

STM32 MCU family

32-bit Flash microcontrollers powered by
ARM® Cortex™-M3



STM32  Releasing your **creativity**

November 2009

Welcome to the world of STM32

Releasing your creativity

The STM32 family of 32-bit Flash microcontrollers is based on the breakthrough ARM Cortex™-M3 core – a core specifically developed for embedded applications that require a combination of high-performance, real-time, low-power and low-cost operation. The STM32 family benefits from the Cortex-M3 architectural enhancements (including the Thumb-2® instruction set) that deliver improved performance combined with better code density, and a tightly coupled nested vectored interrupt controller that significantly speeds response to interrupts, all combined with industry-leading power consumption. STMicroelectronics was a lead partner in developing the Cortex-M cores and with STM32 offers a comprehensive portfolio of advanced MCUs that we are committed to extending in capability, price range and features to cover the needs of microcontroller convergence.

The STM32 family is built to offer new degrees of freedom to MCU users. It offers a complete 32-bit product range that combines high-performance, real-time, low-power and low-voltage operation, while maintaining full integration and ease of development.

It eases migration from the 16-bit world thanks to its high level of features integration, its easy-to-use architecture, its low-power capability and cost-effectiveness. The STM32 family will enable you to create new applications, and design in the innovations you have been long dreaming about.

The STM32 key benefits

- Leading-edge architecture with the latest Cortex-M3 core from ARM
- Excellent real-time behaviour
- Outstanding power efficiency
- Superior and innovative peripherals
- Maximum integration
- Easy development, fast time to market



Cortex-M3 core



Leading edge architecture
Excellent real-time behaviour

Outstanding power efficiency



Sub μ A RTC, low voltage
0.27 mA/MHz, low-power modes

Superior and innovative peripherals



USB OTG, Ethernet, dual CAN, ADC 12-bit, advanced timers

Maximum integration



Reset circuitry clocks, oscillators, PLL regulator
RTC, watchdog

Extensive tools and software



Various IDE, starter kits, libraries, RTOS and stacks

Future proof design

Environment friendly, suits low-power operation

Address all your needs and beyond

Cost and space saving

More time for innovation improved productivity



STM32 platform
more than 70 fully compatible devices

STM32, the optimal platform choice

The STM32 is an optimal choice to support many applications with the same platform:

- From reduced memory and pin requirements to larger needs
- From performance demanding to battery operated
- From simple cost-sensitive to complex high-value

The total pin-to-pin, peripheral and software compatibility across the family gives you full flexibility across more than 70 devices.

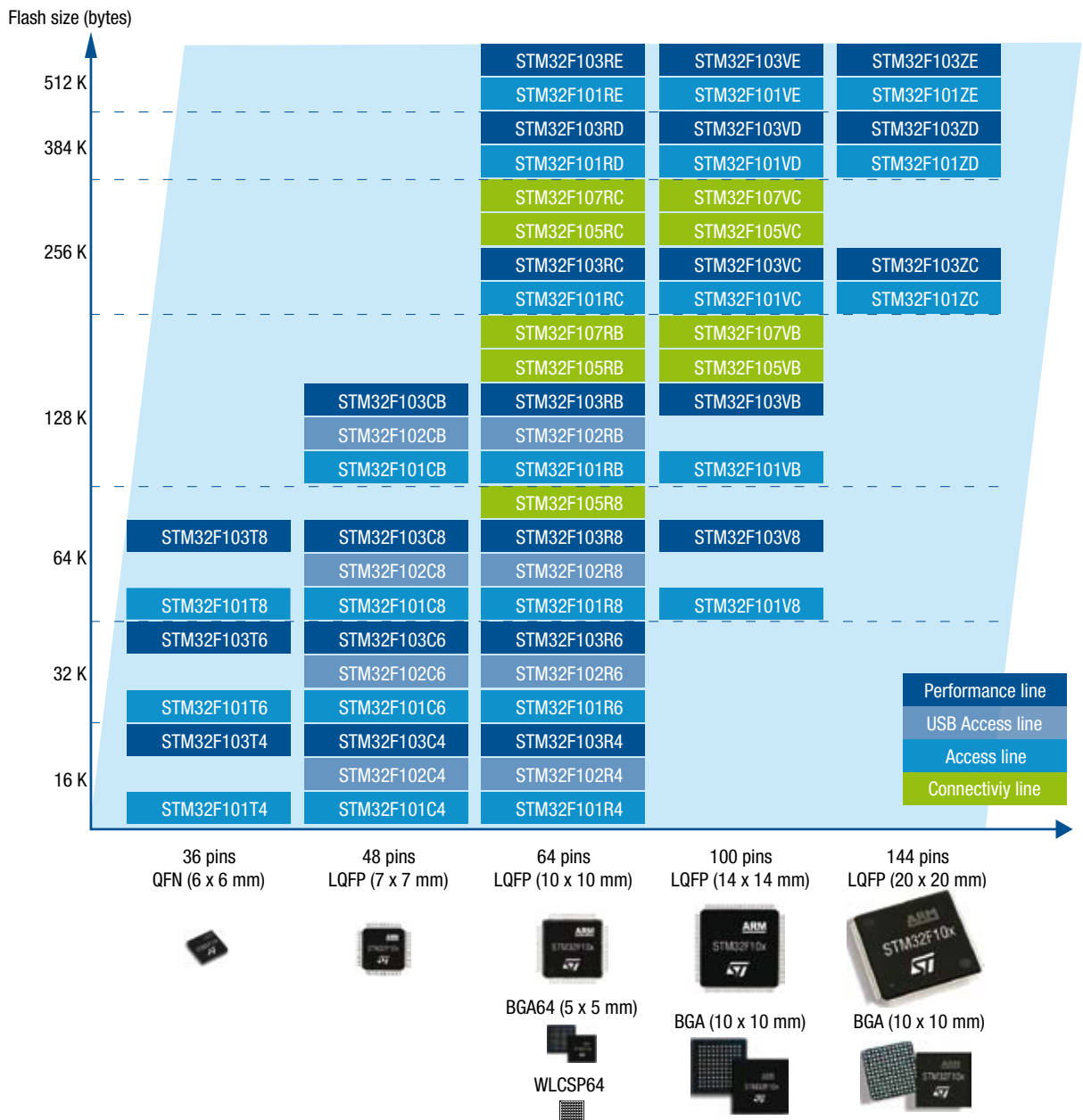
You can upgrade to a higher or downgrade to a lower memory size, or use different packages without changing your initial layout or software.

STM32, the largest portfolio

The STM32 offers the widest selection of microcontroller devices:

- Up to 72 MHz Cortex-M3 CPU
- 4-Kbyte to 64-Kbyte SRAM
- Four lines: Performance, USB Access, Access and Connectivity lines
- Pin-to-pin, software and peripheral compatibility across family
- 2.0 to 3.6 V power supply, 5 V tolerant I/Os
- -40 to +85 °C or up to 105 °C operating temperature range

STM32F10x portfolio



Applications

Industrial

- PLC
- Inverters
- Printers, scanners
- Industrial networking

Building and security

- Alarm systems
- Access control
- HVAC

Low power

- Glucose meters
- Power meters
- Battery-operated applications

Appliances

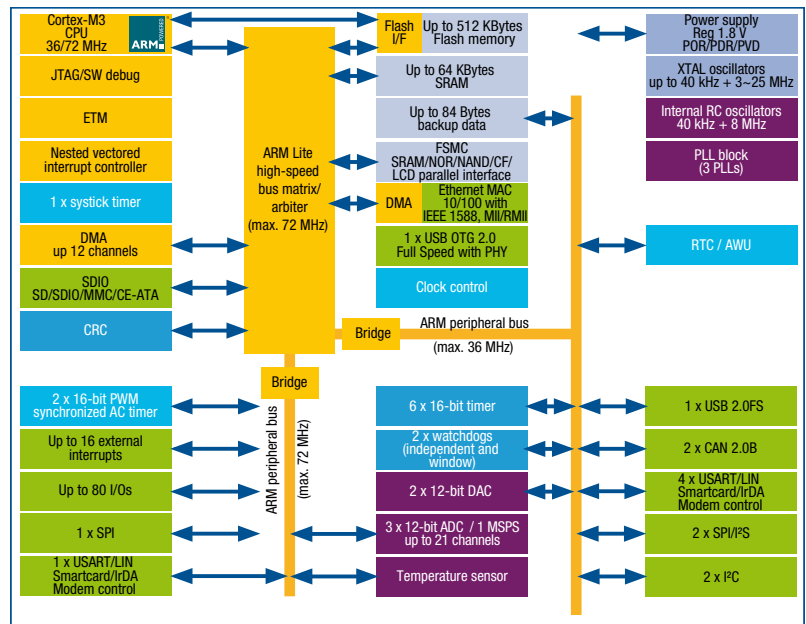
- Motor drive
- Application control

Consumer

- PC peripherals, gaming
- Digital cameras, GPS platforms
- Home audio

STM32F10x family block diagram

This block diagram shows all the available peripherals. For exact product content, please refer to the device summary.



AWU: Auto wake-up capability with RTC alarm
 CAN: Controller area network
 CF: CompactFlash
 CRC: Cyclic redundancy check
 DMA: Direct memory access
 ETM: Embedded Trace Macrocell
 IrDA: Infrared Data Association
 I²S: Inter-IC sound
 LIN: Local interconnect network
 MII: Media independent interface
 MMC: MultiMediaCard
 PDR: Power-down reset
 POR: Power-on reset
 PVD: Programmable voltage detector
 RMI: Reduced media independent interface
 RTC: Real-time clock
 SDIO: Secure digital input output
 SD: Secure digital
 USART: Universal sync/asynch receiver transmitter

STM32, more choice with four complete lines

The four lines are pin-to-pin and software-compatible, and offer the same embedded Flash options. The Performance line takes the 32-bit MCU world to new levels of performance and energy efficiency. With its Cortex-M3 core at 72 MHz, it is able to perform high-end computation while providing a rich set of peripherals. The USB Access line is the intermediary between Performance and Access line. Its 48 MHz CPU maximum speed provides excellent performance while keeping the

dynamic power consumption very low. It is intended for users that requires mandatorily the USB peripheral.

The Access line is the entry point of the STM32 family. It has the power of the 32-bit MCU but at a 16-bit MCU cost.

The Connectivity line adds Ethernet, USB OTG, dual CAN, audio class I²S. It is intended for applications where connectivity and real-time performances are required.

STM32F10x: product lines

The four lines include:

| |
|---|
| Multiple communication peripherals Up to 5 x USART, 3 x SPI, 2 x I²C |
| ETM* |
| FSMC** |
| 2-channel x 12-bit DAC* |
| Up to 6 x 16-bit timers |
| Main oscillator 4-16 MHz / 3-25 MHz*** |
| Internal 8 MHz and 40 kHz RC oscillators |
| Real-time clock with battery domain and 32 kHz external oscillator |
| 2 x watchdogs |
| Reset circuitry and brown out warning |
| Up to 12-channel DMA |



Performance line STM32F103

| | | | | | | | |
|------------|---------------------------------------|--|---------------|-------|---------|-----|-----------|
| 72 MHz CPU | Up to 512 Kbyte Flash / 64 Kbyte SRAM | 2/3 x 12-bit ADC (1 µs) Temperature sensor | USB FS device | SDIO* | 2 x I²S | CAN | PWM timer |
|------------|---------------------------------------|--|---------------|-------|---------|-----|-----------|

USB Access line STM32F102

| | | | | | | | |
|------------|---------------------------------------|--|---------------|--|--|--|--|
| 48 MHz CPU | Up to 128 Kbyte Flash / 16 Kbyte SRAM | 1 x 12-bit ADC (1 µs) Temperature sensor | USB FS device | | | | |
|------------|---------------------------------------|--|---------------|--|--|--|--|

Access line STM32F101

| | | | | | | | |
|------------|---------------------------------------|--|--|--|--|--|--|
| 36 MHz CPU | Up to 512 Kbyte Flash / 48 Kbyte SRAM | 1 x 12-bit ADC (1 µs) Temperature sensor | | | | | |
|------------|---------------------------------------|--|--|--|--|--|--|

Connectivity line STM32F105/STM32F107

| | | | | | | | |
|------------|---------------------|--|----------------|--------------|---------------------|-------------------------------------|--|
| 72 MHz CPU | Up to 64 Kbyte SRAM | 2 x 12-bit ADC (1 µs) Temperature sensor | USB 2.0 OTG FS | 2 x CAN 2.0B | 2 x I²S audio class | Ethernet IEEE 1588 (STM32F107 only) | |
|------------|---------------------|--|----------------|--------------|---------------------|-------------------------------------|--|

* For part numbers starting at 256 Kbytes of embedded Flash

** For high-density Access and Performance lines

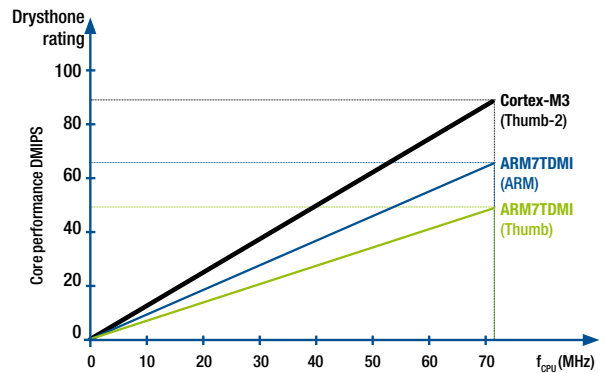
*** For Connectivity line

STM32 key benefits

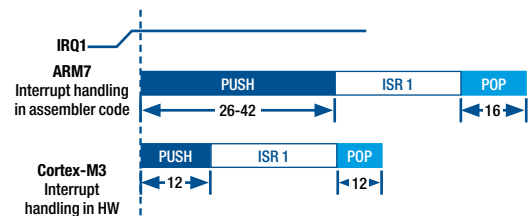
Leading-edge architecture with Cortex-M3 core

- Harvard architecture
- 1.25 DMIPS/MHz and 0.19 mW/MHz
- Thumb-2 instruction set brings 32-bit performance with 16-bit code density
- Single cycle multiply and hardware division
- Embedded, fast interrupt controller is now inside the core allowing:
 - Excellent real-time behaviour
 - Low latency down to six CPU cycles inter-interrupt
 - Six CPU cycles wake-up time from low-power mode
- Up to 35% faster and up to 45% less code than ARM7TDMI®

Cortex-M3 performance versus ARM7TDMI



Cortex-M3 interrupt versus ARM7TDMI



Outstanding power efficiency

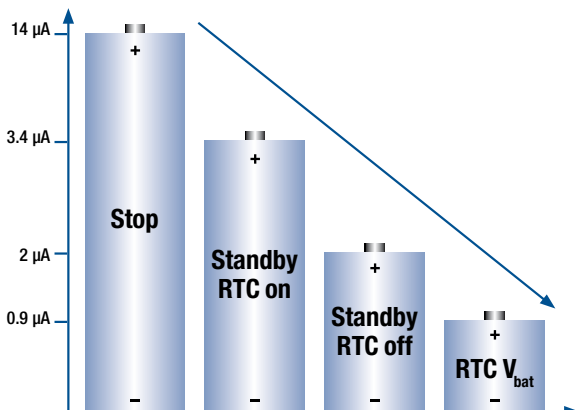
High performance does not mean high power consumption. We have taken special care to address three main energy requirements driven by the market:

- High dynamic power efficiency in running mode
- Extremely low power when the application is in standby
- Low-voltage capability for direct battery operation

In run mode, executing from Flash at full 72 MHz CPU speed, the STM32 has a current consumption as low as 27 mA. In standby mode, current consumption is as low as 2 µA typical, with reset circuitry active. Finally, its 2.0 V to 3.6 V power supply enables its use for battery-operated applications.

STM32F10x typical current

(on 128-Kbyte device @ 25 °C)



The STM32 has three different low-power modes and a versatile clocking scheme so that users can optimize power consumption versus performance.

The STM32 also embeds a real-time clock (RTC) running either from a 32 kHz quartz oscillator or an internal RC oscillator. The RTC has a separate power domain, with an embedded switchover to run either from a dedicated coin cell battery or from the main supply. On 128-Kbytes devices, typical current consumption is 0.9 µA at 2.0 V. It embeds up to 84 bytes for data backup. Start-up time from low-power modes is lower than 6 µs typical from stop mode, and 50 µs typical from standby mode and reset.

- Low voltage **2.0 V to 3.6 V** operation
- Down to 27 mA in run mode from Flash at 72 MHz
- Startup time from stop **< 6 µs**
- Startup time from standby **50 µs**
- Reset circuitry always active

High level of integration

- Built-in supervisor reduces need for external components:
 - Power-on reset, low-voltage detect, brown-out detect, watchdog timer with independent clock
- One main crystal drives entire system:
 - Inexpensive 4-16 MHz / 3-25 MHz crystal drives CPU, USB and all peripherals
 - Embedded PLL generates multiple frequencies
 - Flexible PLL to clock simultaneously USB, CAN, Ethernet and audio class I²S
 - Optional 32 kHz crystal for RTC
- Embedded factory trimmed 8 MHz RC oscillator can be used as main clock
- Additional low-frequency RC oscillator for RTC or watchdog
- Only 7 external passive components required for base system on LQFP100 package

Flexible static memory controller (FSMC)

The flexible static memory controller offers:

- 4 independent banks to support external memory with frequency up to 36 MHz when system is at 72 MHz
- CompactFlash, SRAM, PSRAM, NOR and NAND memory support
- Programmable timings to support a wide range of devices
- Code execution from external memory
- Parallel interface to LCD controllers, Intel 8080 / Motorola 6800 modes support

Superior and innovative peripherals

The need for speed

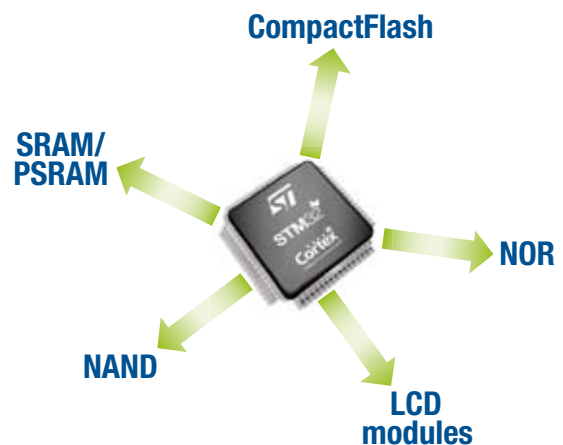
| | |
|-----------------------|---|
| USB | 12 Mbit/s |
| USART | Up to 4.5 Mbit/s |
| SPI | 18 MHz master and slave |
| I²C | 400 kHz |
| GPIO | 18 MHz maximum toggle |
| PWM timer | 72 MHz clock input |
| SDIO | Up to 48 MHz |
| I²S | From 8 kHz to 96 kHz sampling frequencies |

The need for analog

| | |
|------------|--|
| ADC | Up to 3x 12-bit ADC, 1 μ s conversion time |
| DAC | 2-channel, 12-bit |

The need for connectivity

| | |
|-----------------|---|
| Dual CAN | Up to 2 independent CAN |
| Ethernet | 10/100 Mbit/s MAC with hardware IEEE 1588 |
| USB OTG | Full speed host, device or OTG |



Motor control

- The STM32 Performance and Connectivity lines embed features that are perfectly suited to three-phase brushless motor control:
 - Powerful Cortex-M3 core
 - 6 PWM advanced control timers with embedded dead-time generation
 - Numerous PWM outputs allowing multiple DC-brush, stepper or universal motor drives
 - Dual sample and hold ADC, 12-bit resolution, 1 μ s conversion time
- Free motor control firmware libraries supporting AC induction motor (sensored) and PMSM motor (sensorless, Hall-sensor or encoder) vector control
- Less than 21 μ s for sensorless vector control loop
- Class B compliance with the EN/IEC 60335-1 norm:
 - Pre-certified full set of self-test routines
- Run your motor in just a few steps:
 - STM3210B-MCKIT full developer kit for vector drives
- For STM32 Performance line devices starting at 256 Kbytes of Flash, two advanced control PWM timers and three ADCs are on board for dual motor control, triple sample and hold capabilities.



Superior connectivity: Ethernet with IEEE 1588, USB OTG and dual CAN

The STM32 Connectivity line makes networking economical with a central system or other devices for a wide range of products, as a result of an embedded Ethernet MAC peripheral with dedicated DMA controller. The IEEE 1588 precision time protocol hardware support provides accurate clock synchronization over the network and retains ample CPU bandwidth to implement the embedded application.

The USB 2.0 OTG makes the STM32 Connectivity line a turnkey solution to add a USB device, host or OTG function to a product. Firmware upgrade in the field, data logging or data storage are now as easy as connecting a standard USB mass storage device to the STM32. Adding a USB keyboard, mouse or any other device is just as easy.

The dual CAN 2.0B makes the STM32 Connectivity line a turnkey solution to implement a CAN gateway. Also since dual CAN and USB peripherals can be used simultaneously, the STM32 is the perfect fit to connect a computer or USB device to CAN networks.

Superior audio: audio class I²S

The two audio class I²S of the STM32 Connectivity line, combined with the embedded Ethernet and USB OTG peripherals, address the connectivity and features required of many home-audio applications.

The new PLL block clocking the two I²S peripherals provides less than 0.5% error on the master clock connected to the external audio DAC.

The USB 2.0 OTG controller can connect any USB device, including USB mass storage devices and portable audio players. The powerful Cortex-M3 core running at 72 MHz is able to handle not only the audio decoding of music files stored on an SD card or USB mass storage device connected to the STM32, but also the user interface.



Connectivity line application highlights

USB enabled devices

Aftermarket car diagnostic tool, gateway between accessories and OEM interface



Home audio



- Processing power: audio codec
- Human machine interface: touch sensing, LCD
- Communication peripherals: 2x I²S, USB Host, USB device+CAN, Ethernet

Ethernet enabled devices

Factory automation



Communication



- Communication peripherals:
 - Ethernet with IEEE 1588 support
 - USB OTG
 - Dual CAN
- Platform offer

Security



- Communication peripherals
- Human machine interface: touch sensing, LCD

Device summary

| Part number | Program memory | | RAM (bytes) | A/D inputs | Timer functions | | Serial interface | I/Os (high current) | Packages |
|--|----------------|----------|-------------|------------|--------------------------|---------------------|--|--|----------|
| | Type | Size | | | 12 or 16-bit (IC/OC/PWM) | Others | | | |
| | Flash | (Kbytes) | | | | | | | |
| STM32F101 Access Line: 36 MHz CPU speed, EMI (100 and 144 pins), 2-channel DAC, Vbat pin, low-power features, embedded POR, PDR and PVD, 8 MHz and 40 kHz internal RC oscillator, 4-16 MHz main oscillator, dedicated 32 kHz oscillator, -40 to 85 °C, 2.0 to 3.6 supply voltage | | | | | | | | | |
| 36 pins | STM32F101T4 | ● | 16 | 4 K | 10x12-bit | 2x16-bit (8/8/8) | 2xWDG, 24-bit down counter | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 26(26) |
| | STM32F101T6 | ● | 32 | 6 K | 10x12-bit | 2x16-bit (8/8/8) | | | 26(26) |
| | STM32F101T8 | ● | 64 | 10 K | 10x12-bit | 3x16-bit (12/12/12) | | | 26(26) |
| | STM32F101C4 | ● | 16 | 4 K | 10x12-bit | 2x16-bit (8/8/8) | | | 36(36) |
| 48 pins | STM32F101C6 | ● | 32 | 6 K | 10x12-bit | 2x16-bit (8/8/8) | 2xWDG, RTC, 24-bit down counter | 2xSPI, 2xI ² C, 3xUSART (IrDA, ISO 7816) 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 36(36) |
| | STM32F101C8 | ● | 64 | 10 K | 10x12-bit | 3x16-bit (12/12/12) | | | 36(36) |
| | STM32F101CB | ● | 128 | 16 K | 10x12-bit | 3x16-bit (12/12/12) | | | 36(36) |
| | STM32F101R4 | ● | 16 | 4 K | 16x12-bit | 2x16-bit (8/8/8) | | | 51(51) |
| 64 pins | STM32F101R6 | ● | 32 | 6 K | 16x12-bit | 2x16-bit (8/8/8) | 2xWDG, RTC, 24-bit down counter | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 51(51) |
| | STM32F101R8 | ● | 64 | 10 K | 16x12-bit | 3x16-bit (12/12/12) | | | 51(51) |
| | STM32F101RB | ● | 128 | 16 K | 16x12-bit | 3x16-bit (12/12/12) | | | 51(51) |
| | STM32F101RC | ● | 256 | 32 K | 16x12-bit | 6x16-bit (16/16/16) | | | 51(51) |
| 100 pins | STM32F101RD | ● | 384 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 3xSPI, 2xI ² C, 5xUSART/UART (IrDA, ISO 7816) | 51(51) |
| | STM32F101RE | ● | 512 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | | | 51(51) |
| | STM32F101V8 | ● | 64 | 10 K | 16x12-bit | 3x16-bit (12/12/12) | | | 80(80) |
| | STM32F101VB | ● | 128 | 16 K | 16x12-bit | 3x16-bit (12/12/12) | | | 80(80) |
| 144 pins | STM32F101VC | ● | 256 | 32 K | 16x12-bit | 6x16-bit (16/16/16) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 3xSPI, 2xI ² C, 5xUSART/UART (IrDA, ISO 7816) | 80(80) |
| | STM32F101VD | ● | 384 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | | | 80(80) |
| | STM32F101VE | ● | 512 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | | | 80(80) |
| | STM32F101ZC | ● | 256 | 32 K | 16x12-bit | 6x16-bit (16/16/16) | | | 112(112) |
| | STM32F101ZD | ● | 384 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | | 112(112) | |
| | STM32F101ZE | ● | 512 | 48 K | 16x12-bit | 6x16-bit (16/16/16) | | 112(112) | |
| STM32F102 USB Access Line: 48 MHz CPU speed, Vbat pin, low-power features, embedded POR, PDR and PVD, 8 MHz and 40 kHz internal RC oscillator, 4-16 MHz main oscillator, dedicated 32 kHz oscillator, -40 to 85 °C, 2.0 to 3.6 supply voltage | | | | | | | | | |
| 48 pins | STM32F102C4 | ● | 16 | 4 K | 10x12-bit | 2x16-bit (8/8/8) | 2xWDG, RTC, 24-bit down counter | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 36(36) |
| | STM32F102C6 | ● | 32 | 6 K | 10x12-bit | 2x16-bit (8/8/8) | | | 36(36) |
| | STM32F102C8 | ● | 64 | 10 K | 10x12-bit | 3x16-bit (12/12/12) | | | 36(36) |
| | STM32F102CB | ● | 128 | 16 K | 10x12-bit | 3x16-bit (12/12/12) | | | 36(36) |
| 64 pins | STM32F102R4 | ● | 16 | 4 K | 16x12-bit | 2x16-bit (8/8/8) | 2xWDG, RTC, 24-bit down counter | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 51(51) |
| | STM32F102R6 | ● | 32 | 6 K | 16x12-bit | 2x16-bit (8/8/8) | | | 51(51) |
| | STM32F102R8 | ● | 64 | 10 K | 16x12-bit | 3x16-bit (12/12/12) | | | 51(51) |
| | STM32F102RB | ● | 128 | 16 K | 16x12-bit | 3x16-bit (12/12/12) | | | 51(51) |
| STM32F103 Performance Line: 72 MHz CPU speed, EMI (100 and 144 pins), 2-channel DAC, Vbat pin, low-power features, embedded POR, PDR and PVD, 8 MHz and 40 kHz internal RC oscillator, 4-16 MHz main oscillator, dedicated 32 kHz oscillator, 1 x high-speed USART 4.5 Mbit/s, motor control oriented PWM, 3 x ADC (triple sample and hold capability), -40 to 85 °C or -40 to 105 °C | | | | | | | | | |
| 36 pins | STM32F103T4 | ● | 16 | 6 K | 10x12-bit | 3x16-bit (12/12/14) | 2xWDG, 24-bit down counter | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816), USB, CAN | 26(26) |
| | STM32F103T6 | ● | 32 | 10 K | 10x12-bit | 3x16-bit (12/12/14) | | | 26(26) |
| | STM32F103T8 | ● | 64 | 20 K | 10x12-bit | 4x16-bit (16/16/18) | | | 26(26) |
| | STM32F103C4 | ● | 16 | 6 K | 10x12-bit | 3x16-bit (12/12/14) | | | 36(36) |
| 48 pins | STM32F103C6 | ● | 32 | 10 K | 10x12-bit | 3x16-bit (12/12/14) | 2xWDG, RTC, 24-bit down counter | 2xSPI, 2xI ² C, 3xUSART (IrDA, ISO 7816) | 36(36) |
| | STM32F103C8 | ● | 64 | 20 K | 10x12-bit | 4x16-bit (16/16/18) | | | 36(36) |
| | STM32F103CB | ● | 128 | 20 K | 10x12-bit | 4x16-bit (16/16/18) | | | 36(36) |
| | STM32F103R4 | ● | 16 | 6 K | 16x12-bit | 3x16-bit (12/12/14) | | | 51(51) |
| 64 pins | STM32F103R6 | ● | 32 | 10 K | 16x12-bit | 3x16-bit (12/12/14) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 1xSPI, 1xI ² C, 2xUSART (IrDA, ISO 7816) | 51(51) |
| | STM32F103R8 | ● | 64 | 20 K | 16x12-bit | 4x16-bit (16/16/18) | | | 51(51) |
| | STM32F103RB | ● | 128 | 20 K | 16x12-bit | 4x16-bit (16/16/18) | | | 51(51) |
| | STM32F103RC | ● | 256 | 48 K | 16x12-bit | 8x16-bit (24/24/28) | | | 51(51) |
| 100 pins | STM32F103RD | ● | 384 | 64 K | 16x12-bit | 8x16-bit (24/24/28) | 2xWDG, RTC, 24-bit down counter | 3xSPI, 2xI ² S, 2xI ² C, 5xUSART/UART (IrDA, ISO 7816), SDIO, USB, CAN | 51(51) |
| | STM32F103RE | ● | 512 | 64 K | 16x12-bit | 8x16-bit (24/24/28) | | | 51(51) |
| | STM32F103V8 | ● | 64 | 20 K | 16x12-bit | 4x16-bit (16/16/18) | | | 80(80) |
| | STM32F103VB | ● | 128 | 20 K | 16x12-bit | 4x16-bit (16/16/18) | | | 80(80) |
| 144 pins | STM32F103VC | ● | 256 | 48 K | 16x12-bit | 8x16-bit (24/24/28) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 2xSPI, 2xI ² C, 3xUSART (IrDA, ISO 7816) | 80(80) |
| | STM32F103VD | ● | 384 | 64 K | 16x12-bit | 8x16-bit (24/24/28) | | | 80(80) |
| | STM32F103VE | ● | 512 | 64 K | 16x12-bit | 8x16-bit (24/24/28) | | | 80(80) |
| | STM32F103ZC | ● | 256 | 48 K | 21x12-bit | 8x16-bit (24/24/28) | | | 112(112) |
| | STM32F103ZD | ● | 384 | 64 K | 21x12-bit | 8x16-bit (24/24/28) | | 112(112) | |
| | STM32F103ZE | ● | 512 | 64 K | 21x12-bit | 8x16-bit (24/24/28) | | 112(112) | |
| STM32F105/107 Connectivity Line: 72 MHz CPU speed, 2-channel DAC, Vbat pin, low power features, embedded POR, PDR and PVD, internal RC 8 MHz and 40 kHz internal RC oscillator, 3-25 MHz main oscillator, dedicated 32 kHz oscillator, 1 x high-speed USART 4.5 Mbit/s, motor control oriented PWM, 2 x ADC (double sample and hold capability), advanced PLL schemes for audio class I ² S communication, -40 to 85 °C or -40 to 105 °C | | | | | | | | | |
| 64 pins | STM32F105R8 | ● | 64 | 20 K | 16x12-bit | 7x16-bit (20/20/22) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 3xSPI, 2xI ² S, 2xI ² C, 3xUSART (IrDA, ISO 7816), 2xUART, USB OTG FS, 2xCAN | 51(51) |
| | STM32F105RB | ● | 128 | 32 K | 16x12-bit | 7x16-bit (20/20/22) | | | 51(51) |
| | STM32F105RC | ● | 256 | 64 K | 16x12-bit | 7x16-bit (20/20/22) | | | 51(51) |
| | STM32F107RB | ● | 128 | 48 K | 16x12-bit | 7x16-bit (20/20/22) | | | 51(51) |
| 100 pins | STM32F107RC | ● | 256 | 64 K | 16x12-bit | 7x16-bit (20/20/22) | 2xWDG, RTC, 24-bit down counter, 2x16-bit basic timers | 3xSPI, 2xI ² S, 2xI ² C, 3xUSART (IrDA, ISO 7816), 2xUART, USB OTG FS, 2xCAN, Ethernet MAC10/100 | 51(51) |
| | STM32F105V8 | ● | 64 | 20 K | 16x12-bit | 7x16-bit (20/20/22) | | | 80(80) |
| | STM32F105VB | ● | 128 | 32 K | 16x12-bit | 7x16-bit (20/20/22) | | | 80(80) |
| | STM32F105VC | ● | 256 | 64 K | 16x12-bit | 7x16-bit (20/20/22) | | | 80(80) |
| | STM32F107VB | ● | 128 | 48 K | 16x12-bit | 7x16-bit (20/20/22) | | 80(80) | |
| | STM32F107VC | ● | 256 | 64 K | 16x12-bit | 7x16-bit (20/20/22) | | 80(80) | |

Development tools

A complete range of high-end and low-cost development tools is available, including complete tool solutions, easy-to-use starter kits, embedded operating systems and software, all tailored to the STM32.

Promotion kits

Play, explore and develop applications on the **STM32 Primer** and **Primer 2** with Raisonance toolset, free demos and an online community at www.stm32circle.com to stimulate creative designs.

Evaluate STM32 performance in real time, with the innovative **STM32-PerformanceStick** and DashBoard performance evaluation GUI, sample applications and unlimited Hitex toolset.

STM32-ComStick allows you to easily evaluate the networking features of the STM32 Connectivity line, Ethernet, USB Host and OTG. It includes integrated debugging/programming capability via USB and unlimited Hitex HiTOP5 and Tasking VX C compiler



Starter kits

Starter kits include an evaluation board, JTAG in-circuit debugger/programmer, integrated development environment, C/C++ compiler and sample applications with source code.

| Part number | Featured product | Description |
|--|---|--|
| STM3210B-SK/HIT | STM32F103RBT6 | Hitex kit with unlimited HiTOP5, Tasking VX compiler, STM32-PerformanceStick with integrated debugging/programming via USB, extension I/O board with peripheral evaluation features, DashBoard GUI |
| STM3210B-SK/IAR STM3210C-SK/IAR STM3210E-SK/IAR | STM32F103RBT6 STM32F107RCT6 STM32F103RET6 | IAR Embedded Workbench for ARM (for up to 32 Kbytes of code), IAR C/C++ compiler, J-Link (USB/JTAG), evaluation board |
| STM3210B-SK/KEIL STM3210C-SK/KEIL STM3210E-SK/KEIL | STM32F103RBT6 STM32F107RCT6 STM32F103RET6 | Keil RealView MDK with uVision 3 (for up to 16 Kbytes of code), ARM C/C++ compiler, ULINK (USB/JTAG), evaluation board |
| STM3210B-SK/RAIS STM3210C-SK/RAIS | STM32F103RBT6 STM32F107RCT6 | Raisonance REva kit with RIDE (debug up to 32 Kbytes of code), GNU C/C++ compiler, modular evaluation hardware with integrated RLink (USB/JTAG) |
| STM3210B-MCKIT | STM32F103RBT6 | ST motor-control starter kit with complete sensor and sensorless libraries, evaluation hardware platform for vector drive of three-phase PMSM and induction motors, plus Segger J-Link for host PC interface |

Evaluation board STM3210B-EVAL, STM3210C-EVAL and STM3210E-EVAL

Complete hardware evaluation platform with the STM32F103, implementing the full range of device peripherals and features.

For more information, visit www.st.com/stm32



STM32 embedded firmware

- **STM32 firmware library:** Complete packages consisting of device drivers for all the standard device peripherals. Each device driver includes a set of functions covering full peripheral functionality.
- **STM32 USB developer kit:** Complete firmware package that makes implementation of the USB slave interface in STM32 applications quick and painless.
- **DSP Software Library:** the STM32 DSP (digital signal processor) software library provides a set of functions well suited for digital signal processing applications.
- **STM32 Speech Codec Software Library:** STM32 Speech Codec software library enables you to transmit long messages and store more speech data.
- **STM32 self-test routines Class B norm certification:** A full set of ready-to-use self-test routines for home appliance certification under EN/IEC 60335-1 Class B norm (functional safety).
- **STM32 motor control software:** Complete 3-phase motor control library supporting PMSM motors in sensed and sensorless mode and AC induction motors in sensed mode, and a patented single-shunt algorithm. This software is included in the STM32 motor control starter kit.

Third-party development solutions

Choose from a full range of solutions that offer start-to-finish control of application development from a single environment that includes development environment, C/C++ compiler and in-circuit emulator.

| Supplier | IDE | Supported compilers | In-circuit debuggers, emulators |
|-------------------------------|-------------------|---|--|
| Aiji System | OPENice-EDS | Supports a variety of images Dwarf1/2, ELF, AxF, Keil, GCC, ARM (ADS, RVDS) | OPENice-A1000 |
| Altium / TASKING | EDE | TASKING C/C++ | Tantino, Tanto, J-Link |
| Green Hills Software | MULTI | Green Hills | Green Hills Probe |
| Hitex | HITOP5 | GNU C/C++, Tasking, ARM, and IAR | Tantino for Cortex |
| IAR¹ | EWARM | IAR's ISO C/C++ and Extended Embedded C++ | AnbyICE, ARM RealView ICE, J-Link, Macraigor Wiggler and other RDI-based JTAG interfaces |
| iSYSTEM | WinIdea | ARM, GHS, GNU, IAR, Keil, Tasking | iONE |
| Keil | uVision3 | Keil, GNU C/C++, ARM (ADS and RVDS) | Keil ULink, Hitex Tanto, iSYSTEM iC3000, Nohau EMUL-ARM |
| Lauterbach | TRACE32 PowerView | IAR, MetaWare, High C/C++, ARM (ADS and RVDS), Windriver, GNU C/C++ | TRACE32 – Power Tool, TRACE32 – ICD |
| Raisonance² | RIDE | GNU C/C++ | RLink |
| Rowley | CrossWorks | GNU C/C++ | CrossConnect, Macraigor Wiggler, IAR, J-Link |
| Signum | Chameleon | Compatible with all major C/C++ ARM compilers | JTAGjet, JTAGjet-Trace (ETM) |

For information about compatibility with other tools, refer to the relevant third-party internet site.

Operating systems, solution stacks and more

| Company | RTOS | TCP/IP solutions | USB solutions | | | Website |
|-----------------|---------------------|----------------------------|---------------|--------------|--------------|--|
| | | | Device | Host | OTG | |
| CMX Systems | CMX-RTX | - | - | - | - | www.cmx.com |
| eCosCentric | eCosPro | - | - | - | - | www.ecoscentric.com |
| Express Logic | ThreadX | - | - | - | - | www.rtos.com |
| FreeRTOS | FreeRTOS | - | - | - | - | www.FreeRTOS.org |
| HCC-Embedded | - | - | EUSBD | EUSBH | EUSB-OTG | www.hcc-embedded.com/www.hcc-embedded.com/en/solution/st_micro |
| IAR | PowerPac | PowerPac TCP/IP | PowerPac USB | PowerPac USB | PowerPac USB | www.iar.com, www.iar.com/st |
| Interniche | | NicheLite | - | - | - | www.iniche.com, www.st.com/mcu |
| Keil | ARTX-ARM | RL-TCPnet | RL-USB | - | - | www.keil.com |
| Micrium | µC/OS-II, µC/OS-III | µC/TCP-IP | uC/USB Device | uC/USB Host | uC/USB OTG | www.micrium.com, www.micrium.com/st/index.html |
| Micro Digital | smxARM | smxNS | smxUSBD | smxUSBH | smxUSBO | www.smxrtos.com, www.smxrtos.com/stmicro.htm |
| Quadros Systems | RTXC Quadros | RTXC Quadnet RTXC Quark | RTXCusb | RTXCusb | RTXCusb | www.quadros.com |
| Segger | embOS | embOS/IP | emUSB Device | emUSB Host | emUSB OTG | www.segger.com |



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