STM32F7 series
ARM® Cortex®-M7 powered
Releasing your creativity

STM32 F7

life.augmented

STM32® high performance

Very high performance 32-bit MCU with DSP and FPU

The STM32F7 with its ARM® Cortex®-M7 core is the smartest MCU and has the best performance of the 32-bit STM32 family.

PERFORMANCE

The STM32F7 delivers 1082 CoreMark/ 462 DMIPS executing from embedded Flash thanks to the ST ART Accelerator™ at 216 MHz and up to twice the DSP performance, without compromising on power efficiency. External memory can be used with no performance penalty thanks to the L1 cache (up to I/D 16KB+16KB). Fully pin-to-pin and code compatible with the STM32F4 and the STM32 ecosystem.

Benefits: Allows creation of more responsive, innovative applications, running on either on-chip or off-chip memories. Easy upgrade for existing designs based on STM32F4.

SMART ARCHITECTURE WITH NEW PERIPHERAL SET

The STM32F7 optimizes the system performance by combining brand-new peripherals around the Cortex-M7, with a superior interconnect architecture with AXI and multi AHB bus matrix, multiple DMA and the Chrom-ART Accelerator™ hardware.

Benefits: Concurrent, high-speed data transfers between bus masters and slaves without loading the CPU.

Large SRAM with overloading architecture

- Up to 512 Kbytes including 128 Kbytes of Data TCM RAM
- 16 Kbytes of instruction TCM RAM
- 4 Kbytes of backup SRAM

Benefits: Support for large data buffers, critical real-time data routines and backup.

New peripheral sets

- Two SAI (with SPDIF output support), three I²S half-duplex and SPDIF input
  Benefit: Multiple audio channel input and output support.
- 2x USB OTG with dedicated power supply
  Benefit: Enables USB communication even when the MCU is powered at 1.8 V.
- Dual QuadSPI interface:
  Benefit: Connect cost-effective memories with only 1, 4 or 8 data pins.
- On-Chip USB High Speed Phy (on some variants):
  Benefit: More integration on high-speed USB communication

POWER EFFICIENT

- Up to 6 CoreMark/mW at 1.8 V
- 130 µA typical in Stop mode with all SRAM saved

Benefit: Put more innovation and creativity in power-constrained applications.

LQFP64	10 x 10 x 1.4 mm
LQFP100	14 x 14 x 1.4 mm
LQFP144	20 x 20 x 1.4 mm
LQFP176	24 x 24 x 1.4 mm
LQFP208	28 x 28 x 1.4 mm
UFBGA144	7 x 7 x 0.6 mm (pitch 0.5)
UFBGA176	10 x 10 x 0.6 mm (pitch 0.65)
TFBGA216	3 x 13 x 1.2 mm (pitch 0.8)
WLCSP100	< 4.3 x 4.7 mm
WLCSP143	< 5.9 x 4.6 mm
WLCSP180	< 6.2 x 5.6 mm

UP TO SIX LINES FOR MORE PERFORMANCE

ARM® Cortex®-M7 – 216 MHz

ACCELERATION
- ART Accelerator™
- L1 cache: data and instruction cache
- Chrom-ART Accelerator™ (except. STM32F7x3/F7x2)
- Floating Point Unit

CONNECTIVITY
- 2 x USB2.0 OTG FS/HS
- SDIO (x2 on F76x & F779)
- USART, UART, SPI, I²C
- CAN2.0
- HDMI-CEC
- Ethernet IEEE 1588 (except. STM32F7x3/F7x2)
- FMC
- MDIO slave (on F76x and F77x)
- Camera I/F (except. STM32F7x3/F7x2)
- Dual mode Quad-SPI

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

OTHER
- 16- and 32-bit timers
- 3 x 12-bit ADC 2.4 MSPS
- Low voltage supply: 1.7 to 3.6 V
- 85 °C and 105 °C ranges

Advanced lines

Product STM32 F7		F_{CPU} (MHz)	L1 cache (I/D)	FPU	Flash (bytes)	RAM (KB) + 16K ITCM + 4K backup	JPEG codec	CAN	DF SDM	TFT LCD controller	MIPI®-DSI
STM32F7x9[2] STM32F7x8[1]		216	16K+16K	Double Precision	1M to 2M (RWW)	512K (incl.128K DTCM)	•	3	•	•	•
STM32F7x7[2]		216	16K+16K	Double Precision	1M to 2M (RWW)	512K (incl.128K DTCM)	•	3	•	•	
STM32F7x6[2]		216	4K+4K	Single Precision	512K to 1M	320K (incl.64K DTCM)		2		•	
STM32F7x5	765	216	16K+16K	Double Precision	1M to 2M (RWW)	512K (incl.128K DTCM)		3	•		
STM32F7x5	745	216	4K+4K	Single Precision	512K to 1M	320K (incl.64K DTCM)		2			

Foundation lines

Product lines	F_{CPU} (MHz)	L1 cache (I/D)	FPU	Flash (bytes)	RAM (KB) + 16K ITCM + 4K backup	JPEG codec	CAN	DF SDM	PC-ROP (protected code execution)	USB HS PHY
STM32F7x3[2]	216	8K+8K	Single Precision	256K to 512K	256K (incl.64K DTCM)		1		•	•
STM32F7x2[2]	216	8K+8K	Single Precision	256K to 512K	256K (incl.64K DTCM)		1		•	

Notes: [1] Voltage Regulator Off mode available for WLCSP180 package (STM32F778AIY6TR)

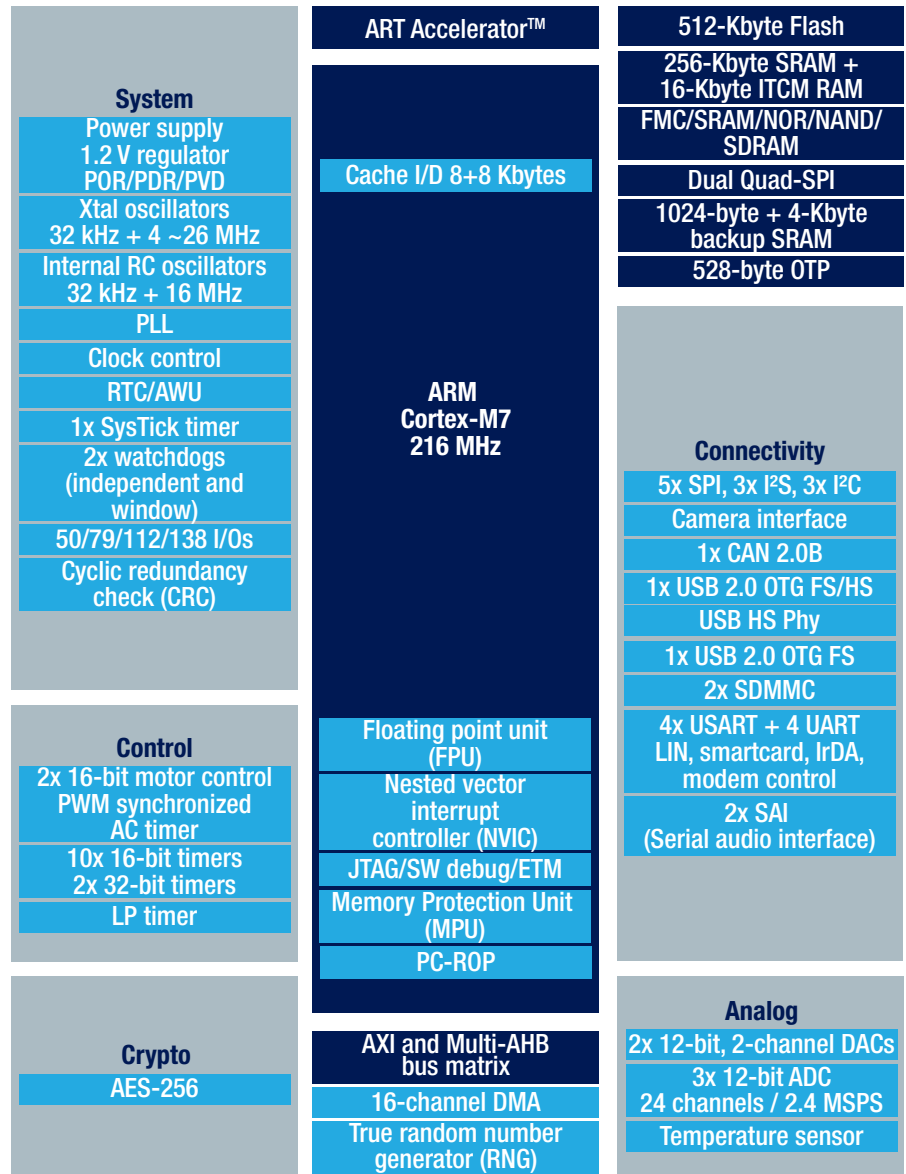[2] Only STM32F732, STM32F733, STM32F756, STM32F777 and STM32F779 include HW crypto/hash functions

STM32F733 BLOCK DIAGRAM

System

- Power supply 1.2 V regulator POR/PDR/PVD
- Xtal oscillators 32 kHz + 4 ~26 MHz
- Internal RC oscillators 32 kHz + 16 MHz
- PLL
- Clock control
- RTC/AWU
- 1x SysTick timer
- 2x watchdogs (independent and window)
- 50/79/112/138 I/Os
- Cyclic redundancy check (CRC)

Control

- 2x 16-bit motor control PWM synchronized AC timer
- 10x 16-bit timers 2x 32-bit timers
- LP timer

Crypto

- AES-256

ART Accelerator™

- Cache I/D 8+8 Kbytes

ARM Cortex-M7 216 MHz

- Floating point unit (FPU)
- Nested vector interrupt controller (NVIC)
- JTAG/SW debug/ETM
- Memory Protection Unit (MPU)
- PC-ROP

AXI and Multi-AHB bus matrix

- 16-channel DMA
- True random number generator (RNG)

Memory

- 512-Kbyte Flash
- 256-Kbyte SRAM + 16-Kbyte ITCM RAM
- FMC/SRAM/NOR/NAND/SDRAM
- Dual Quad-SPI
- 1024-byte + 4-Kbyte backup SRAM
- 528-byte OTP

Connectivity

- 5x SPI, 3x I²S, 3x I²C
- Camera interface
- 1x CAN 2.0B
- 1x USB 2.0 OTG FS/HS
- USB HS Phy
- 1x USB 2.0 OTG FS
- 2x SDMMC
- 4x USART + 4 UART LIN, smartcard, IrDA, modem control
- 2x SAI (Serial audio interface)

Analog

- 2x 12-bit, 2-channel DACs
- 3x 12-bit ADC 24 channels / 2.4 MSPS
- Temperature sensor

STM32 F7

STM32F779 BLOCK DIAGRAM

System

- Power supply 1.2 V regulator POR/PDR/PVD
- Xtal oscillators 32 kHz + 4 ~26 MHz
- Internal RC oscillators 32 kHz + 16 MHz
- PLL
- Clock control
- RTC/AWU
- 1x SysTick timer
- 2x watchdogs (independent and window)
- 50/79/112/138 I/Os
- Cyclic redundancy check (CRC)

Control

- 2x 16-bit motor control PWM synchronized AC timer
- 10x 16-bit timers
- 2x 32-bit timers
- LP timer

Crypto

- AES-256

ART Accelerator™

Cache I/D 8+8 Kbytes

ARM Cortex-M7 216 MHz

- Floating point unit (FPU)
- Nested vector interrupt controller (NVIC)
- JTAG/SW debug/ETM
- Memory Protection Unit (MPU)
- PC-ROP

AXI and Multi-AHB bus matrix

16-channel DMA

True random number generator (RNG)

- 512-Kbyte Flash
- 256-Kbyte SRAM + 16-Kbyte ITCM RAM
- FMC/SRAM/NOR/NAND/SDRAM
- Dual Quad-SPI
- 1024-byte + 4-Kbyte backup SRAM
- 528-byte OTP

Connectivity

- 5x SPI, 3x I²S, 3x I²C
- Camera interface
- 1x CAN 2.0B
- 1x USB 2.0 OTG FS/HS
- USB HS Phy
- 1x USB 2.0 OTG FS
- 2x SDMMC
- 4x USART + 4 UART LIN, smartcard, IrDA, modem control
- 2x SAI (Serial audio interface)

Analog

- 2x 12-bit, 2-channel DACs
- 3x 12-bit ADC 24 channels / 2.4 MSPS
- Temperature sensor

STM32F7 ON-LINE TRAINING

ST MCU FINDER

Free mobile and desktop application to find the right STM32F7 MCU.

MCU Finder

STM32F7 ECOSYSTEM

Hardware tools
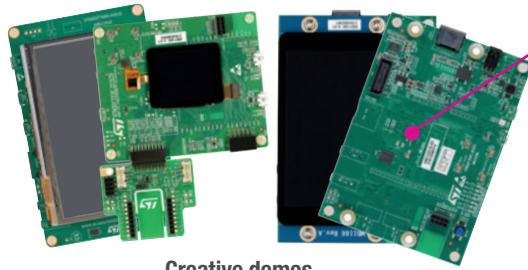www.st.com/stm32hardwaretools

STM32 Nucleo boards

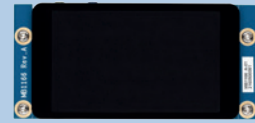**Flexible prototyping**
NUCLEO-F746ZG
NUCLEO-F767ZI
NUCLEO-F722ZE

Discovery kits

Creative demos
STM32F746G-DISCO
STM32F723E-DISCO
STM32F769I-DISCO
STM32F769I-DISC1

STM32F769 Discovery Kit
Accessories

B-LCD40-DSI1*
4" WVGA TFT LCD with MIPI-DSI interface and capacitive touch
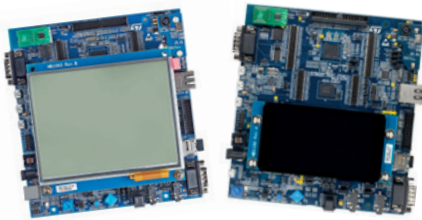
Notes: * for STM32F769I-DISC1 only

B-LCDAD-RPI1
15-pin single-row flexible printed circuit DSI adapter board

B-LCDAD-HDMI1
DSI to HDMI adapter

Note: on STM32F769 Discovery kits use the dual-row 8-way connector to host a 3rd-party Wi-Fi module available on the market

Evaluation boards

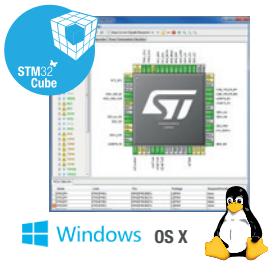**Full-feature evaluation**
STM32746G-EVAL2
STM32F769I-EVAL

Hardware Crypto/Hash devices
STM32756G-EVAL2
STM32F779I-EVAL

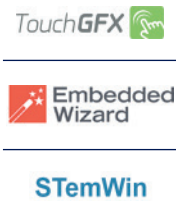## Software tools
www.st.com/stm32softwaretools

STM32CubeMX

Windows   OS X

Partner IDEs

IAR SYSTEMS
ARM KEIL Microcontroller Tools
SEGGER
Rowley Associates

TASKING
KEOLABS
EMPROG
SYSPROGS

CooCox
atollic
i SYSTEM
ARM mbed
aC6 Systèmes

Free IDE

GUI solutions

TouchGFX

Embedded Wizard

STemWin

STMStudio

Configure and generate code — **Compile and debug** — **Monitor**

Embedded Software
www.st.com/stm32embeddedsoftware

STM32 Cube   ARM mbed   MATLAB SIMULINK
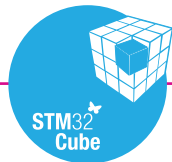
STM32Cube LL (Low Layer)	STM32Cube HAL and middleware Std Libraries	CMSIS and Mbed SDK	Virtual machines and models
High optimization low portability	Average optimization STM32 portability	Low optimization ARM portability	Low optimization large portability