If only I could add natural language, cloud-based voice UI to my product
STM32H7 dual core - Adding natural language cloud-based voice UI to your product

- Arm® Cortex®-M7 core @480 MHz high and Arm® Cortex®-M4 core @240 MHz performances for Audio and voice DSP
- Embedded security to protect your application and secure firmware update
- One chip, 2 applications running in parallel
- Ready for security: state of the ART cyber protection and secure firmware update

All necessary memory is embedded: 2 MB of Flash and 1 MB of SRAM
If only I could address the design challenges in factory automation systems
STM32H7 single core - Building a factory automation product

High performance for optimized control or HMI

Large embedded memory and external memory support
- Up to 2 MB of Flash & up to 1.4 MB of SRAM
- Fast multiple Octo-SPI interface

Extended connectivity with Ethernet MAC, Multiple FD-CAN and USB

Fast 16-bit and 12-Bit ADC, and extended Temp range support up to 125 °C

SIL ready enabled by native hardware features and safety library
If only
I could run deeply embedded applications with advanced performance at minimum cost
STM32H7 - Creating a smartphone-like graphic UI for your embedded device

- Graphic hardware accelerations for better effects, transitions and fluidity
- Up to 1.4 MB SRAM (frame buffer) for integrated and cost-effective single chip solution
- Multiple high-speed external memory interface
- Graphic support from 64-pin LQFP packages (improved cost effectiveness)
- TouchGFX free graphic tool suite for stunning HMI and simplified development
STM32H7 series

New product lines expanding the STM32 portfolio

New Performance Record
Up to 2424 + 800 CoreMark (Cortex®-M7 @480MHz + Cortex®-M4 @240MHz) in Dual core
Up to 2778 CoreMark (Cortex®-M7 @550MHz) in Single core

Single and Dual-core flexible architecture for industrial, security or AI applications
Accelerated graphics, fast data transfer, advanced peripherals

Advanced security features
Crypto Hash, Cortex®-M7 Security services

Rich eco-system to speed-up your design
SW tools, HW boards, community and partners
High performance range

Arm® Cortex® -M7 up to 550 MHz

Most powerful Cortex core with double precision FPU, MPU, advanced DSP and L1 cache

Arm® Cortex® -M4 @240 MHz

Best in class core for real-time with single precision FPU, DSP, MPU and ART Accelerator™
The extended STM32H7 experience

STM32H7

Dual core lines for concurrent-applications

Cortex-M4
Cortex-M7

Single core lines for single-application

Cortex-M7
Single Core Architecture Approach for performance and advanced HMI

Factory automation

Cortex-M7 = HMI, process control, power management

Connectivity & security

Cortex-M7 = Alarm panel, Wireless Modules
Create a rich human machine interface

Cortex-M7 - handling audio and rich HMI, Real Time control tasks

Display
High Resolution

Memory
NOR, PSRAM-Octo-SPI
eMMC
SDRAM, SD card

Cortex-M7

RAM

FLASH

Main DMA

Audio decoding and output

STM32H7

Display Interface

Chrom-ART Accelerator™ JPEG codec

Crypto Hash

optional
Dual-core architecture approach for richer and more complex applications

**Industrial tool machine**

*Cortex-M7* = HMI
*Cortex-M4* = Com/Gateway + Motor Control + Sensor pre-processing (AI)

**Home automation & security**

*Cortex-M7* = AI NN (Pattern recognition, ASR)
*Cortex-M4* = Com/Gateway + Real-time I/F
Build complex applications mixing AI and real-time control

Connected Kitchen Aid with advanced HMI (Large display and Voice recognition)

- Display
- Memory: NOR Quad-SPI, eMMC, SDRAM, SD card
- Voice recognition
- Display Interface
- Memory Interface
- arm Cortex-M7
- Chrom-ART Accelerator™ JPEG codec
- Crypto Hash
- RAM
- FLASH
- Main DMA
- Hi-res timer
- STM32H7
- Motor control
- Sensing
- Communication
- Optional
Powerful cores supported by a powerful architecture

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

Manage security
Use dedicated cryptography and Hashing HW acceleration to offload the CPU by more than 90%

Transfer data efficiently across peripherals
The Main DMA takes care of the most complex schemes between memories and peripherals with up to 16 channels to offload the CPU

Generate complex wave forms
High-Resolution timer (2.1ns) can generate complex wave forms synchronized on multiples events, with no CPU assist
STM32H7 line-up
<table>
<thead>
<tr>
<th>Model</th>
<th>CoreMark</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H7</td>
<td>3224</td>
<td>550 MHz</td>
</tr>
<tr>
<td>STM32F0</td>
<td>106</td>
<td>48 MHz</td>
</tr>
<tr>
<td>STM32G0</td>
<td>142</td>
<td>64 MHz</td>
</tr>
<tr>
<td>STM32F1</td>
<td>177</td>
<td>72 MHz</td>
</tr>
<tr>
<td>STM32F2</td>
<td>389</td>
<td>120 MHz</td>
</tr>
<tr>
<td>STM32F4</td>
<td>608</td>
<td>180 MHz</td>
</tr>
<tr>
<td>STM32F7</td>
<td>1082</td>
<td>216 MHz</td>
</tr>
<tr>
<td>STM32F3</td>
<td>245</td>
<td>72 MHz</td>
</tr>
<tr>
<td>STM32G4</td>
<td>550</td>
<td>170 MHz</td>
</tr>
<tr>
<td>STM32L0</td>
<td>75</td>
<td>32 MHz</td>
</tr>
<tr>
<td>STM32L1</td>
<td>93</td>
<td>32 MHz</td>
</tr>
<tr>
<td>STM32L4</td>
<td>273</td>
<td>80 MHz</td>
</tr>
<tr>
<td>STM32L4+</td>
<td>409</td>
<td>120 MHz</td>
</tr>
<tr>
<td>STM32L5</td>
<td>443</td>
<td>110 MHz</td>
</tr>
<tr>
<td>STM32U5</td>
<td>651</td>
<td>160 MHz</td>
</tr>
<tr>
<td>STM32WL</td>
<td>162</td>
<td>48 MHz</td>
</tr>
<tr>
<td>STM32WB</td>
<td>216</td>
<td>64 MHz</td>
</tr>
</tbody>
</table>

- **STM32F0**: 106 CoreMark, 48 MHz Cortex-M0
- **STM32G0**: 142 CoreMark, 64 MHz Cortex-M0+
- **STM32F1**: 177 CoreMark, 72 MHz Cortex-M3
- **STM32F2**: 389 CoreMark, 120 MHz Cortex-M3
- **STM32F4**: 608 CoreMark, 180 MHz Cortex-M4
- **STM32F7**: 1082 CoreMark, 216 MHz Cortex-M7
- **STM32F3**: 245 CoreMark, 72 MHz Cortex-M4
- **STM32G4**: 550 CoreMark, 170 MHz Cortex-M4
- **STM32L0**: 75 CoreMark, 32 MHz Cortex-M0+
- **STM32L1**: 93 CoreMark, 32 MHz Cortex-M3
- **STM32L4**: 273 CoreMark, 80 MHz Cortex-M4
- **STM32L4+**: 409 CoreMark, 120 MHz Cortex-M4
- **STM32L5**: 443 CoreMark, 110 MHz Cortex-M33
- **STM32U5**: 651 CoreMark, 160 MHz Cortex-M33
- **STM32WL**: 162 CoreMark, 48 MHz Cortex-M4, 48 MHz Cortex-M0+
- **STM32WB**: 216 CoreMark, 64 MHz Cortex-M4, 32 MHz Cortex-M0+

**Key Features**:
- **Longevity Commitment**: 10 Years
- **Ultra-low Power MCUs**
- **Mainstream MCUs**
- **Wireless MCUs**
- **Optimized for mixed-signal Applications**
- **Cortex-M0+ Radio co-processor**
# Extensive STM32H7 portfolio

## Dual-core Line

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>DMIPS</th>
<th>RAM</th>
<th>Flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H745/755</td>
<td>480+240 MHz</td>
<td>1027 + 300 DMIPS</td>
<td>1 MB</td>
<td>up to 2 MB</td>
</tr>
<tr>
<td>STM32H747/757</td>
<td>480+240 MHz</td>
<td>1027 + 300 DMIPS</td>
<td>1 MB</td>
<td>up to 2 MB</td>
</tr>
</tbody>
</table>

## Single-core Line

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>DMIPS</th>
<th>RAM</th>
<th>Flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H723/733</td>
<td>550 MHz</td>
<td>1177 DMIPS</td>
<td>564 KB</td>
<td>up to 1 MB</td>
</tr>
</tbody>
</table>

## Value Line

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>DMIPS</th>
<th>RAM</th>
<th>Flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H725/735</td>
<td>550 MHz</td>
<td>1177 DMIPS</td>
<td>564 KB</td>
<td>up to 1 MB</td>
</tr>
</tbody>
</table>

Extended temperature range 125 °C ambient
STM32H7 MCU Series
32-bit Arm® Cortex®-M7 or Cortex®-M7 + Cortex®-M4

**CORE, MEMORIES AND ACCELERATION**

- **Single and Dual core versions**
- **High performance up to 480 MHz in Dual core and up to 550 MHz in Single core**
- **128 KB to 2 MB Flash Dual Bank**
- **Up to 1.4 MB RAM**
- **More security features (Boot, Tamper …), OTFDEC on external memories, Crypto/Hash and security services (optional)**
- **35 communication peripherals**
- **16-bit ADC up to 3.6 Msps, up to 5 MSPS in 12-bit, Comparators, Op Amp**
- **TT-FD-CAN and FD-CAN**
- **High-Resolution timer (2.1ns)**
- **Low-Power Timers**
- **LDO and SMPS option**
- **Up to 140 °C junction temperature / 125 °C ambient (optional)**

---

**TABLE**

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Flash (MB)</th>
<th>RAM (KB)</th>
<th>UART (MAX)</th>
<th>CAN (FD)</th>
<th>Power supply</th>
<th>Temp. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H7427V66</td>
<td>480 x 240</td>
<td>1.4MB (128 KB DCM, 64 KB CCM, 1152 KB OPAM, 4 KB backup)</td>
<td>3</td>
<td>•</td>
<td>LDO</td>
<td>-40°C to 105°C ambient / -40°C to 125°C ambient</td>
</tr>
<tr>
<td>STM32H741V66</td>
<td>480 x 240</td>
<td>1.4MB (128 KB DCM, 64 KB CCM, 1152 KB OPAM, 4 KB backup)</td>
<td>1</td>
<td>•</td>
<td>LDO</td>
<td>-40°C to 105°C ambient / -40°C to 125°C ambient</td>
</tr>
</tbody>
</table>

---

1. OTFDEC: On External Memories, Crypto/Hash and security services (optional)
2. Crypto and Security options are: CMS | STG, SRTG, STP and STSP
3. Crypto and Security features are: CMS, STG, SRTG, STP, and STSP
4. OTFDEC available only on STM32H7427V66
5. SMPS available only on STM32H763V76 / STM32H764V76
ST's new STM32H7 microcontrollers combine the high performance of a single core with rich feature integration.

- System integration
- Advanced connectivity and control
- Security services

www.st.com/STM32H7
New STMicroelectronics’ STM32H7 Microcontrollers Combine
Dual-Core Performance with Rich Feature Integration

- System integration
- Advanced connectivity and control
- Security services

STM32H7 74x/75x series
links to product pages

STM32H745/755 [here]
STM32H747/757 [here]
STM32H742 [here]
STM32H743/753 [here]
STM32H750 [here]
ST blog article [here]

www.st.com/STM32H7
New STM32H7 Microcontrollers for best combination of performance, integration and power saving inside an MCU

- STM32H7A3/H7B3 [here]
- STM32H7B0 Value line [here]

www.st.com/STM32H7
Performance and smart architecture are yours to innovate
Create a rich human machine interface

Cortex-M7 - handling audio and rich HMI, Real Time control tasks

- **Display**
  - LCD-TFT
- **Memory**
  - NOR Quad-SPI or Octo-SPI, PSRAM, eMMC, SDRAM, SD card
- **Cortex-M7 - handling audio and rich HMI, Real Time control tasks**
  - Audio decoding and output
  - Flash
  - Main DMA
  - RAM
  - Crypto Hash
  - STM32H7

**STM32**

 יכולה ליצור מסך אנושי עבה והממשק התאזרות

**Cortex-M7 - ביצועים גבוהים ורבים וניהול זמן בפועל, משימות של הפעלה בזמן מ٭**

- **מסך**
  - LCD-TFT
- **זיכרון**
  - NOR Quad-SPI או Octo-SPI, PSRAM, eMMC, SDRAM, SD card
- **עיבוד אודיו ורמי הפעלה מ٭**
  - האודיו
  - פלאש
  - DMA ראשי
  - RAM
  - חמשת זג
  - STM32H7

**STM32**
Seamlessly move and format data

Main DMA - Flexible and high-speed data transfers schemes without CPU load

Display Interface

Display

Memory Interface

Memory

STM32H7

optional

Cortex-M7

Chrom-ART Accelerator™ JPEG codec

Crypto Hash

ARM Cortex-M7

RAM

FLASH

Main DMA

ARM Cortex-M4

RAM

H-res timer
Reinforce the security in your solution

Cryptography and Hashing hardware assist
Authenticate your chip and securely install your code in memory

STM32H7

Display

Memory
NOR Quad-SPI
eMMC
SDRAM
SD card

arm Cortex-M7

Security services*

Chrom-ART Accelerator™
JPEG codec

Crypto Hash*

RAM

RAM

FLASH

Main DMA

Hi-res timer

* requires part numbers with integrated security options
STM32 Control real-time applications

High resolution timer: advanced wave forms generation

STM32H7

Display
- LCD-TFT
- Display Interface

Memory
- NOR Quad-SPI
- eMMC
- SDRAM
- SD card

arm Cortex-M7

Chrom-ART Accelerator™
JPEG codec

Crypto Hash

RAM

FLASH

Main DMA

Hi-res timer

Timing defined in multiple timers

optional

ARM

We, augmented

29
Industrial and health & wellness DNA

- Error Code Correction on all Flash and RAM and dual core for safety
- Large choice of packages
- Advanced digital and analog
  
  (High resolution timer, 16-bit and 12-bit ADC, Op-Amp, Ethernet, CANFD…)
- High temperature -40°C up to 140°C junction temperature (125°C ambient)
Industrial and health & wellness DNA

Industrial

- **Inverters**
  Advanced timers and analog peripherals

- **Communication gateway**
  Rich connectivity and optional dual core

- **Human Machine Interface**
  Chrom-ART Accelerator™ and display interfaces for TFT and MIPI-DSI

Health & Wellness

- **Health and wellness**
  Chrom-ART Accelerator™ and display interfaces for TFT and MIPI-DSI

- **Individual assistance** (hearing, respiratory)
  Advanced timers and analog

- **Measurements and Data logger**
  Advanced Analog
• Small packages
• Power efficiency and high performance
• Advanced audio and graphic
• High-speed peripherals
• Large expandable memories to support ever increasing communication protocols
Consumer DNA

Consumer DNA

• **IoT gateway**
  Large memory and rich communication peripherals

• **Access control**
  Chrom-ART Accelerator™ and display interfaces for TFT and MIPI-DSI

• **Drones**
  High processing architecture with dual core option, advanced timers and analog peripherals, small packages
Secure your production and your applications
STM32Trust on STM32H7 Series

Global security ecosystem and services

STM32 concept
Support customer’s Secure Boot / Root Of Trust

SFI
A Secure Installer of Secure Boot / Root Of Trust

SBSFU
A reference SW package for FW Update and Secure Boot / Root Of Trust
Secure your production flow with secure firmware install (SFI*)

Manage STM32 authentication, firmware decryption and installation

Customer premises

- FW
  - Store encryption key into HSM
  - ST Hardware Secure Module (HSM)

Untrusted environment

- Encrypted FW transfer
- STM32H7 SFI
  - Authenticate target STM32
  - Generate installation license
  - HSM physical transfer

(*) : optional – SFI service available on specific part numbers
Manage STM32 authentication, firmware decryption and installation

Customer premises

<table>
<thead>
<tr>
<th>SFI</th>
<th>FW</th>
<th>Encrypted FW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store encryption key in HSM</td>
<td></td>
</tr>
<tr>
<td>Trusted Package Creator</td>
<td>ST Hardware Secure Module (HSM)</td>
<td></td>
</tr>
</tbody>
</table>

3rd Party premises

<table>
<thead>
<tr>
<th>SMI</th>
<th>Module</th>
<th>Encrypted Module</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Store encryption key in HSM</td>
<td></td>
</tr>
<tr>
<td>Trusted Package Creator</td>
<td>ST Hardware Secure Module (HSM)</td>
<td></td>
</tr>
</tbody>
</table>

Untrusted environment

<table>
<thead>
<tr>
<th>Encrypted FW Transfer</th>
<th>HSM</th>
<th>Physical transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Secure Loader
Embedded services provisioned by ST

Secure Loader
Mass Market approach

STM ecosystem
with Encryption, HSM and programming tools

Firmware cloning protection on the first installation via UART / SPI / USB

Protect 3rd party Software IP (SMI)
Secure Boot Secure FW Update - SBSFU

Reference library source code for IAP

Demonstrate SW modules for:
- Secure Boot
- Secure Engine for Crypto and key
- Firmware Update image management

Ensure authentication and secure programing of in the field products

Reference implementation of STM32H7 hardware memory protections
A full set of security

Encryption
- AES-128/256 Encryption
- DES/TDES crypto engine
- SHA-256 Authentication
- Certified Crypto library
- True Random Number Generator
- Unique ID
- Key provisioning for STM32 authentication

Decryption

Authentication

Memory and IP protection
- Anti-tamper detection
- Memory Protection Unit (MPU)
- Secure Boot
- Read and Write Protection
- Secure User Area (Hide Protect)
- PC-ROP
- JTAG fuse
- Octo-SPI On The Fly Decrypt engine on external NOR Flash

Some of the above features are optional and require specific part numbers. See the next slide for more details.
### STM32H7 detailed security functions

<table>
<thead>
<tr>
<th>STM32Trust Security function</th>
<th>CM7</th>
<th>CM7 Crypto</th>
<th>CM7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CM7/CM4</td>
<td>CM7/CM4</td>
<td>CM7/CM4</td>
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<tr>
<td></td>
<td>STM32H72x</td>
<td>STM32H74x</td>
<td>STM32H75x</td>
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<tr>
<td></td>
<td>STM32H7Ax</td>
<td>STM32H72x</td>
<td>STM32H73x</td>
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<tr>
<td></td>
<td>CM7/CM4</td>
<td>CM7/CM4</td>
<td>CM7/CM4</td>
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<tr>
<td></td>
<td>STM32H72x</td>
<td>STM32H74x</td>
<td>STM32H75x</td>
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<td></td>
<td>STM32H7Ax</td>
<td>STM32H72x</td>
<td>STM32H73x</td>
</tr>
<tr>
<td>Secure Boot</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Secure User Memory for SBSFU software package</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Secure Install/Update</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>By SBSFU software package</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Secure Storage</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>for Boot only</td>
<td></td>
<td>●</td>
<td>●</td>
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<tr>
<td>Access Debug</td>
<td>●</td>
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</tr>
<tr>
<td>Read Out Protection RDPL0/1/2</td>
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<tr>
<td>Resource Isolation</td>
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</tr>
<tr>
<td>Memory Protection Unit</td>
<td>●</td>
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<tr>
<td>Secure Execution</td>
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<td>●</td>
</tr>
<tr>
<td>By SBSFU software package</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Crypto Engine</td>
<td>TRNG Fips</td>
<td>AES / DES / SHA / TRNG Fips</td>
<td>AES / DES / SHA / TRNG Fips</td>
</tr>
<tr>
<td>Hardware crypto accelerator</td>
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<td>●</td>
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<tr>
<td>Crypto Engine</td>
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<tr>
<td>On-the-fly decryption from external memories</td>
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<tr>
<td>SWIP Protection/Collaborative Dev</td>
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<tr>
<td>Secure Module Install (SMI)</td>
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<tr>
<td>Secure Manufacturing</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Secure Firmware Install (SFI)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Note: a crypto library is available on request for both crypto and non crypto parts.
Solutions for STM32H7 Graphics
Enhance your product with great graphic

- Smart home
  - Watch video

- Kitchen appliances
  - Watch video

- Industrial
  - Watch video

- Smart home
  - Watch video

- Smart home
  - Watch video

- Industrial
  - Watch video

- Industrial
  - Watch video
Enhanced graphic UI for any resolution

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Display Type</th>
<th>RAM Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; – 3&quot;</td>
<td>Display with GRAM</td>
<td>Internal RAM</td>
</tr>
<tr>
<td>4&quot; – 5&quot;</td>
<td>Display without GRAM</td>
<td>Internal RAM</td>
</tr>
<tr>
<td>7&quot;</td>
<td>Display without GRAM</td>
<td>External RAM</td>
</tr>
<tr>
<td>+10&quot;</td>
<td>Display without GRAM</td>
<td>External RAM</td>
</tr>
</tbody>
</table>

STM32H7A3/7B3/7B0
STM32H723/725/730
STM32H743/745/747/750

STM32H723/725/730
STM32H743/745/747/750
## STM32H7 detailed graphic features

<table>
<thead>
<tr>
<th>Features</th>
<th>STM32H7A3/7B0</th>
<th>STM32H723/725/730</th>
<th>STM32H745/747</th>
<th>STM32H743/750</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware acceleration</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Chrom-ART Accelerator™</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Hardware acceleration for graphical operations</td>
<td></td>
<td></td>
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<tr>
<td>Chrom-GRC™</td>
<td>●</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minimizing memory usage for round displays</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>JPEG CODEC</td>
<td>●</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Optimized video playback</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Memory interfaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quad-SPI</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Connecting QSPI Flash</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octo-SPI</td>
<td>●</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Connecting Octo SPI flash or Octal RAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FMC</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Connecting parallel flash, SDRAM, PSRAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDMMC</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Connecting eMMC, MMC,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display interfaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD-TFT display controller</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>MIPI-DSI</td>
<td>-</td>
<td>-</td>
<td>●</td>
<td>-</td>
</tr>
<tr>
<td><strong>Parallel 8080/6800</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Embedded memory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embedded SRAM for framebuffers</td>
<td>Up to 1024 Kbytes</td>
<td>Up to 364 Kbytes</td>
<td>Up to 512 Kbytes</td>
<td>Up to 512 Kbytes</td>
</tr>
<tr>
<td>Embedded flash for code and data</td>
<td>128 Kbytes to 2048 Kbytes</td>
<td>128 Kbytes to 1024 Kbytes</td>
<td>1024 Kbytes to 2048 Kbytes</td>
<td>128 Kbytes to 2048 Kbytes</td>
</tr>
</tbody>
</table>
X-CUBE-TouchGFX
Graphical User Interface development

Faster and easier GUI Development

Free for all STM32 Developers

Maximum Performance on minimum footprint

Interoperable with STM32Cube Ecosystem
STM32 Graphics Extended Ecosystem

TouchGFX Implementers
World-wide network for TouchGFX expertise
and design services

Advanced Graphics Solutions
Software partners taking the full advantages
of STM32 graphic capabilities
Solutions for STM32H7 Artificial Intelligence
Embed AI in your applications with STM32H7

- People detection
- Food classification
- Voice recognition
- Industrial applications
The key steps behind Neural Networks on STM32

Optimized C code generated by STM32Cube.AI

- Pre-trained model
- Keras
- TensorFlowLite
- ONNX
- PyTorch
- And more

STM32Cube.AI

STM32CubeMX

NN C files
STM32.AI lib
STM32 BSP
STM32 device

User app

Model is pre-compiled and linked only with used ops

run-time
Solutions for STM32H7
Functional safety
SIL functional safety package for STM32

Reduce time and cost to build STM32-based systems certified to IEC 61508 industrial safety standard

SIL2/SIL3
Customer Development

Certified STM32 Self-Test Library X-CUBE-STL
Safety Documentation
MCU Safety Features
Product Portfolio

ST Quality foundations
ST provides a complete, certified offering to
- Lower project costs
- Reduce design complexity
- Ease SIL certification assessment
STM32 high performance built-in safety features

<table>
<thead>
<tr>
<th>Features</th>
<th>STM32F2/F4</th>
<th>STM32F7</th>
<th>STM32H7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual watchdogs: Independent watchdog and system window watchdog</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Backup clock circuitry with clock security system (CSS)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Hardware CRC unit / Programmable polynomial</td>
<td>● / -</td>
<td>● / ●</td>
<td>● / ●</td>
</tr>
<tr>
<td>Supply monitoring (POR, BOR, PVD)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>I/O function locking</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>PWM critical register protections (write-once registers)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Memory protection unit (MPU) 8 zones – to ensure data integrity from invalid behavior</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Multiple Flash memory protection levels</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>ECC Error Code Correction (SECDED) for SRAM</td>
<td>-</td>
<td>-</td>
<td>●</td>
</tr>
<tr>
<td>ECC Error Code Correction (SECDED) for Flash memory</td>
<td>-</td>
<td>-</td>
<td>●</td>
</tr>
</tbody>
</table>

**Note:** Arm Cortex-M cores also have built-in safety features (dual stack pointer, fault exceptions, and debug module).
Solutions for STM32H7 Motor control
Drive your motor with STM32H7

Robotic

High end Appliance

Servo motor - Industrial

Medical
FOC (field-oriented control) for BLDC/PMSM motors

STM32 tools and software provide an integrated development environment to ease and support the design of motor control solutions.
<table>
<thead>
<tr>
<th>Features</th>
<th>STM32H742/743/745/747/750</th>
<th>STM32H723/725/730</th>
<th>STM32H7A3/7B0</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>Cortex-M7 + Cortex-M4(*)</td>
<td>Cortex-M7</td>
<td>Cortex-M7</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>FPU</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>MPU</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>Safety</td>
</tr>
<tr>
<td>Freq CPU max</td>
<td>480 MHz +240 MHz(*)</td>
<td>550 MHz</td>
<td>280 MHz</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>DMIPS</td>
<td>1027 (single core), 1027+300(*)</td>
<td>1177</td>
<td>599</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>Flash / SRAM data size</td>
<td>128KB to 2MB / Up to 1MB</td>
<td>128KB to 1MB / 564KB</td>
<td>128KB to 2MB / 1.4MB</td>
<td>Performance and integration/cost</td>
</tr>
<tr>
<td>Including : ITCM/DTCM RAM</td>
<td>64KB / 128KB</td>
<td>Up to 256KB (configurable) / 128KB</td>
<td>64KB / 128KB</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>Error Code Correction</td>
<td>SECDED on full memory map</td>
<td>SECDED on full memory map</td>
<td>SECDED on Flash and partial RAM (I/D-TCM and caches)</td>
<td>Safety</td>
</tr>
<tr>
<td>ADC SAR</td>
<td>3 x 16-bit 3.6 Msps</td>
<td>2x16-bit 3.6 Msps, 1x12-bit 5 Msps</td>
<td>2x16-bit 3.6 Msps</td>
<td>Efficiency</td>
</tr>
<tr>
<td>Other Analog</td>
<td>2x Comp, 2x PGA, 2xDAC, 1xDACDM, 2xComp, 2xPGA, 2xDAC, 1xDFSAMD</td>
<td>2x Comp, 2x PGA, 2xDAC, 2xDFSMD</td>
<td>2x Comp, 2x PGA, 2xDAC, 2xDFSMD</td>
<td>Integration/cost</td>
</tr>
<tr>
<td>Advanced Motor Control timer</td>
<td>2x (240 MHz)</td>
<td>2x (275 MHz)</td>
<td>2x (280 MHz)</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>Cache and Accelerator</td>
<td>16KB+16KB L1 cache + ART(*)</td>
<td>32KB+32KB L1 cache</td>
<td>16KB+16KB L1 cache</td>
<td>Performance and efficiency</td>
</tr>
<tr>
<td>Security Services</td>
<td>yes(**)</td>
<td>yes(**)</td>
<td>yes(**)</td>
<td>System Integrity</td>
</tr>
<tr>
<td>(SFI and SB-SFU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package</td>
<td>LQFP100/144/176/208; BGA100/169/176/240; WLCS156</td>
<td>VFQFPN88; LQFP100/144/176; BGA100/144/169/176; WLCS115</td>
<td>LQFP64/100/144/176: BGA100/169/176/216/225; WLCS132</td>
<td>Cost/Integration/flexibility</td>
</tr>
<tr>
<td>Max Temperature range °C</td>
<td>[-40 .. +125] Tj max 140 °C</td>
<td>[-40 .. +125] Tj max 140 °C</td>
<td>[-40 .. +85] Tj max 130 °C</td>
<td>Integration and cost</td>
</tr>
</tbody>
</table>

(*) : on Dual core versions  
(**) : on crypto part numbers
A complete ecosystem for single and dual-core architecture
Supported by the STM32 ecosystem

Software
- STM32 CubeMX
- STM32 CubeIDE
- STM32 CubeProgrammer
- STM32 CubeMonitor

Embedded Software
- Configuration
- Development
- Programming

Hardware
- STM32 Nucleo boards
- Discovery kits
- Evaluation boards

Customer support
- FAE - Worldwide Customer Support
- community.st.com

Partner Program
- life.aidmented
Software tools for STM32H7

Complete support of Arm Cortex-M architecture

STM32CubeMX
- STM32CubeMX enhanced for Dual-core
  - Configure and generate Code
  - Multi-core resources allocation
  - Peripherals configuration

IDEs
- Compile and Debug
  - Multi-Core Solutions
  - Partners IDE
  - Free IDE based on Eclipse
  - Multi-core debugging

STM32 Programming & Monitoring tools
- STM32CubeProg
- STM32CubeMonitor
  - Program the application into the chip
  - Sign the application and generate license
  - Monitor variables at run-time
STM32H7 hardware solutions

Speed-up evaluation, prototyping and design
(board selection guide available at the end of this presentation)

- **5 Evaluation Boards**: Full feature STM32H7 evaluation
- **6 Discovery Kits**: Flexible prototyping & demo
- **6 Nucleo Boards**: Affordable and quick prototyping

Starting at $318
Starting at $97
Starting at $87
Starting at $69
Starting at $27
### STM32H7 class

<table>
<thead>
<tr>
<th>Coat/Speed</th>
<th>Part numbers</th>
<th>Evaluation boards</th>
<th>Discovery Kits</th>
<th>Nucleo boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>STM32H743</td>
<td>STM32H743I-EVAL2</td>
<td>-</td>
<td>NUCLEO-H743ZI2</td>
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</tr>
<tr>
<td>STM32H753, Crypto enabled</td>
<td>STM32H753I-EVAL2</td>
<td>-</td>
<td>NUCLEO-H753ZI</td>
<td></td>
</tr>
<tr>
<td>STM32H750 Value Line, Crypto enabled</td>
<td>-</td>
<td>STM32H750B-DK</td>
<td>-</td>
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<tr>
<td>STM32H745</td>
<td>-</td>
<td>STM32H745I-DISCO</td>
<td>NUCLEO-H745ZI-Q</td>
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<tr>
<td>STM32H747</td>
<td>STM32H747I-EVAL</td>
<td>STM32H747I-DISCO</td>
<td>STM32H747I-DISC1</td>
<td></td>
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<tr>
<td>STM32H755/757, Crypto enabled</td>
<td>STM32H757I-EVAL</td>
<td>-</td>
<td>NUCLEO-H755ZI-Q</td>
<td></td>
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<tr>
<td>STM32H7A3</td>
<td>-</td>
<td>-</td>
<td>NUCLEO-H7A3ZI-Q</td>
<td></td>
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<tr>
<td>STM32H7B3, Crypto enabled</td>
<td>STM32H7B3I-EVAL</td>
<td>STM32H7B3I-DK</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>STM32H7B0, Value line, Crypto enabled</td>
<td>STM32H7B3I-EVAL *</td>
<td>STM32H7B3I-DK *</td>
<td>-</td>
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</tr>
<tr>
<td>STM32H723/733</td>
<td>-</td>
<td>-</td>
<td>NUCLEO-H723ZG</td>
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<tr>
<td>STM32H725/735</td>
<td>-</td>
<td>STM32H735G-DK</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>STM32H730, Value line, Crypto enabled</td>
<td>-</td>
<td>STM32H735G-DK *</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

* Recommended board (no dedicated board for this part number)
Software, tools and services
a broad ecosystem to support development

Large selection of partners already engaged for:
• Embedded software
• Software tools
• Graphics UI
• Security
• Training and services

and many more …
Thank you