC
  - 3-phase power meters
  - Bank card reader
  - Receipt printer
  - Bill validation
  - Tax control machine
- Building, fire and security
  - Alarm system
  - Power meter
- Medical
- Appliances
- Others (hands-free car kits, cellphone basestations, etc.)



64/144-pin LQFP and BGA *-40 to +85 °C operating temperature range* *Single power 3.3 V*

Take control of your design

With the STR710F series you take control of your design. The flexibility of the family, with its extensive range of options for Flash and RAM, its comprehensive set of peripherals, and its versatile package options, enables reuse for a whole range of products, optimizing your developments. It helps you build cost-effective and powerful solutions that bring innovation in your market.

Take control of your application

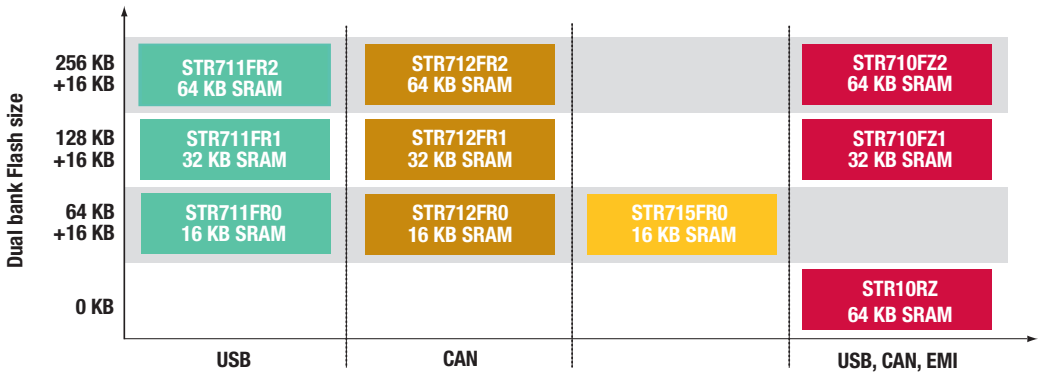
The STR710F series helps you take control of your software with our complete STR7 software library and extensive application notes explaining how to get the most from the device.

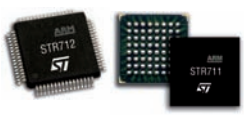
The STR710F enables you to take control of your development. Its ARM7 core is an industry standard – recognized globally – and with extensive support for all major tool providers, you will have no problem establishing the best fit to reduce the time to market of your development.

STR710F family

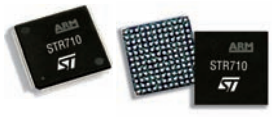
Features and benefits

Features	Benefits
High-performance, industry standard core ARM7TDMI RISC 32-bit CPU	Future-proof microcontrollers that easily adapt to customer requirements
Extensive software and tool support including the complete STR7 library for USB	Dramatically reduces development time and increases ease-of-use
Largest choice of peripherals and interfaces, including USB and CAN	Reduces system cost with all peripherals in one chip
Flexible power and clock management	Allows full control over power consumption and performance/power tradeoffs
Superior RAM/Flash ratio	Unlimited possibilities - up to 64 K RAM, and always above 16 K even with smallest Flash option
High-quality embedded Flash with 16 K extra Flash for EE emulation	Retention guaranteed up to 20 years at 85 °C Reduces system cost with no need for external EEPROM
Extensive package options including the space efficient 8x8 LFBGA64 and 10x10 LFBGA144	Optimizes development – each device is available with extensive options to ensure compatibility with any product range





64-pin LQFP/BGA



144-pin LQFP/BGA

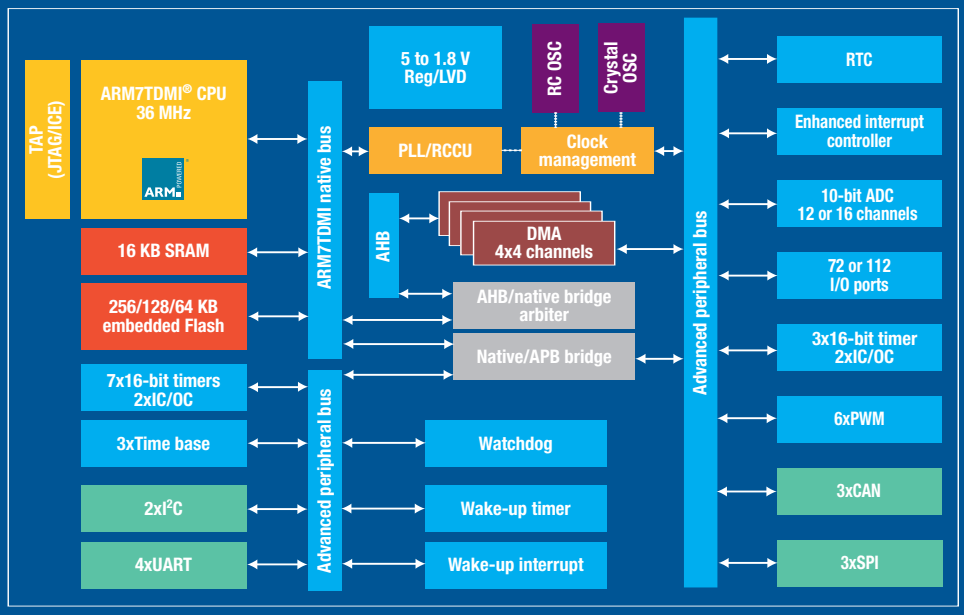
Package

STR730F Flash microcontrollers from STMicroelectronics combine the industry standard ARM7TDMI core with embedded Flash and powerful peripheral functions, including up to 20 timers, 4xUARTs and 3xCANs. They are ideal for embedded applications requiring a compact yet powerful MCU, as well as versatile, scalable solutions such as user interfaces, factory automation systems and appliances. Additionally, the STR730F family features a single 5 V power supply particularly well suited to industrial applications.

Built on the leading ARM architecture, the STR730F Flash series allows fast response to emerging requirements, enabling the rapid implementation of changes at low-cost. This family of standard ARM microcontrollers is ideal for a wide range of needs, both now and in the future.

Applications

- Industrial
  - Circuit breakers
  - Factory automation
  - Home automation
  - Industrial networks
  - PLCs
  - Copiers/printers
- Building, fire and security
  - Alarm systems
- POS
  - Receipt printers
  - Bill validation
  - Tax control machines
  - Cash registers
- Appliances
- HVAC
- Motor control
- Medical
- Others (hands-free car kits, fish finding sonar)



100-pin LQFP and 144-pin LQFP and BGA, -40 to 85 °C or up to 105 °C operating temperature range, single power 5 V

Abbreviations
AHB: Advanced high-speed bus APB: Advanced peripheral bus DMA: Direct memory access

Full design control

The STR730F family features a unique combination of peripherals with up to 20 timers, 3xCANs, 16xPWMs signals and 4xUARTs. Offering versatile package options which enable reuse for a full range of products, it helps users to build cost-effective, powerful and innovative solutions and optimize the design process.

Optimize performance

The STR730F family features up to four clock sources, numerous internal clock dividers and multipliers, an internal RC, 32 KHz or 2 MHz software configurable, a dual APB architecture, five low-power modes and one dedicated low-power voltage regulator. This combination of advanced options allows performance to be fine-tuned to the smallest detail. It also provides significant power saving functionality due to its many low-power modes.

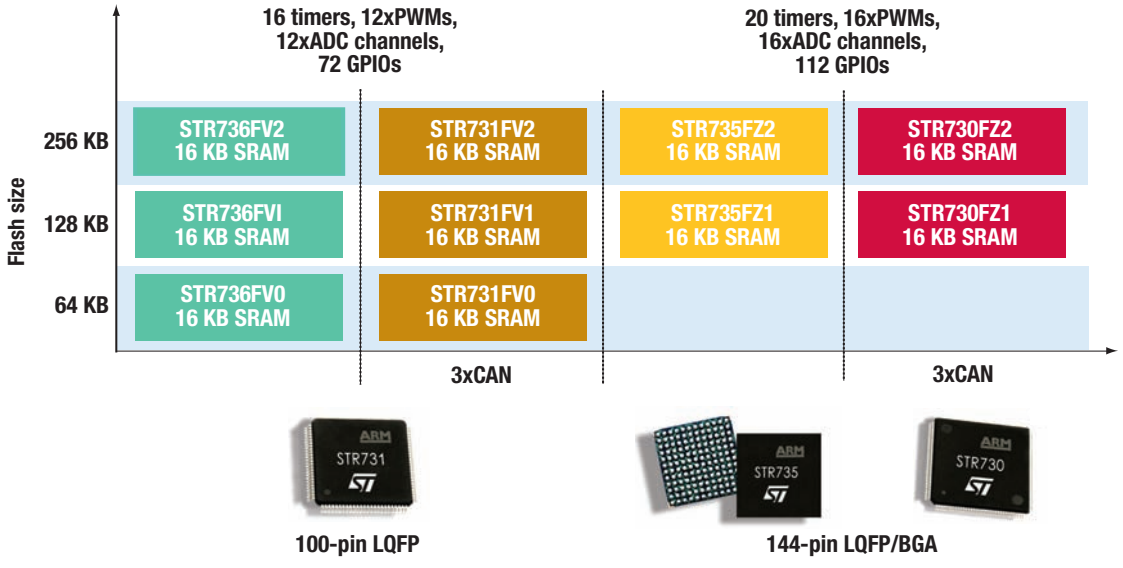
Total control of software

With ST's complete STR7 software library and comprehensive set of application notes, the STR730F offers total software control and improved time to market. The superb combination of the industry standard, and globally recognized, ARM7 core and extensive support by all major tool providers offers a fast route to best-fit and an optimized development process.

STR730F family

Features and benefits

Features	Benefits
High-performance industry standard core ARM7TDMI RISC 32-bit CPU	Future-proof micro controllers that easily adapt to customer requirements
Extensive software and tools including the complete STR7 library supporting all standard peripherals and the CAN	Dramatically reduces development time and increases ease-of-use
Largest choice of peripherals and interfaces including 4xUARTs, up to 20 timers and up to 3xCANs	Reduces system cost with all peripherals in one chip
Flexible power and clock management	Allows full control over power consumption and performance/power tradeoffs
Single 5 V power supply	Native supply of industrial applications. No 3.3 V conversion needed
High-quality embedded Flash	Retention guaranteed up to 20 years at 85 °C Suitable for long-life equipment
16 x channels DMA	Lower CPU load, optimized access to memory
Rich package options including the tiny proven 10x10 LFBGA144	Optimizes your developments: the same device in different options will fit all your product range
Temperature range: -40 to 85 °C or up to 105 °C	Increase domain of validity for the application to +105 °C

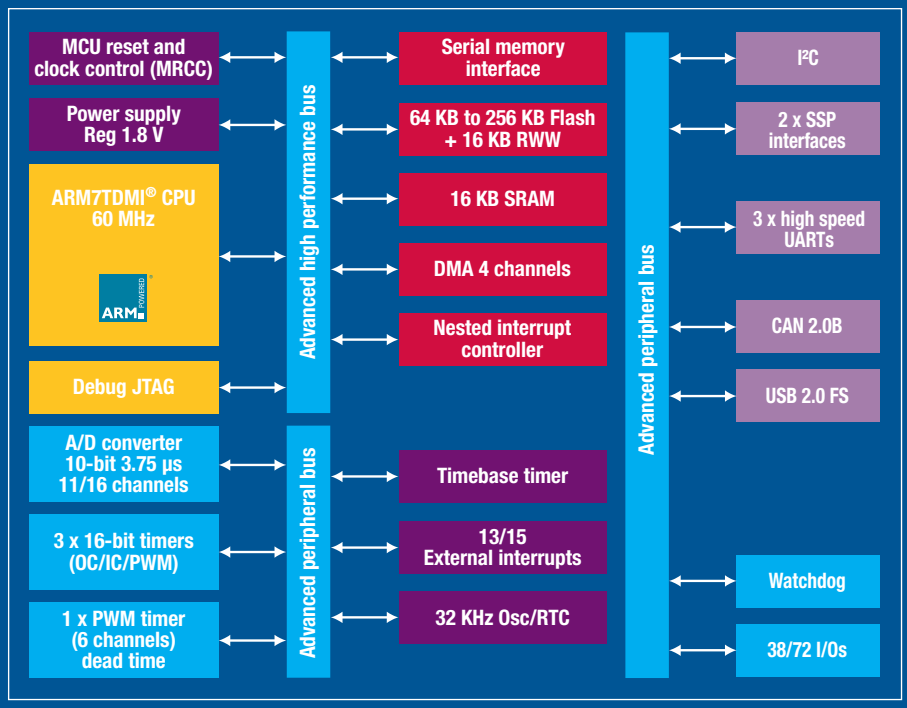


The STR750F is the latest addition of super-integrated, single-chip 32-bit ARM7-based MCUs from STMicroelectronics. Delivering performance without compromise, the STR750F series combines into a single device high performance and low power consumption with ample memory and a full peripheral set. With a wide range of available configurations, the STR750F series is ideal for virtually any application. Packed with peripherals, the STR750F series offers a host of innovative features for advanced control, security and communication.

Based on the ARM7TDMI core, the STR750F series offers high performance with 54 MIPS at 60 MHz and low power consumption below 10 µA in standby mode. To increase versatility, the STR750F can be used with either a 3.3 V or a 5 V power supply.

Applications

- Industrial
  - PLC
  - Inverters
  - Printers, scanners
  - Boiler control
  - Industrial networking
- Building and security
  - Alarm systems
  - Video intercom
  - HVAC
- Low power
  - Glucose meters, power meters, handheld devices
- POS
  - Vending machines
  - ATM machines
- Appliances
  - Motor drive
  - Application control
- Data loggers, medical monitors, PC peripherals



DMA: Direct memory access RTC: Real-time clock RWW: Read-while-write SSP: Synchronous serial peripheral

Innovative features

Many innovative features are inside the STR750F series such as:

- A backup clock in case the main quartz oscillator fails
- Fast startup capability from reset or low power modes (as low as 55 µs to execute first instruction)
- In low-power modes, the automatic wake-up (AWU) feature will enable the micro to wake-up without any external signal nor need for a quartz
- Flexible and powerful 16-bit timers with PWM and a dedicated PWM timer with fast clock and synchronization capability
- 3 x UARTs provide hardware support for LIN protocol (master mode)
- The serial memory interface (SMI) enables easy connection to external SPI Flash for data storage

Wide choices

The STR750F series is available with up to 256 KB of Flash (retention guaranteed up to 20 years @ 85 °C) plus an additional 16 K bank of read-while-write Flash for EEPROM emulation. It is ready for optimum connectivity and control with up to eight communication peripherals including USB and CAN, powerful 16-bit timers, a fast 10-bit ADC. This list is completed by a 4-channel DMA to offload the CPU and a serial memory interface. With its rich set of peripherals, the STR750F family will help customers reduce system cost while addressing all their needs.

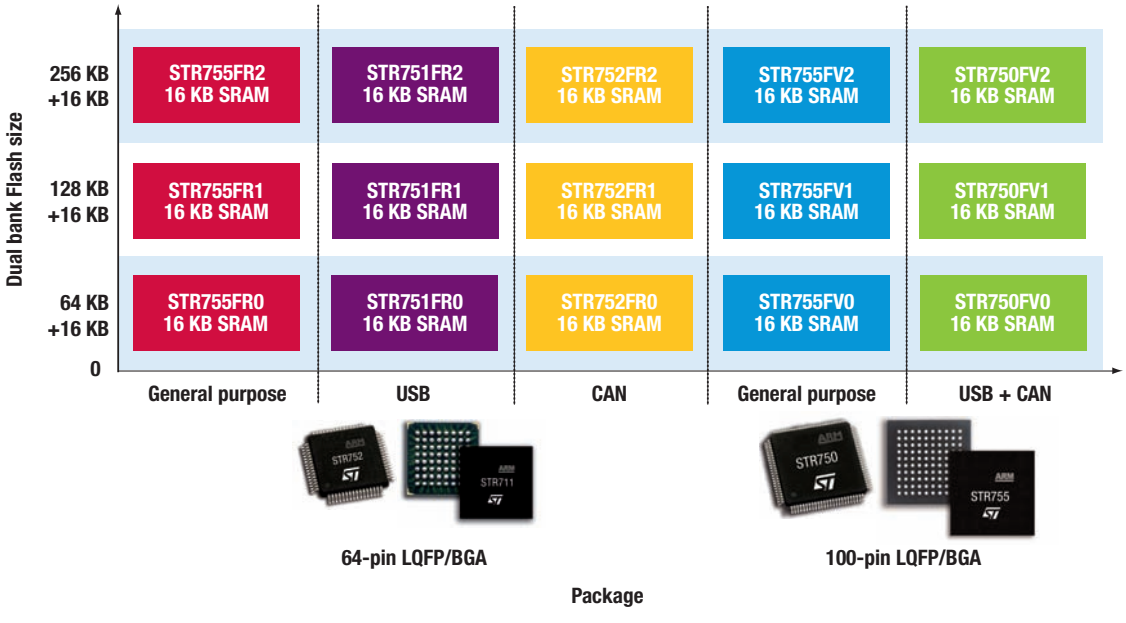
Motor control

The STR750F embeds timers and ADC features that are perfectly suited to 3-phase motor control: a PWM timer offers six outputs, dead time generation, edge aligned and center aligned waveforms, emergency stop, synchronization capability with ADC, synchronization capability with other timers, programmable smoke inhibit feature to protect registers against unwanted writing and a 16-bit timer for encoder interfacing.

STR750F family

Features and benefits

Features	Benefits
Industry standard ARM7TDMI core running up to 60 MHz	Well known core with enough processing power (54 MIPS) to tackle most applications
Excellent low power performance through flexible clock management and multiple low power modes with consumption below 10 µA in standby mode	Easy adjustment of performance/power consumption ratio. Suitable for battery operated applications
Innovative features: backup clock, fast start-up, auto wake-up, serial memory interface (SMI) and LIN support	Additional security and performances for the application
Single 3.3 or 5 V supplies	Additional flexibility for customers. No need for external regulator. Real 5 V drive on the I/O when 5 V is used
Rich peripheral set: USB, USB, CAN, 2xSSPs, I²C, 3xUARTs, 5xtimers,10-bit ADC and up to 72 GPIO	Meets all application needs, reduces system cost
Powerful timers and ADC	Perfect fit for 3-phase motor control applications
Extensive firmware support and tools. The STR750F library is freely distributed from ST, and STR7 devices are supported by third-party tool and RTOS vendors	Dramatically reduces development time and increases ease of use



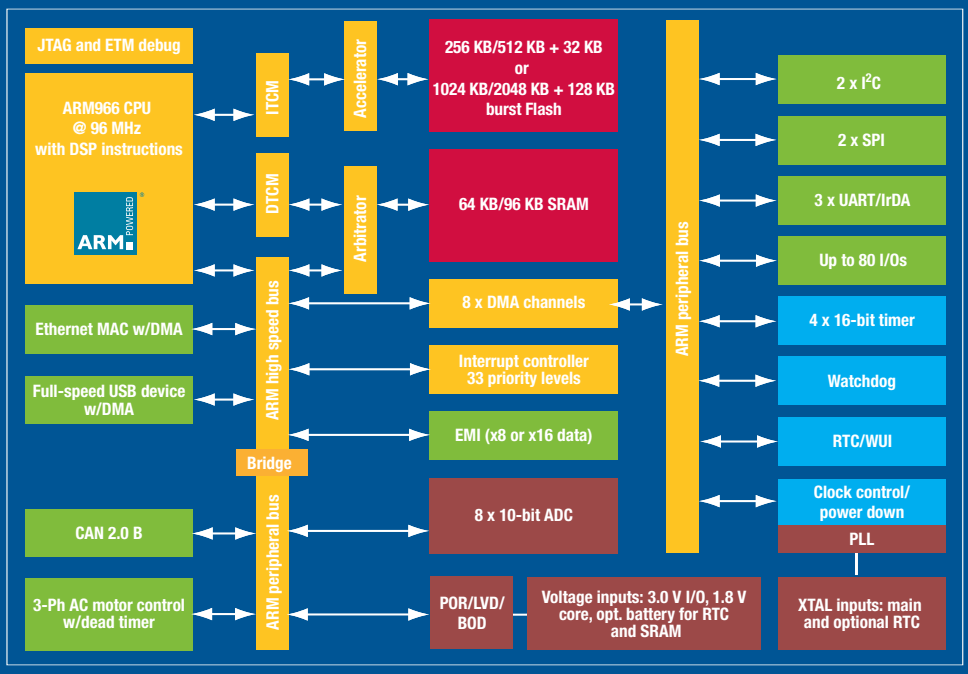
STMicroelectronics brings the power of an ARM9E® processor core to the world of general purpose Flash microcontrollers, opening endless opportunities to embedded system designers by making networking and other demanding applications easy and affordable.

The STR910FA family of MCUs delivers up to 96 MIPS peak performance while executing code directly from its Flash memory, executes single-cycle DSP instructions within its ARM966E-S® core, and includes Ethernet, USB, and CAN interfaces. These features, combined with Flash memory sizes reaching 2.1 Mbytes and a vast 96 Kbytes SRAM, make the STR910FA an ideal single-chip solution to transform embedded control applications into low-cost nodes on a local network, or on the Internet. Binary compatible with ARM7TMDI core code, STR910FA is a “Super ARM7”.

Based on Autobench™ test suite from Embedded Microprocessor Benchmark Consortium (EEMBC®), STR9 registered more than 36 % performance gain over high-end Flash ARM7-based MCUs for the same Autobench tests. Refer to www.eembc.org

Applications

- Point of sales
  - Portable terminals
  - Vending machines
  - Thermal printers
  - Scanners/readers
- Building automation
  - Security/surveillance/fire
  - HVAC
  - Biometric identification
  - Time and attendance
- Industrial automation
  - PLC
  - Industrial networking
  - Robotics
- Communication
  - Serial protocol gateways
  - Office phones
- Portable
  - Medical monitors
  - Data acquisition
  - Test and measurement
  - Automotive diagnostic



ITCM: Instruction tightly coupled memory
DTCM: Data tightly coupled memory
ETM: Embedded trace module
EMI: External memory interface
POR: Power-on reset
LVD: Low voltage detect
BOD: Brown-out detect
WUI: Wake up unit

Rapid data transfer

Networking demands rapid movement of bulk data, and STR910FA devices deliver. The ARM966E-S CPU core has two independent internal 32-bit paths – one path for instructions in Flash memory, and another path for data in SRAM. This architecture ensures blazing DMA data transfers between Ethernet and SRAM, largely independent of CPU involvement or CPU instruction traffic. Other peripherals in the STR910FA can also take advantage of this unimpeded data flow by using one of the many available DMA channels to and from SRAM.

No more crowded spaces

Most STR910FA devices come with 96 Kbytes of SRAM allowing you to easily accommodate the demands of complex applications, real-time operating systems, communication stacks and large buffers for serial transfers. For non-volatile storage, there are dual banks of Flash memory with a total size up to 2.1 Mbytes, giving you the space to add more capabilities to your product. If you need more, the External Memory Interface will accomodate your requirements.

It’s all inside

Embedded designs with constraints on size, cost, and power consumption demand minimal external components surrounding the microcontroller. STR910FA devices answer these needs with features such as built-in system supervisor with brown-out warning, real-time clock, efficient generation of internal clocks for Ethernet, USB, and CPU system all from a single external low cost crystal, and excellent power management for extended battery life in portable applications.

Scale your design

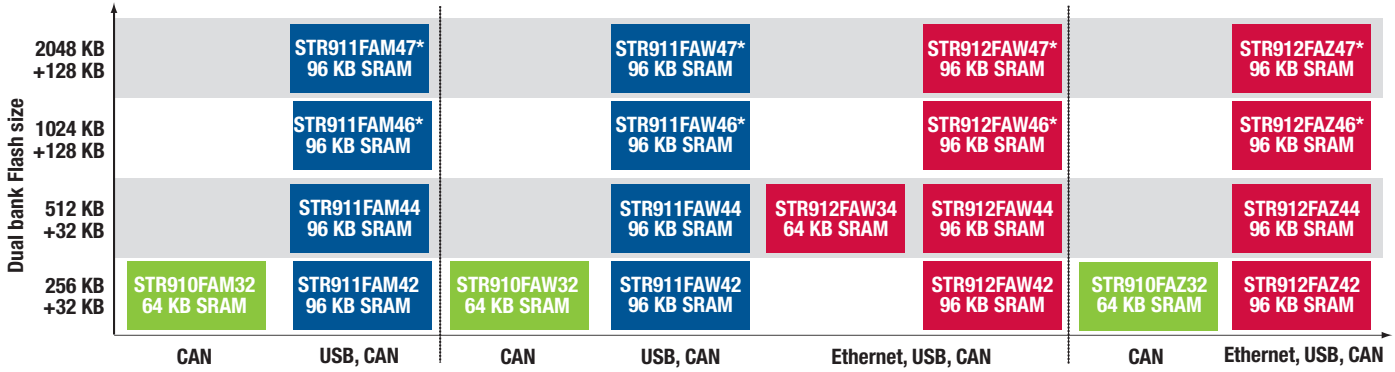
Single MCU platform – multiple products. Select the STR910FA device that meets your current requirements, and know that you have the option to move in memory size and connectivity, but keep your same firmware base when expanding your product line – now and in the future. STR910FA devices range from offering CAN, 3xUARTs, 2xSPIs, 2xI^2Cs, 10-bit ADC, and an external memory interface, and to adding a full-speed USB device and a 10/100 Ethernet MAC interface. ST provides firmware libraries to support all of these interfaces, at no charge, from www.st.com/mcu

STR910FA family

Features and benefits

Features	Benefits
96 MHz ARM966E-S CPU core with single-cycle DSP instructions and independent internal 32-bit buses, one for code and one for data, each with its own TCM interface	This architecture allows simultaneous access to both code and data, generating 96 MIPS peak performance executing code from Flash memory, and at the same time capable of up to 384 MB/s DMA data flow between peripherals and SRAM
10/100 Ethernet connectivity with optimized DMA data flow	Connect your product to a network and retain ample CPU bandwidth to implement the embedded application
Plentiful SRAM and Flash memories. Up to 96 KB SRAM, and up to 2048 KB of dual bank Flash. Either SRAM or Flash memories maybe used for instructions or data	Large memories meet requirements of complex applications, real-time operating systems (RTOSs), communication stacks and data storage. Dual bank Flash is ideal for robust in-application programming (IAP) and EEPROM emulation
New BGA144 package supports synchronous (PSRAM) and asynchronous memories	Enhanced data transfer through burst mode support
Support for USB, CAN, SPI, I²C, UART/IrDA, many timers, and up to 80 5 V-tolerant GPIO. Analog capability with 10-bit ADC and full supervisor functions	Broad connectivity to meet your application needs today and tomorrow. With so much inside, less is needed outside saving you space, cost and logistic headaches
Flexible power and clock management with multiple low power modes, and a low power (< 1 µA typ, 1.2 µA max) real-time clock with programmable wake-up features	Tailor your system on the fly to balance performance and power consumption as needed
Extensive firmware support and tools offering. The STR910FAA library is freely distributed from ST, and STR910FA devices are supported by many third-party tool and RTOS vendors	Dramatically reduces development time and increases ease of use

From 288 KB up to 2176 KB Flash memory, all devices are pin-to-pin compatible



80-pin LQFP

128-pin LQFP

144-pin LFBGA

Package

* Contact sales offices

A complete range of tools, tailored to ST's ARM core-based MCUs, ready to meet any need…

Application development with ST's ARM core-based microcontrollers is supported by fully-featured ST evaluation boards, firmware and embedded operating systems, plus a range of development solutions and production programming tools.

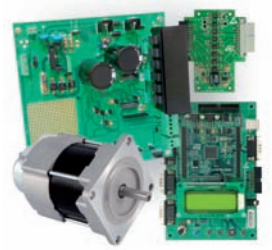
To help users discover device features and start application development quickly and easily, Hitex, IAR, Keil and Raisonance provide complete, low-cost tool packages for the full range of STR7 and STR9 devices. These general purpose starter kits include evaluation board, JTAG in-circuit debugger/programmer, integrated development environment, C/C++ compiler and sample applications with source code.

Application specific kits

STR9-comStick

A very low-cost, unlimited STR9 development package for fast and easy integration of network connectivity in any application. Code samples include Ethernet, USB and CAN implementation plus a web server application.

STR750 Motor control starter kit



A complete STR750F-based development platform with a ready-to-run motor control demo that allows rapid feature evaluation and easy implementation of sensor and sensorless vector-based motor control for three-phase PMSM and AC induction motors.

Firmware and libraries

A range of firmware is available to facilitate application development and shorten time-to-market including third-party RTOS and stack solutions (USB, TCP/IP, etc.) and the free ST firmware libraries, including:

Standard libraries

Provide easy access to all features of standard peripherals for all STRx devices. Libraries include drivers for all standard peripherals from GPIO and timers to CAN, I^2C, EMI, SPI, UART, ADC and more.

USB developer kits

USB-certified firmware packages for effortless development of any flavor of USB firmware (control, interrupt, bulk or isochronous transfer types). They also include implementation of DFU for firmware updates on USB, and of Virtual COM (CDC class) for emulation of an RS232 interface on USB.

ST free firmware packages include C sources, run on all STR7/9 evaluation boards, are easily adapted to other platforms and are compatible with major IDEs. They offer consistency in naming and variable access to facilitate development and code maintenance.

For more information, please refer to the brochure **STR7, STR9 and STM32 development tools**, or visit **www.st.com/mcu**

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Full product information at www.st.com

Order code: BRARM0907