STM32H7 series
Powered by Arm® Cortex®-M7 & -M4
releasing your creativity
STM32H7 high performance

High-performance MCUs with Arm® Cortex®-M7 core and Arm® Cortex®-M4

The STM32H7 series offer the performance of the Cortex-M7 core running up to 480 MHz and add a 240 MHz Cortex-M4 core in dual-core lines. Combined with a smart architecture based on a multi-power domain, developers can always use the best configuration to optimize data transfers and CPU load while minding the power budget. With its embedded hardware accelerators and its extensive digital and analog peripherals, the feature-rich STM32H7 is ideal for industrial environments where fast reaction time is essential. The HMI components (graphic and audio support) allow the device to provide an outstanding user-experience.

Two powerful cores supported by a robust architecture

**CORE, MEMORIES AND ACCELERATION**
- Cortex-M7 core @ 480 MHz
- Cortex-M4 core @ 240 MHz*
- 16 KB + 16 KB I/D L1 Cache
- Double-precision FPU
- 4 x DMA controllers
- 128 KB up to 2 MB dual bank Flash and up to 1.4 MB RAM

*only in STM32H745, STM32H755, STM32H747 and STM32H757

**CONNECTIVITY**
- Up to 2 x USB 2.0 OTG FS/HS
- USART, UART, SPI, and PC
- 2 x CAN (1 x FD and 1 x TT/FD)
- Ethernet MAC
- FMC, Quad-SPI and Dual Octal-SPI
- 2 x SDMMC

**AUDIO**
- 3 x I²S + audio PLL
- 4 x SAI
- 2 x 12-bit DAC
- SPDIF-RX

**GRAPHICS**
- LCD TFT controller
- JPEG Codec
- Chrom-ART Accelerator™
- Chrom-GRC™

**OTHER**
- Optional crypto
- DFSDM
- 16- and 32-bit timers
- 3 x ADCs with 16-bit max. resolution (up to 3.6 MSPS)
- Analog (comp, AOP)
- Power supply 1.7V to 3.6V down to 1.62V in regulator bypass mode
- Up to 140 °C supported as maximum junction temperature

Display nice graphic
The Chrom-ART Accelerator and MJPEG codec offload the CPU by more than 90%

Manage security
Uses a dedicated hardware accelerator for cryptography and hashing functions to offload the CPU by more than 90%

Transfer data efficiently across peripherals
The main DMA takes care of the intensive data transfers between memories with up to 16 channels to offload the CPU

Generate complex wave forms
High-Resolution timer (2.1ns) can generate complex waveforms synchronized on multiples events, without CPU assistance

arm Cortex-M7
arm Cortex-M4
# Core, Memories and Acceleration

- Single-core Cortex-M7 up to 480 MHz
- Dual-core Cortex-M7 480 MHz and Cortex-M4 240 MHz
- Flash and RAM acceleration
- SP-FPU and DP-FPU
- 4 x DMA

## Connectivity

- 2 x USB2.0 OTG FS/HS
- 2 x SDMMC
- 2 x CAN (1 x FD and 1 x TT)
- HDMI-CEC
- FMC, Dual-mode Quad-SPI
- Camera I/F
- Analog (comp, AOP)

## Audio

- 3 x I²S + audio PLL
- 4 x SAI
- 2 x 12-bit DAC
- SPDIF-RX

## Graphic

- Chrom-ART Accelerator™

## Other

- Crypto/Hash (except H742)\(^1\)
- Security services (except H742)
- TRNG
- DFSMD
- 16- and 32-bit timers, HRTimer
- 3 x 16-bit ADC (up to 3.6 MSPS)
- Voltage range 1.62 to 3.6 V (except 100-pin package : 1.71 to 3.6 V)
- Multi-power domains
- -40°C to 105°C ambient
- -40°C to 125°C ambiant\(^2\)

## Value Line

STM32H7B0
- 280
- 128 Kbytes
- 1.4 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 4 Kbytes backup)
- TFT-LCD JPEG codec Chrom-GRC
- LDO
- 32 μA / 1.4MB 28 μA / 32KB

STM32H750
- 480
- 128 Kbytes
- 1 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 4 Kbytes backup)
- TFT-LCD JPEG codec Chrom-GRC
- LDO
- 1270 μA / 1MB 910 μA / 704KB

## Notes

1. Optional - dedicated CPN, STM32H753, STM32H755, STM32H757, STM32H7B3 for the Crypto Variants
2. 125 °C ambiant / 140 °C junction. Dedicated part numbers on STM32H745/H755

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### STM32H7Online Training

www.st.com/STM32H7-online-training
### STM32H757 BLOCK DIAGRAM

#### System
- SMPS, LDO, USB and backup regulators
- POR/PRR/PV/PR/BOR
- Multi-power domains
- Xtal oscillators
  - 32 kHz + 4 ~ 48 MHz
- Internal RC oscillators
  - 32 kHz + 4, 48 & 64 MHz
- 3x PLL
- Clock control
- RTC/AVU
- 1x SysTick timer
- 2x watchdogs
  - (independent and window)
- 82/114/140/168 I/Os
- Unique ID
- Cyclic redundancy check (CRC)

#### Control
- 2x 16-bit motor control
- PWM synchronized
- AC timer
- 10x 16-bit timers
- 2x 32-bit timers
- 5x Low-power timer
- 16-bit high-resolution timer

#### Crypto/Hash processor
- 3DES, AES 256, GCM, CCM
- SHA-1, SHA-256, MD5
- HMAC
- Security services
  - SFI and SB-SFU

#### Chrom-ART Accelerator™
- JPEG Codec Acceleration

#### 2-Mbyte dual-bank Flash memory
- RAM 1056 Kbytes incl.
- 64 Kbytes ITCM
- FMC/SRAM/NOR/NAND/SDRAM

#### Dual-mode Quad-SPI
- 1024-byte + 4-kbyte backup SRAM

#### Connectivty
- TFT LCD controller
- MIPI-DSI
- HDMI-CEC
- 6x SPI, 3x I²S, 4x I²C
- Camera interface
- Ethernet MAC 10/100
  - with IEEE 1588
- MDIO slave
- 2x FDCAN
  - (Flexible Data rate)
- 1x USB 2.0 OTG FS/HS
- 1x USB 2.0 OTG FS
- 2x SDMMC
- 4x USART + 4 UART
  - LIN, smartcard, IrDA, modem control
- 1x Low-power UART
- 4x SAI
  - (Serial audio interface)
- SPDIF input x4
- DFSDM
  - (8 inputs/4 filters)
- SWP
  - (Single Wire Protocol)

#### Analog
- 2x 12-bit, 2-channel DACs
- 3x 16-bit ADC
  - (up to 3.6 Msps)
- 20 channels/up to 2 MSPS
- Temperature sensor
- 2x COMP
- 2x Op amp

### Secure your production flow with Secure Firmware Install (SFI*)

#### Manage STM32 authentication, firmware decryption and installation

<table>
<thead>
<tr>
<th>Customer premises</th>
<th>Untrusted environment</th>
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<tbody>
<tr>
<td>FW</td>
<td>ST32H7</td>
</tr>
<tr>
<td>Encrypted FW</td>
<td>SFI</td>
</tr>
<tr>
<td>Store encryption key in HSM</td>
<td>Authenticate target STM32</td>
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<tr>
<td>ST Hardware Secure Module (HSM)</td>
<td>Generate installation license</td>
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<tr>
<td>Encrypted FW transfer</td>
<td>HSM physical transfer</td>
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**Note:** *optional – SFI service available on specific part numbers

The STM32Trust ecosystem combines knowledge, design tools, and ready-to-use original ST software to build strong cyber-protection into new IoT devices, leveraging industry best-practices.

[www.st.com/stm32trust](http://www.st.com/stm32trust)
<table>
<thead>
<tr>
<th>Part numbers</th>
<th>Product Line</th>
<th>Core</th>
<th>SMPS</th>
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<th>Display</th>
<th>Ethernet</th>
<th>NOR Serial Flash (Mbits)</th>
<th>SDRAM (Mbits)</th>
<th>SRAM (Mbits)</th>
<th>NOR (Mbits)</th>
<th>eMMC (Gbytes)</th>
<th>SDCard (Bbytes)</th>
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**Discovery kits**

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<th>SDRAM (Mbits)</th>
<th>SRAM (Mbits)</th>
<th>NOR (Mbits)</th>
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**Evaluation boards**

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<th>SDRAM (Mbits)</th>
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SOFTWARE TOOLS
www.st.com/stm32softwaretools

STM32CubeMX

IDEs
STM32CubeProg
STM32CubeMonPwr
STM32CubeMonUCPD

Notes:
- ARM Keil, IAR and ac6 support multi-core debugging
- STM32CubeIDE will support multi-core debugging in Q4 2019.

Configure and generate code
Compile and debug
Monitor & program

EMBEDDED SOFTWARE
www.st.com/stm32embeddedsoftware

Customers Applications
STM32Cube Embedded Software

STM32Cube Expansion Packages from ST
STM32Cube Expansion Packages from Partners
Connect  Secure  Process  Move/Actuate  Sense  Convert  Power-up

STM32Cube MCU Packages

STM32Cube MCU Middleware
TCP/IP  Rtos  Bluetooth  802.15.4

STM32Cube HAL & LL drivers

Arm® Cortex®-M

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