STM32MP1 microprocessor broadening STM32 MPU family

Press Presentation
"If only I could make a Smart Home Gateway with advanced HMI and HD video"
Advanced HMI with graphics and video on top of real time applications

- HD video decode with Dual Arm Cortex-A7 @ 800 MHz
- Better user experience powered by advanced 3D GPU
- Wide range of partners ready to support you on many topics: Graphics, HW & SW Services...
- Seamless and flexible combination of audio and real time processing with Cortex-A + Cortex-M architecture
"If only I could find an Industrial grade processor for my applications"
Industrial grade microprocessor for demanding applications

Industrial qualification combining both:
100% operating time during 10 years
Junction temperature: -40°C to 125°C

10 years longevity commitment renewed every year

Industrial connectivity, advanced analog Cortex-M4 for real time processing

Advanced security for Industry 4.0

4 packages available in pitch 0.5 & 0.8mm
If only I could easily improve my applications with Artificial Intelligence
Embedding various Neural Networks for cutting-edge applications

TensorFlow Lite native support running on Cortex-A7 / Linux

STM32Cube.AI tool for machine learning running on Cortex-M4

Camera and audio interfaces to simplify input devices’ integration
STM32MP1 - Constantly Improving

Boosting performances with Dual Cortex-A7 @ 800MHz

A broader STM32 MPU ecosystem to reduce development time & cost
Boosting performances with Dual Cortex-A7 @ 800MHz
Boosting performances
Broadening possibilities

Pin to pin compatibility across all part numbers
Full HW compatibility with STPMIC1

SW compatibility across the family

A Scalable Solution to best meet customers’ needs

@ 650 MHz
@ 800 MHz
Boosting application possibilities

STM32MP1

Real-time & Low Power applications
260 DMIPS

Graphic and communication
High Performance processing
up to 3040 DMIPS

Advanced GUI & HD Video Decode

Connectivity

STM32MP1

3D GPU @ 533MHz
OpenGL ES 2.0
26 Mtri/sec
133 Mpix/sec

dedicated RAM
448 kB

Cortex-A7
up to 800 MHz

Open OS

Cortex-M4
209 MHz

Real time OS

STPMIC1

Motor Control Sensors

Cortex-M4

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Connectivity

Advanced GUI & HD Video Decode
Secure architecture for trusted devices

- Secure boot (ROM)
- Unique ID
- Duplicated resources on Cortex-A7 and Cortex-M4
- Crypto and Hash Hardware Engines
- TRNG

CONFIDENTIALITY ANTI-TAMPERING

- TrustZone
- Secure RAMs and Peripherals
- Secure RTC with Active Tamper
- $T^0$, $V$ and $32$KHz sensor monitoring
- Cortex-M4 resources HW isolation
- Secure OS support: OP-TEE

SECURE MANUFACTURING

- Paired Keys Tools Generator
- Signing Tools for boot
- Development and production programmers with provisioning and authentication

Some of the above features are optional and require to procure dedicated part numbers. Please refer to product specification.
A broader STM32 MPU ecosystem to reduce development time & cost
Enhance your added value by relying on ST and authorized Partners’ solutions

Solutions for EDGE computing & IoT from sensors up to the Cloud

Simplifying Android™ development

A growing base of ST Authorized Partners

ST continuous investment into the most recognized Open Source standards

Android is a trademark of Google LLC.
Create cloud based applications with STM32MP1 solutions

Complete support of main cloud provider

Example of STM32MP1 Discovery board used for EDGE processing
Simplifying Android™ development

Reduce development time & cost with pre-build Solutions provided by ST:
• Free of charge AOSP enablement
• Various Android™ packages

Extra headroom (up to 800MHz Cortex-A) for better user experience

Exclusive plug-in to bridge real-time Cortex-M and Android environments provided in the SDK

Android is a trademark of Google LLC.
Continuous investment in Linux to make customers’ design simpler and more efficient

ST is continuously upstreaming Linux drivers to the Linux community

<table>
<thead>
<tr>
<th>Year</th>
<th>Linux 4.19 LTS</th>
<th>Linux 5.4 LTS</th>
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</tbody>
</table>
A growing base of partners addressing customers’ challenges

Embedded Software

- CRANK SOFTWARE
- Embedded Wizard
- Enea
- Prevas
- Linaro
- PHYTEC
- Qt
- Timesys
- Witekio

Software Development Tools

- ac6
- arm KEIL
- CRANK SOFTWARE
- DOULOS
- Linaro
- IAR SYSTEMS
- Qt

Training

- ac6
- bootlin
- CRANK SOFTWARE
- Enea
- INNOWave
- IAR SYSTEMS
- PHYTEC
- Timesys
- Witekio

Components and Modules

- bytes-at-work
- DH Electronics
- EmCraft Systems
- emtrion
- ENGICAM
- HandsOn Training
- Kontron
- OCTAVO SYSTEMS
- SoMLabs

Engineering Services

- ac6
- bootlin
- DH Electronics
- EmCraft Systems
- emtrion
- ENGICAM
- INNOWave
- Kontron
- OCTAVO SYSTEMS
- SoMLabs
STM32MP1 Line-up
Expanding the STM32MP1 portfolio now 48 part numbers

<table>
<thead>
<tr>
<th>MPU @ 800 MHz</th>
<th>STM32 MP151D</th>
<th>MP151F</th>
<th>STM32 MP153D</th>
<th>MP153F</th>
<th>STM32 MP157D</th>
<th>MP157F</th>
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<tr>
<td>1520 + 260 DMIPS</td>
<td>-</td>
<td>-</td>
<td>3040 + 260 DMIPS</td>
<td>-</td>
<td>3040 + 260 DMIPS</td>
<td>-</td>
</tr>
<tr>
<td>800 MHz Cortex-A7</td>
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<td>-</td>
<td>800 MHz 2x Cortex-A7</td>
<td>-</td>
<td>800 MHz 2x Cortex-A7</td>
<td>-</td>
</tr>
<tr>
<td>209 MHz Cortex-M4</td>
<td>-</td>
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</table>

<table>
<thead>
<tr>
<th>MPU @ 650 MHz</th>
<th>STM32 MP151A</th>
<th>MP151C</th>
<th>STM32 MP153A</th>
<th>MP153C</th>
<th>STM32 MP157A</th>
<th>MP157C</th>
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</thead>
<tbody>
<tr>
<td>1235 + 260 DMIPS</td>
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<td>-</td>
<td>2470 + 260 DMIPS</td>
<td>-</td>
<td>2470 + 260 DMIPS</td>
<td>-</td>
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<tr>
<td>650 MHz Cortex-A7</td>
<td>-</td>
<td>-</td>
<td>650 MHz 2x Cortex-A7</td>
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<td>650 MHz 2x Cortex-A7</td>
<td>-</td>
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<tr>
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</table>

All references are available in 4 Packages:

- TFBGA257 10x10mm p0.5 (4 layers PTH PCB) - smallest package for dual Cortex-A GP MPU
- TFBGA361 12x12mm p0.5 (4 layers PTH + Laser via PCB)
- LFBGA354 16x16mm p0.8 (4 layers PTH PCB)
- LFBGA448 18x18mm p0.8 (6 layers PTH PCB)

All parts are software and pin to pin compatible.
Building the future
STM32 MPU portfolio expansion

STM32 MPU FLAGSHIP
Big step-up in performance, features and security

STM32 MPU ACCESS
Cost optimization and improved security

@ 650 MHz
@ 800 MHz
STM32MP1 - your new companion for advanced applications

Boosting performances with Dual Cortex-A7 @ 800MHz

A broader STM32 MPU ecosystem to reduce development time & cost
Releasing your creativity

/STM32

@ST_World

community.st.com/stm32mpu

www.st.com/STM32MP1
### STM32MP157

#### Block Diagram

**Arm® Dual Cortex®-A7 up to 800 MHz**
- L1 32kB IT
- L1 32kB D
- 256kB L2 Cache

**Arm® Cortex®-M4 209 MHz**
- FPU
- MPU

#### External Memories
- 3x SDMMC

#### Internal Memories
- System RAM 256kB
- MCU System RAM 384kB
- Back up RAM 4kB
- MCU Retention RAM 64kB
- OTP fuse 3kB

#### Connectivity
- 10/100M or Gigabit Ethernet GMAC
- 3x USB 2.0 Host/OTG with 2x HS PHY
- Camera interface
- HDMI-CEC
- 2x CAN FD
- MDIO slave
- DFSOM (8 channels/6 filters)
- 6x SPI / 3x FS
- 6x PC
- 4x UART + 4x USART
- 4x SAI
- SPDIF

#### Graphics
- 3D GPU OpenGL ES 2.0 @ 333 MHz
- MIPI-DSI controller
- LCD-TFT controller

#### Security
- TrustZone
- AES 256, TDES*
- SHA-256, MD5, HMAC
- 3x Tamper Pins with 1 active
- Secure Boot*
- Secure RAMs
- Secure Peripherals
- Secure RTC
- Analog true RNG
- 96-bit unique ID

*Available for STM32MP157C and STM32MP157F only.
Flexible architecture for power efficiency

Power figures at 650MHz

- **361 mW**
  - Dual Arm Cortex-A7 @ 650 MHz / Cortex-M4 @ 209MHz
- **277 mW**
  - Arm Cortex-A7 @ 650 MHz / Cortex-M4 @ 209MHz
- **98 mW**
  - Arm Cortex-M4 @ 209 MHz
- **32 µW**
  - STANDBY
- **4 µW**
  - VBAT

Typ @ VDDCORE = 1.2V, VDD = 3.3V @ 25 °C, Peripherals OFF

From STANDBY to Linux console in around a second

Optimize power vs. processing needs

Keep track of the time & ensure system security allowing RTC (Real Time Clock) and Tamper protection
Flexible architecture for power efficiency

Power figures at 800MHz

- 589 mW: Dual Arm Cortex-A7 @ 800 MHz / Cortex-M4 @ 209MHz
- 449 mW: Arm Cortex-A7 @ 800 MHz / Cortex-M4 @ 209MHz
- 98 mW: Arm Cortex-M4 @ 209 MHz
- 32 µW: STANDBY
- 4 µW: VBAT

Typ @ VDDCORE = 1.2V, VDD = 3.3V @ 25 °C, Peripherals OFF

Optimize power vs. processing needs

From STANDBY to Linux console in around a second

Keep track of the time & ensure system security allowing RTC (Real Time Clock) and Tamper protection
STPMIC1 power management IC dedicated to STM32MP1 MPU

Simplify your design and optimize power consumption

- DC/DCs & LDOs for
  - STM32MP1
  - Memories
  - External devices

- Optimized power consumption
- BOM savings for typical applications
- Small PCB footprint vs. full discrete solution
Thank you