

STM32H7R/S high-performance lines

Scalable & secure bootflash microcontrollers





The STM32 portfolio

Five product categories













32- and 64-bit microprocessors















32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score



Scalable security







STM32**H7R3/7S3** 600 MHz 1284 DMIPS SRAM 620 KB 64K user flash 128K ST-iRoT Chrom-ART

STM32**H7R7/7S7** 600 MHz **1284 DMIPS** SRAM 620 KB 64K user flash 128K ST-iRoT NeoChrom

STM32H7 portfolio now over 170 part numbers



Dual-core Line STM32**H745/755**

480 + 240 MHz

RAM 1 MB

480 + 240 MHz1027 + 300 DMIPS 1027 + 300 DMIPS

STM32H747/757

RAM 1 MB

Flash up to 2 MB Flash up to 2 MB



STM32**H7A3/B3** 280 MHz 599 DMIPS RAM 1.4 MB Flash up to 2 MB

STM32**H742** 480 MHz **1027 DMIPS RAM 692 KB** Flash up to 2 MB

STM32**H743/753** 480 MHz **1027 DMIPS** RAM 1 MB

Flash up to 2 MB

STM32**H723/733** 550 MHz **1177 DMIPS RAM 564 KB** Flash up to 1 MB

STM32**H725/735**

550 MHz **1177 DMIPS RAM 564 KB** Flash up to 1 MB



STM32H7B0 STM32**H750** STM32H730 280 MHz 480 MHz 550 MHz 599 DMIPS **1027 DMIPS 1177 DMIPS** RAM 1 MB **RAM 1.4 MB RAM 564 BB** Flash 128 KB Flash 128 KB Flash 128 KB

Arm® Cortex® core

Cortex®-M7

Cortex®-M7 & -M4



Opening new innovation possiblities with scalable and secure bootflash-microcontrollers

General-purpose MCU lines

STM32H7**R3/S3**

Graphics MCU lines

STM32H7**R7/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





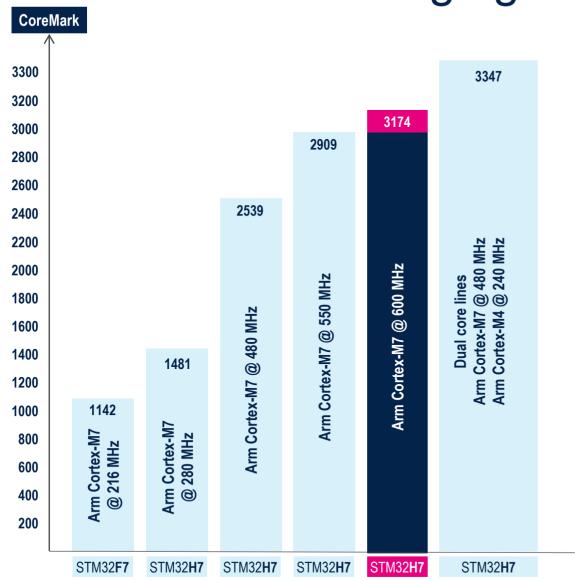








A high-performance architecture leveraging internal and external memories



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

Ecosystem to configure boot & code execution

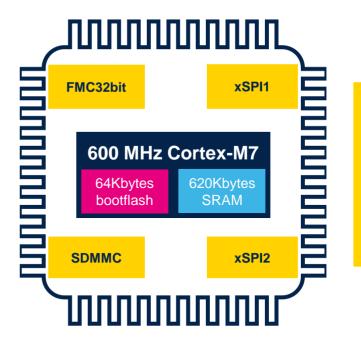
Load & run code in large internal SRAM for faster execution

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.

Connect most types of parallel memories

Up to 32 bit interfaces
@ 100MHz



Connect most types of serial memories

1-16 bit interfaces
Up to 200MHz DTR



#4

#5

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**







Graphic

TFT-I CD controller

JPEG Codec

FMC. Parallel LCD

Audio

2x SAI

2x microphones, 1x filter Voice Activity Detector

Analog

2x 12-bit ADC Digital temperature

Security

Life cycle

Secure debug authentication

ST-IROT

Secure key storage

PKA, TRNG, AES. Hash, HMAC

3x MCE (OTF-decrypt/encrypt) 96-bit unique ID

Active tampering

NeoChrom GPU

Chrom-ART

Chrom-GRC

DCMIPP

64 Kbytes bootflash

620 Kbytes SRAM w/ flex ECC & I/D TCM shareable

Arm® Cortex®-M7

600 MHz

DP-FPII

L1 cache

2x 32 Kbytes I/D cache

DSP

MPII

Cordic

HPDMA & GPDMA

4 Kbytes backup RAM

Camera

8/16-bit DCMI

Timers

16x 16-bit timers

1x advanced timer

5x LP timers

1x graphics timer

4x 32-bit timers

2x watchdogs 1x sysTick timer

Memory Interfaces

FMC 8/16/32-bit (SRAM, NOR, NAND, PSRAM TET-LCD)

1x Octo-SPI (200MHz) (Hyper, Octo, Nand, NOR. PSRAM)

1x Hexa-SPI (200MHz) (Hyper, Octo, Nand, NOR, PSRAM)

2x SD/SDIO/MMC

Connectivity

1x 10/100 ethernet

1x USB HSw / PHY + 1x USB FS

1x UCPD controller

2x I2C + 1x I3C

3x USART, 4x UART, 2x LPUART

6x SPI

2x FDCAN

HDMI-CEC

System

LDO. SMPS POR/PDR/PVD/BOR

Int Oscillators: 64 MHz HSI, 48 MHz HSI 4 MHz CSI, 32 KHz LSI

Ext oscillators: 4-50 MHz HSE, 32 KHz LSE

> RTC, 128 bytes back-up registers

USB Power w/ 3.3V int. regulator

STM32H7RS MCU block diagram

High performance

Scalable security

Large embedded RAM memory

Fast & flexible external memory I/F

Advanced graphic capabilities





Stronger security

Robust hardware features and turnkey SoC software implementations

Memory protections

against illegal access control

OTP, HDP, WRP, MPU Ext. Flash Enc/Dec MCE Ext. RAM Enc/Dec MCE Secure Debug, Active Tamper

Platform authentication during product lifecycle

2 boot stages
Protection level states
Debug authentication

Cryptography

for hardware robustness

Side channel AES, PKA TRNG, MCE1, MCE2, HUK NIST - CAVP certified CryptoLib

Code isolation

for runtime protection

3 isolation stages 4 encrypted MCE domains Dedicated keystores

Turnkey SOC security services

STM32Trust RoT reference codes

Hardware Security robutness

Secure Firmware IP Installation

XIP encrypted code

Immutable Root of Trust

SESIP™3 psacertified™ level three

target certifications

State-of-the-art security assurance level



STM32H7Rx/Sx portfolio

General-purpose & graphics lines, security options, large package offering





A rich & fast set of memory interfaces

Serial RAM Single/Quad/Octo/Hexa **Parallel RAM** Serial PSRAM MultiMediaCard System v. 5.1 PSRAM, SDRAM, LPSDR SDRAM **Memory types & standards** SD Memory v. 6.0 **Serial Flash Parallel Flash SDIO** v 4.0 Single/Quad/Octo/Hexa NOR & NAND NOR & NAND XSPI (JDES251C), HyperBus, Xcella 200MHz DTR Max interface frequency 100 MHz SDR 200 MHz (with PHY) Up to 16-bit (Hexadeca) Interface width Up to 32-bit 2x 1/2/4/8-bit + Up to 8-bit (Octo) **SDIO XSPI FMC Memory interfaces** Secure digital input/output multimedia Expanded Serial Peripheal Inteface Flexible memory controller interface w. DMA w. DMA w. DMA



External serial memory Performance OctoSPI NOR Flash

From 190 MHz OctoSPI Flash

From 100 MHz OctoSPI Flash

56

MegaBytes/second

100

MegaBytes/second

Nonsequential Read

From 100 MHz OctoSPI Serial Flash

189

MegaBytes/second

364
MegaBytes/second

From 190 MHz OctoSPI Serial Flash

Sequential Read

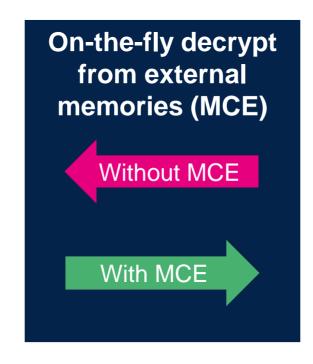


Memory performance xSPI interface: 16bit serial PSRAM

xSPI **Read** operation Maximum bandwidth:

345

xSPI Write operation Maximum bandwidth:



xSPI Read operation Maximum bandwidth:

340 MB/second

xSPI Write operation Maximum bandwidth:

Test conditions:

- CPU frequency: 600 MHz
- AXI frequency: 300 MHz
- Memory frequency: 200 MHz
- Load 16kB
- Memory in HEXA configuration (16-bit mode)
- Ext mem: 16bit serial PSRAM memory in DQS mode









MCU: 00% FPS: 60 Neachrom (DN) OFF

MJPEG Videos







Scale/animate bitmaps



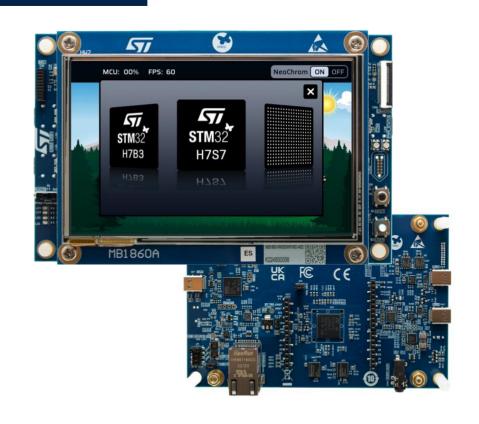




High-performance graphics on STM32H7R/S

Experience the newest STM32H7 high-performance graphics MCU running up to WSVGA in 16 bpp resolutions.

- RGB-TFT 16/18/24 bit and parallel 8080 display interface
- Fast code execution from external memories (XiP)
 - FMC for 16/32 bit SDRAMs and xSPI for x8 and x16 bit serial Hyper/Octal/PSRAMS
- NeoChrom GPU for more graphics accelerations
 - 2.5D, 2D copy, Scaling, rotation, mirroring, alpha-blending and much more
- JPEG CODEC for accelerating MJPEG videos





STM32 NeoChrom GPU Texture mapping capabilities



Texture mappers have a significant effect on the MCU load. NeoChrom graphic accelerator improves the performance significantly for operations like texture mapping, image scaling and rotation.



Graphic operation example:

Coverflow of 3 bitmaps, which are texture mapped with correct perspective scaling and rotation

| During day screen | MCU load | FPS |
|-------------------|----------|-----|
| With NeoChrom | 10% | 60 |
| Without NeoChrom | 79-90% | 25 |





Accelerate your development with our dedicated ecosystem







STM32Cube framework

Tools and software supporting you during all your design steps

Evaluation, prototyping and selection

Hardware and software configuration

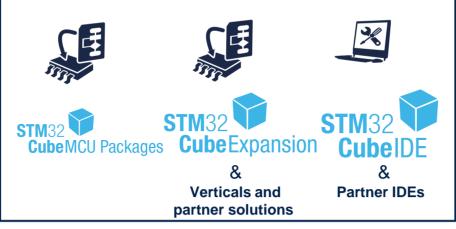
Application development and debug

Code and hardware options programming

Run-time application monitoring











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



Simplified external memory-based development

Application

STM32CubeMX assists the application project initialization with pinout, clock tree, MCU peripherals and middleware configuration.

External memory loader

STM32CubeMX assists the creation of memory loader tuned for your selected external memory.

Boot

STM32CubeMX assists the creation of your boot project including access management to your selected external memory with Load-and-Run or Execute-in-place boot options.



Our technology starts with You



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