STM32H7R/S high-performance lines

Scalable & secure bootflash microcontrollers
The STM32 portfolio

Five product categories

Wireless MCU
Ultra-low-power MCU
Mainstream MCU
High-performance MCU
Embedded MPU

Short- and long-range connectivity
32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score
32- and 64-bit microprocessors

Enabling edge AI solutions
Scalable security
Opening new innovation possibilities with scalable and secure bootflash-microcontrollers

General-purpose MCU lines
STM32H7R3/S3

Graphics MCU lines
STM32H7R7/S7

Run MPU-like applications on a real-time MCU

Leverage more design freedom

Fast-track your development with MCU ecosystem
## What the STM32H7R/S lines offer

**Max performance: 600 MHz bootflash MCU**
- Real-time execution from internal or external memories
- High speed serial & parallel memory interfaces up to 200 MHz DTR
- Large internal SRAM

**High scalability to optimize your design & reduce costs**
- Flexible external memory capacity
- 10 packages: from cost-effective 68 to 225 pins

**Security assurance: ready for future security directives**
- Target security certification: SESIP Level 3 and PSA certified L3.
- On-the-fly decrypt/encrypt & secure boot

**Best-in-class platform for graphics applications**
- Powerful 2.5D NeoChrom GPU - smart DMA architecture memory/GPU
- Enabling UIs with HD resolution.
High-performance & multi-purpose MCUs for a wide range of applications

- Smart homes & cities
- Industrial
- Medical
- Point of sales
- Robotics
A high-performance architecture leveraging internal and external memories

**Arm® Cortex®-M7 @ 600 MHz**

- Double precision FPU, MPU, advanced DSP
- 32 Kbytes + 32 Kbytes L1 I/D allowing zero wait-state execution from external memories
- 620 Kbytes of SRAM
- High speed external memory support up to 200 MHz DTR

**1284 DMIPS**

**3174 CoreMark**
Why choose the STM32H7R/S bootflash MCU?

#1
Lowest cost STM32H7 to-date

#2
Fast memory interfaces up to 200MHz DTR

#3
More freedom to connect any MCU memory type

#4
Ecosystem to configure boot & code execution

#5
Load & run code in large internal SRAM for faster execution

The STM32HR/S lines are the most cost-effective STM32H7 MCUs. They offer fast external memory interfaces to provide more freedom on memory selection and architecture.
Bringing new features to the STM32H7 series

- 200 MHz Hexadeca SPI with PHY and DTR-mode
  Fewer pins, more performance

- NeoChrom GPU, JPEG Codec and LTDC
  Accelerating MPU-like GUIs

- Code execution from external/internal memory
  Securing internal & external code & data

- I3C with DMA & 2xUSB HS/FS with PHY & UCPD
  Enriched communication interfaces
Securing external memories

Security option with memory crypto engine for on-the-fly encryption and decryption

STM32H7S3 or STM32H7S7
S=Crypto

- MCE1 w. AES: Block & Stream
- MCE2 w. Noekeon: Block
- MCE3 w. Noekeon: Block
- 2x SDMMC No MCE

Rich & fast memory interfaces

- xSPI1/2
- xSPI2/1
- FMC8/16/32
- SD/SDIO/MMC

Choose your preferred memory type

- Up to 200MHz 16-bit Serial RAM and Flash (DTR)
- Up to 200MHz 8-bit Serial RAM and Flash
- Up to 100MHz 32-bit Parallel RAM and Flash
- Up to 100MHz e.MMC, SDCard, OctoSPI Flash: 200MHz 16bit Serial PSRAM: 200MHz DTR

Performance impact example using MCE security option
Code execution from external memory with Data in D-TCM

<table>
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<tr>
<th>OctoSPI Flash: 200MHz 16bit Serial PSRAM: 200MHz DTR</th>
<th>CoreMark</th>
<th>Fast fourier transform (FFT)</th>
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<tr>
<td>No Cipher vs Block AES/Noekeon: 0-1% impact</td>
<td>0-1% impact</td>
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<tr>
<td>No cipher vs Fast Block AES/Noekeon: 0-1% impact</td>
<td>0-1% impact</td>
<td>0-1% impact</td>
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<tr>
<td>No Cipher vs AES Stream: 0% impact</td>
<td>0% impact</td>
<td>0% impact</td>
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</table>
Notes:
- IDD RUN, code int flash, TYP SMPS, perip off, cache on
- IDD SLEEP: ECC enabled, perip OFF, VOS High
- IDD STANDBY: IWDG OFF, Backup SRAM Off, RTC & LSE ON, 3.3V
- IDD VBAT: Backup SRAM OFF, RTC/LSE ON
STM32H7Rx/Sx portfolio

General-purpose & graphics lines, security options, large package offering
The NeoChrom GPU offloads the CPU from the graphic computations, freeing up the memory and boosting performance.

Fully supported in the X-CUBE-TOUCHGFX

- Scale/animate bitmaps
- Full screen transitions
- 360° Bitmap rotations
- Perspective correct texture mapping
- Fast 2D bitmap copy color format conversion
- Vector graphics (SW)
- Text scrolling
- MJPEG videos
GUI application example

MPU-like applications
Run rich GUIs and much more

Watch video now!
Scalable security to boost your time to market

How many security building blocks do you need to reach your security goals?

Choose between different security offers

From secure hardware to full solution owned & maintained by ST
### Stronger security

#### Robust hardware features and turnkey SoC software implementations

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<td>OTP, HDP, WRP, MPU</td>
<td>Side channel AES, PKA</td>
<td>Hardware Security robustness</td>
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<td>Ext. Flash Enc/Dec MCE</td>
<td>TRNG, MCE1, MCE2, HUK</td>
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<td>Immutable Root of Trust</td>
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- Strong hardware features and turnkey SoC software implementations
- Robust hardware features and turnkey SoC software implementations
- Memory protections against illegal access control
- Cryptography for hardware robustness
- Platform authentication during product lifecycle
- Code isolation for runtime protection
- State-of-the-art security assurance level

- Target certifications

**STM32 Trust**

**life augmented**

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Scalable security to accelerate time to market

- Scalable configurations
- Security for int./ext. memories
- Supporting remote provisioning
- Ready for device certification
Secure your production flow: secure firmware install (SFI)

Protect application firmware during the manufacturing stage

Complete toolset to encrypt OEM binaries with the STM32 Trusted Package Creator software

Securely flash the STM32 with licenses from a STM32HSM at the programming partner location

Control the number of devices programmed with the firmware
Accelerate your development with our dedicated ecosystem
Tools and software supporting you during all your design steps

- **STM32CubeMX**
- **STM32CubeIDE**
- **STM32CubeExpansion**
- **STM32CubeProgrammer**
- **STM32CubeMonitor**

**Worldwide support channels**
Development tools for STM32H7R series

Jump-start your development with STM32H7R evaluation kits

• Prototyping with STM32H7S Nucleo board
  • 256 Mbit Octo-SPI NOR Flash
  • Ethernet, USB,
  • STLINK debugger, Arduino UNO extension interface

• Feature-rich prototyping with STM32H7S discovery kit
  • 1 Gbit Octo-SPI NOR Flash, 256Mbit Octo-SPI PSRAM
  • WVGA TFT display, Ethernet, USB, microSD, audio, microphone mems
  • STLINK debugger, Arduino UNO, and camera extension interfaces

• Move from idea to implementation in no time
  • STM32CubeMX assisted project start on STM32H7S Nucleo board
  • Full project template with BSP and ready to call services
  • Preconfigured STM32 clocks, pinout, and peripherals

*Recommended Resale Price (RRP)
## Simplified external memory-based development

### Application
STM32CubeMX assisted application project initialization with pinout, clock tree, MCU peripherals and middleware configuration.

### External memory loader
STM32CubeMX assisted creation of memory loader tuned for your selected external memory.

### Boot
STM32CubeMX assisted creation of your boot project including access management to your selected external memory with Load-and-Run or Execute-in-place boot options.
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Our technology starts with You