

STM32 F4 series Cortex™-M4 MCU Releasing your creativity

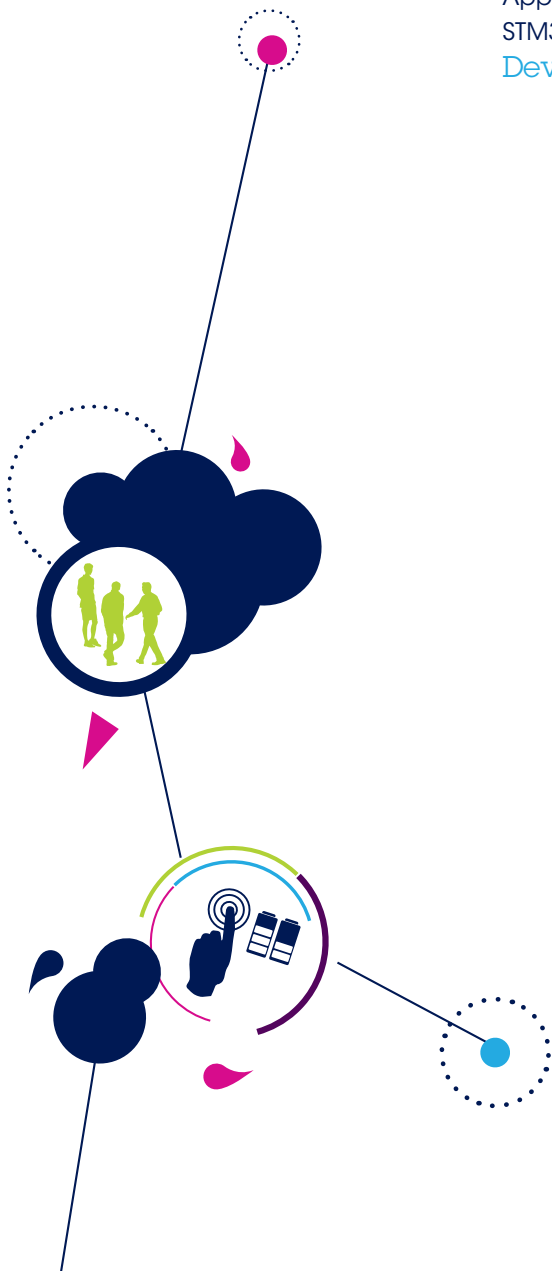




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STM32 F4 series

32-bit Flash MCU, up to 180 MHz/225 DMIPS, with DSP instructions, floating point unit and advanced peripherals

ST is extending its range of target applications with the STM32 F4 series. Based on the Cortex™-M4 core, this series opens the door to the digital signal controller (DSC) market. This extension to our STM32 product portfolio offers devices that are pin-to-pin and software compatible with the STM32 F2 series, but with more performance, DSP capability, a floating point unit, more SRAM, and peripheral improvements such as a TFT LCD controller with graphic acceleration, SDRAM, serial audio interface, less than 1 µA RTC and 2.4 MSPS ADCs. The ARM® Cortex-M4 core features built-in single-cycle multiply-accumulate (MAC) instructions, optimized SIMD and saturated arithmetic instructions.

The adaptive real-time ART Accelerator™ combined with ST's 90 nm technology provides linear performance up to 180 MHz, unleashing the full performance of the core. The Chrom-ART Accelerator™ offers twice as much performance for graphic content creation and handling. The STM32 F4 series now provides products offering the best balance between performance (105 DMIPS), power efficiency (140 µA/MHz in Run mode, 11 µA typ in Stop mode), and size (3 x 3 mm package). These features expand the number of addressable applications in the industrial, consumer and healthcare segments.

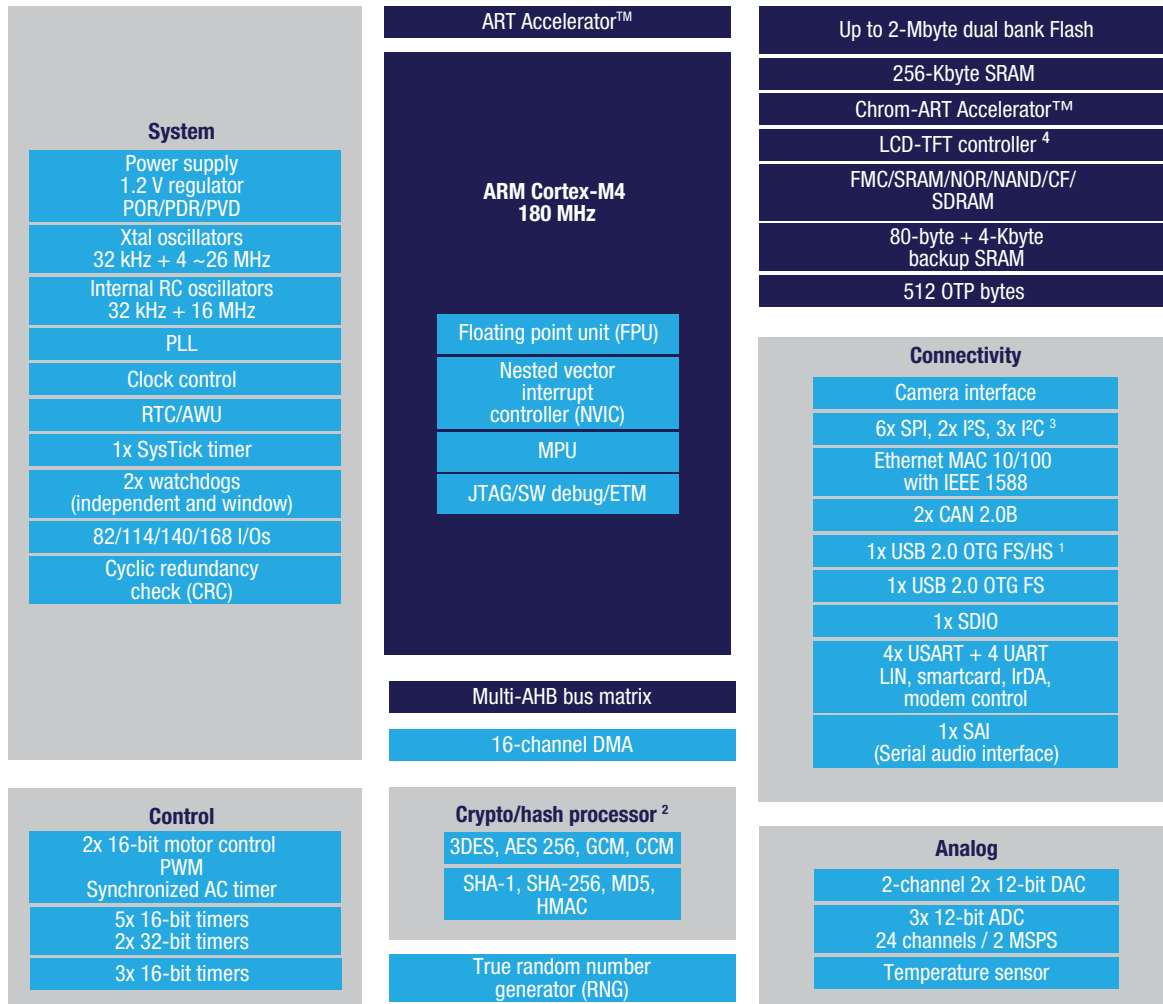
The STM32 F4 series includes devices with 128 Kbytes to 2 Mbytes of on-chip Flash memory, and up to 256 Kbytes of SRAM, and 20 communication interfaces.

WLCSP (down to 3 x 3mm), UFQFPN48, LQFP64, LQFP100, LQFP144, LQFP176, UFBGA176, LQFP208, TFBGA216 packages are available.

KEY APPLICATIONS

- Industrial and medical
 - Control panels with LCD screens for alarm systems, high-end meters, factory automation
 - Medical: respiratory equipment, patient monitors
 - EPOS: scanners, cash registers, tax machines, vending machines, printers
 - Industrial AC servos, general-purpose inverters, solar inverters and robots
 - Surveillance cameras
- Consumer
 - HMI for appliances
 - DAB, car radios and infotainment
 - Home audio, switch boxes, headsets
 - Sensor hub for mobile devices

BLOCK DIAGRAM



Notes:

1. HS requires an external PHY connected to the ULPI interface
2. Crypto/hash processor on STM32F415, STM32F417, STM32F437 and STM32F439 only
3. With digital filter feature, up to 1 Mbit/second
4. For STM32F4x9 only

FEATURES AND BENEFITS

Features	Benefits
<p>High performance</p> <ul style="list-style-type: none"> Up to 180 MHz/225 DMIPS Cortex-M4 with single cycle DSP MAC and floating point unit CoreMark score: 608 at 180 MHz CoreMark/MHz: 3.37 	<ul style="list-style-type: none"> Boosted execution of control algorithms More features for your applications Ease of use Better code efficiency Faster time to market Elimination of scaling and saturation Easier support for meta-language tools
<p>Maximum integration</p> <p>Up to 2 Mbytes of on-chip dual bank Flash memory, up to 256 Kbytes of SRAM, reset circuit, internal RCs, PLLs, ultra-small packages (WLCSP)</p>	<ul style="list-style-type: none"> Read while write operations support More features in space constrained applications Use of high-level languages: Java, .Net

FEATURES AND BENEFITS

Features	Benefits
<p>Designed for high performance and ultra-fast data transfers</p> <ul style="list-style-type: none"> • ART Accelerator™: memory accelerator • Chrom-ART Accelerator™: graphic accelerator (rectangle filling, rectangle copy with pixel format conversion and blending) • 32-bit, 7-layer AHB bus matrix with up to 10 masters and 8 slaves including 3 blocks of SRAM • Multi DMA controllers: 2 general-purpose, 1 for USB HS, one for Ethernet • One 4th SRAM block dedicated to the core • Flexible memory interface with SDRAM support: up to 90 MHz, 32-bit parallel 	<ul style="list-style-type: none"> • Performance equivalent to zero-wait execution from Flash • Graphic content is created twice as fast and independently from the CPU • Concurrent execution and data transfer • Simplified resource allocation • High bandwidth for external memories • Cost-effective external RAM
<p>Outstanding power efficiency</p> <ul style="list-style-type: none"> • Ultra-low dynamic power in Run mode: 140uA/MHz at 84 MHz (STM32F401), 260 uA/MHz at 180 MHz (STM32F429/F439) running CoreMark benchmark from Flash memory (peripherals off) • RTC <1 uA typ in V_{BAT} mode • Down to 11 uA typ (STM32F401) 100 uA typ (STM32F429/439) in Stop mode • 3.6 V down to 1.7 V¹ V_{DD} • 1.2 V voltage regulator with power scaling capability 	<ul style="list-style-type: none"> • Extra flexibility to reduce power consumption for applications requiring both high-processing and low-power performance when running at low voltage or on a rechargeable battery
<p>Superior and innovative peripherals and connectivity</p> <ul style="list-style-type: none"> • Connectivity: camera interface, crypto/hash HW processor with AES GCM and CCM support, and SHA-256 • Ethernet MAC10/100 with IEEE 1588 v2 support, 2 USB OTG (one with HS support) • Up to 20 communication interfaces (including 4x USART + 4x UART, 6x SPI, 3x I²C with digital filter, 2x CAN, SDIO) • USART at 11.25 Mbit/s; SPI at 45 Mbit/s • Audio: dedicated audio PLL, 2x I²S and 1x SAI with TDM² support • LCD TFT controller • Up to SVGA format (800 x 600) • Up to 24-bit RGB parallel pixel output • 2-layer support with blending • Analog: 2x 12-bit DACs, 3x 12-bit ADCs reaching 7.2 MSPS in interleaved mode • Up to 17 timers: 16 and 32 bits running up to 180 MHz 	<ul style="list-style-type: none"> • New possibilities to connect and communicate high-speed data • High-quality multi-channel audio support • Support for cost-effective standard displays • More precision thanks to high resolution
<p>High integration</p> <ul style="list-style-type: none"> • WLCSP49 3 x 3 mm (STM32F401, 256-Kbyte Flash/64-Kbyte SRAM), WLCSP90 4 x 4.2 mm (STM32F405/F415, 1-Mbyte Flash/192-Kbyte SRAM), WLCSP143 4.5 x 5.5 mm (STM32F429/439, 2-Mbyte Flash/256-Kbyte SRAM) 	<ul style="list-style-type: none"> • Smaller board space allowing for smaller applications
<p>Extensive tools and software solutions</p> <ul style="list-style-type: none"> • Hardware sector protection with execute only access, • Various IDE, starter kits, libraries, RTOS and stacks, either open source or provided by ST or 3rd parties, including the ARM CMSIS DSP library optimized for Cortex-M4 instructions 	<ul style="list-style-type: none"> • Software IP protection • A wide choice within the STM32 ecosystem to develop your applications

Note:

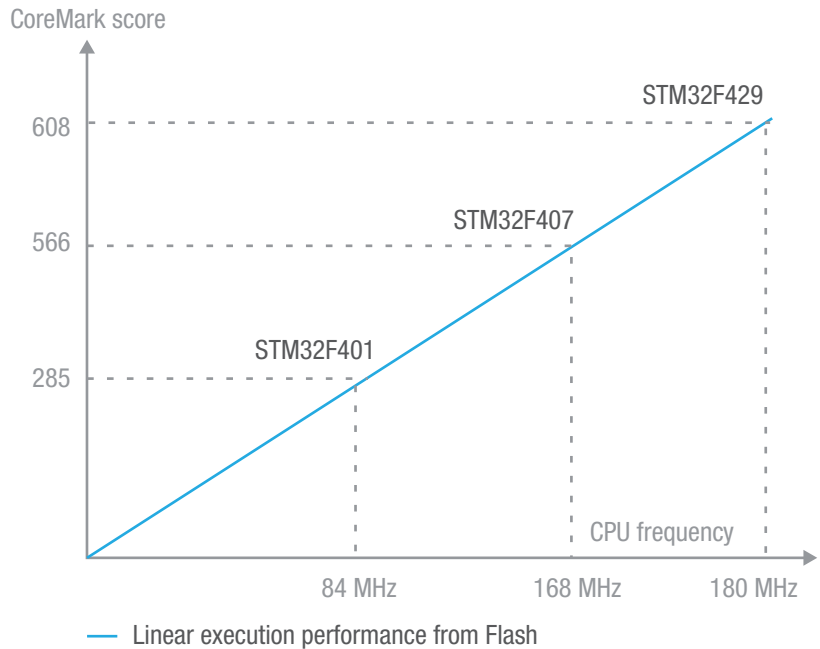
1. Except LQFP64 and LQFP100 packages
2. TDM: time division multiplex

HIGH-PERFORMANCE

ART Accelerator performance

Unleashing the full performance of the core beyond the embedded Flash's intrinsic speed is an art. Combined with ST's 90 nm technology, our ART Accelerator™ achieves a linear performance up to 180 MHz, offering 225 DMIPS and 608 CoreMark performance executing from Flash. The acceleration mechanism is made possible using a prefetch queue, a branch cache and a smart arbitration mechanism.

- MCUs using less advanced accelerators or slower embedded Flash memories impact execution performance as wait states occur.
- MCUs using faster Flash but no branch cache acceleration to achieve performance usually show higher power consumption as a result of more accesses to a power-hungry Flash.



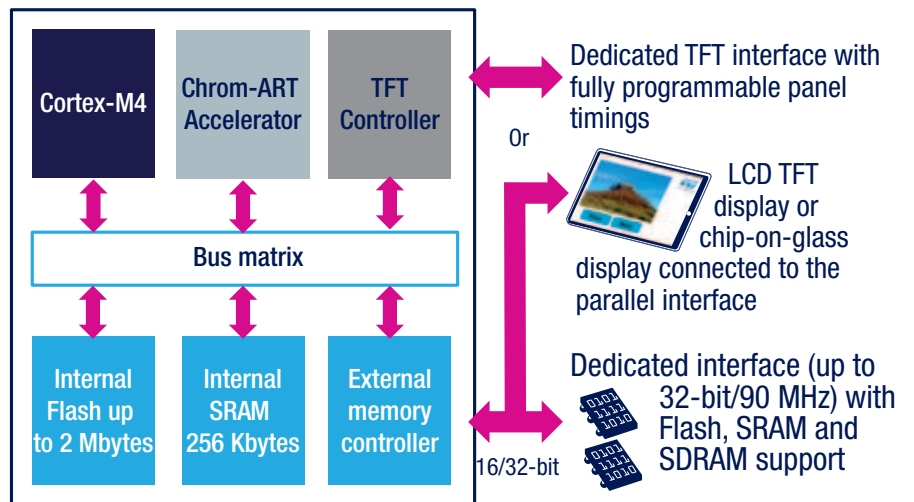
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Richer graphic and animations with ST Chrom-ART Accelerator

In applications using a display, graphical data generation can consume a lot of CPU bandwidth. To offload the CPU, a dedicated DMA has been developed by ST to perform graphic content copy from the frame buffer (internal or external RAM) to the display interface (FMC or TFT controller). This advanced graphic accelerator, the Chrom-ART Accelerator, achieves a twofold increase in performance versus the CPU. In addition to raw data copy, additional functionalities are supported such as image format conversion or image blending (image mixing with some transparency).

Human machine interface implementation example

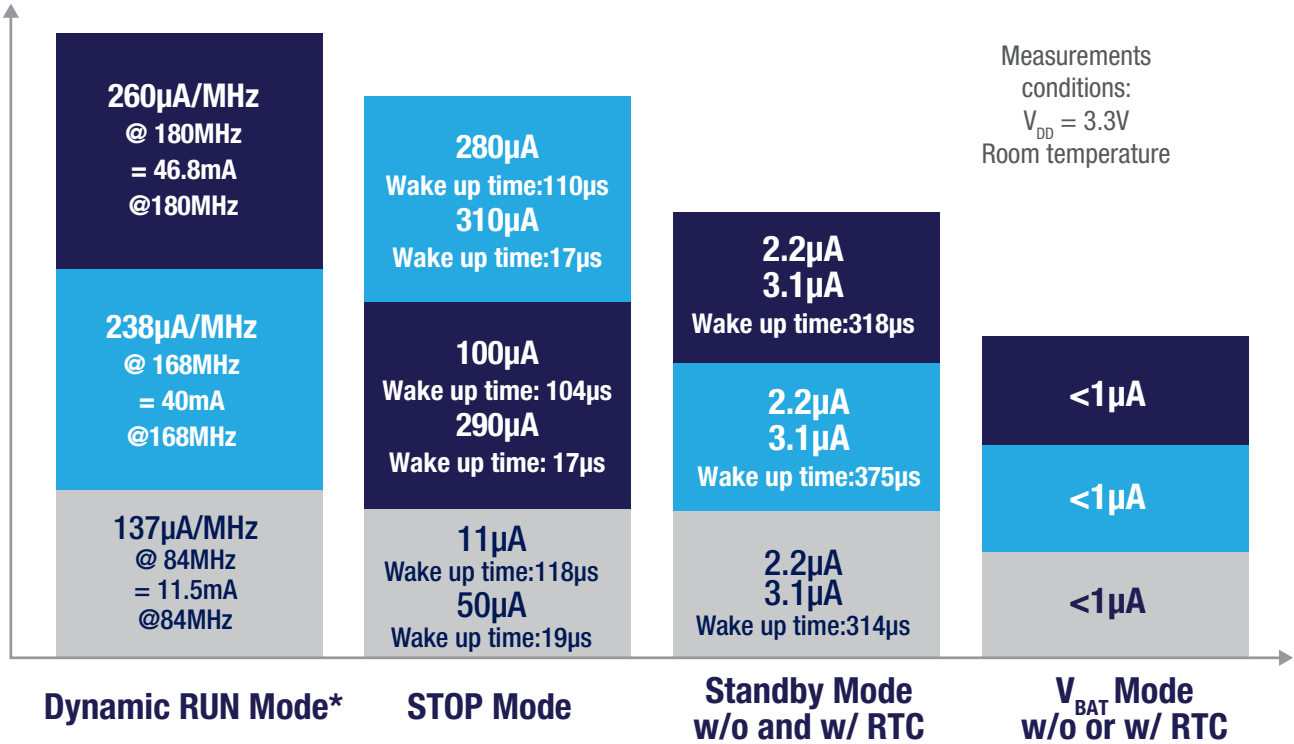
- STM32F427/429 using Chrom-ART Accelerator, internal or external memory for frame buffer and TFT controller for display
 - Up to VGA/SVGA
 - 16-/32-bit external memory interface
 - Recommended packages: LQFP100, LQFP144, LQFP176/BGA176 or LQFP208/BGA216



POWER EFFICIENCY

ST's 90 nm process and advanced design techniques (voltage scaling) achieve best-in-class power efficiency in the high-performance field.

Typ current V_{DD} range



Notes:

* Run mode Conditions: Coremark executed from Flash, peripherals OFF

■ STM32F427/437 and STM32F429/439

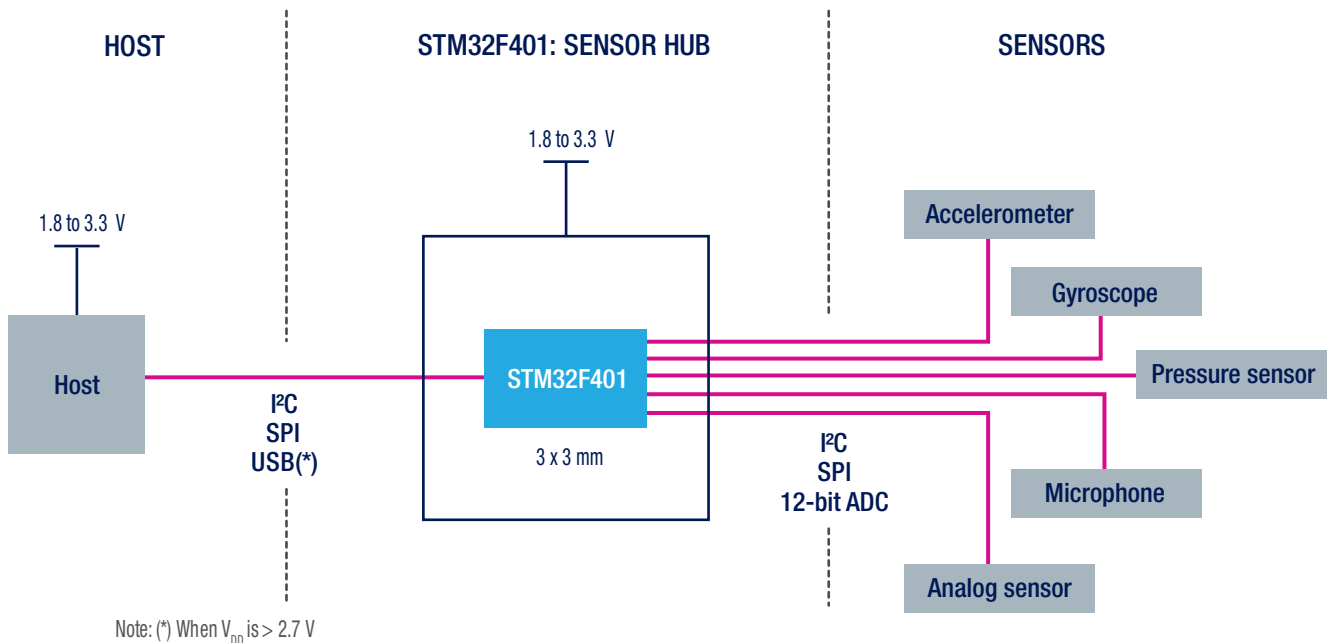
■ STM32F405/415 and STM32F407/417

■ STM32F401

HIGH INTEGRATION

Many consumer and industrial applications are seeking smaller form factors to offer more portability and freedom to the end consumer. Thanks to ST's 90 nm process and best-in-class design strategies, the STM32F4 series is available in packages as small as 3 x 3 mm with rich connectivity and features sets.

STM32F401 as sensor hub example





Development tools

As for all STM32 products, a complete development tool offering is available, including the following dedicated kits.

- STM32 F4 Discovery kits (order codes: STM32F401C-DISCO (with STM32F401VCT6 MCU), STM32F4DISCOVERY (with STM32F407VGT6 MCU) and STM32F429I-DISCO) and expansion boards for STM32F4DISCOVERY (order codes: STM32F4DIS-BB, STM32F4DIS-CAM, STM32F4DIS-LCD and STM32F4DIS-WIFI¹)
- STM32 F4 evaluation boards (order codes: STM3240G-EVAL (with STM32F407IGH6 MCU), STM3241G-EVAL (with STM32F417IGH6 MCU), STM32429I-EVAL1 (with STM32F429NIH6 MCU) and STM32439I-EVAL2 (with STM32F439NIH6 MCU)
- STM32 F4 starter kits from IAR (order codes: STM3240G-SK/IAR – with STM32F407ZGT6 MCU, and STM3242I-SK/IAR – with STM32F429IIT6 MCU) and from Keil (order code: STM3240G-SK/KEI – with STM32F407IGH6 MCU)
- STM32 F4 EvoPrimer (order codes: STM3240GPRIMER, with STM32F407IGH6 MCU, and STM3242IPRIMER, with STM32F429ZIT6 MCU); EvoPrimer target boards (order codes: STM3240GPRIM-D, with STM32F407IGH6 MCU, and STM3242IPRIM-D, with STM32F429ZIT6 MCU)
- STM32F4 Experiment kit from IAR (order code: STM32F4-GAME¹, with STM32F429IIT6 MCU)

Note:

1. Available mid of Q4/2013.



STM32F429I-DISCO
STM32F401C-DISCO
STM32F4DISCOVERY



STM32F4DISCOVERY + STM32F4DIS-BB,
STM32F4DIS-CAM and STM32F4DIS-LCD



STM3240G-EVAL
STM3241G-EVAL



STM32429I-EVAL1
STM32439I-EVAL2

SOFTWARE DEVELOPMENT ENVIRONMENT

In addition to traditional C++ development environments, you can now develop applications in Java or with .NET Micro Framework from Microsoft.

- STM32 F4 series Java evaluation kit (order code: STM3240G-JAVA , with STM32F407IGH6 MCU)
- STM32 Java development environment (order code: STM32-JAVA)
- Microsoft .NET Micro Framework platform (order codes: STM3240G-ETH/NMF and STM3240G-USB/NMF, with STM32F407VGT6 MCU)
- Matlab/Simulink integration with peripheral modelization - can be used together with Matlab 2013b that generates a code-based Cortex-M DSP library (available for free download from www.st.com/stm32-mat-target)



STM3240G-JAVA



STM3240G-ETH/NMF + STM3240G-USB/NMF



Firmware solutions

From the hardware abstraction layer, through middleware and up to the application field, the STM32 software ecosystem is extensive, providing a consistent set of solutions coming from more than 30 partners, based on open sources, or built in-house.

All STM32 F4 peripherals are functionally covered, including the peripheral library, DSP library, crypto library, file systems, USB, Ethernet, display, industrial, audio and motor-control applications.

Contact your local ST sales and marketing office for more information on the solutions described in this document.

HARDWARE ABSTRACTION LAYER

- STM32 F4 standard peripheral and DSP library: Complete set of device drivers for all standard device peripherals with many examples, including a standardized-interface DSP library, with more than 50 math operations (FIR, FFT, matrix, and more) accelerated for the STM32 F4 DSP instruction set.
- STM32 cryptographic library: Implementation of cryptographic algorithms, using STM32F41x or STM32F43x hardware acceleration when available, or 100% implemented by software for the others, but with same API.

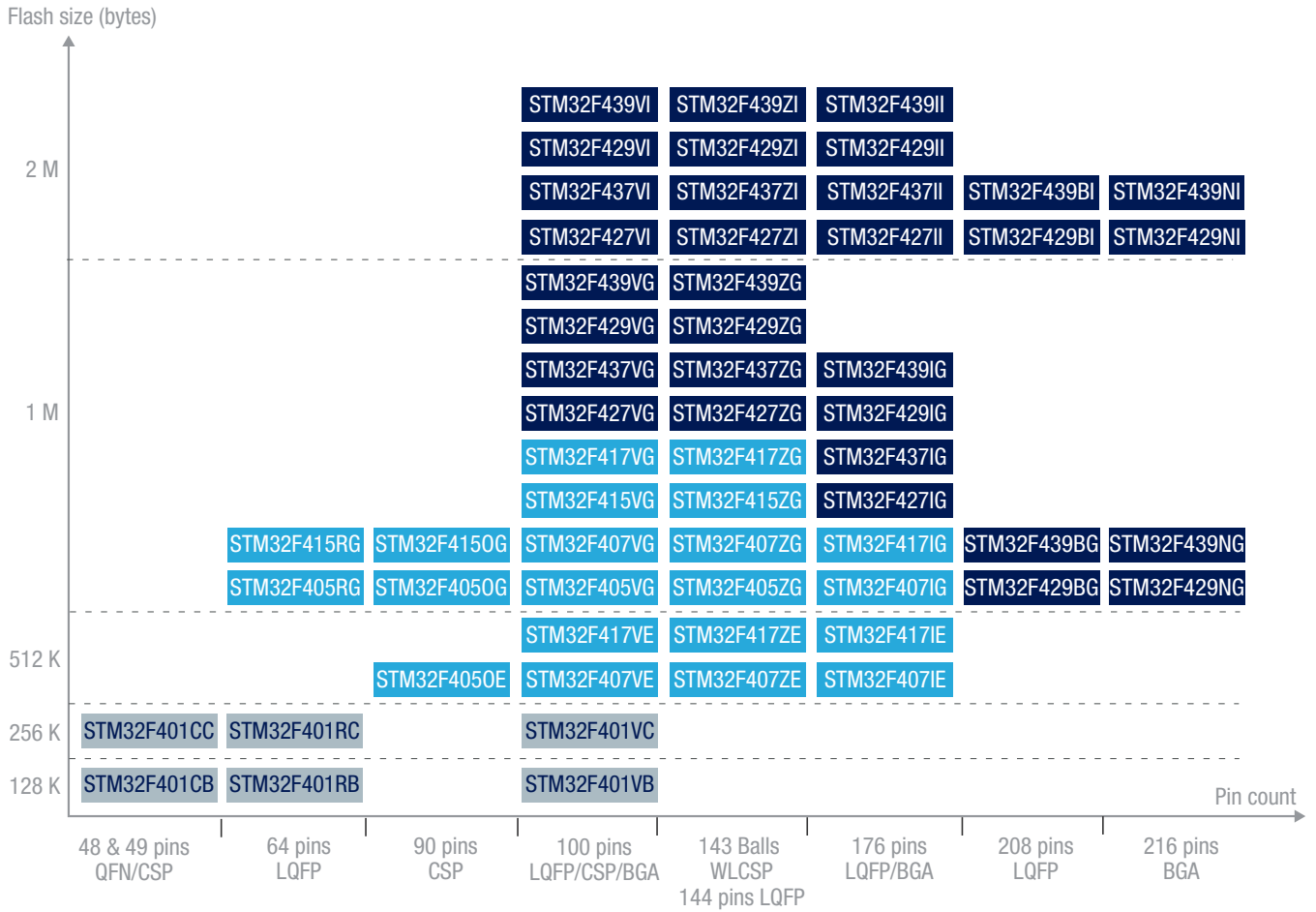
MIDDLEWARE

- Many RTOS and file systems, from open source to commercial solutions
- STM32 USB Host and Device libraries: Complete firmware packages for USB, slave and host, with many classes covered
- STM32 TCP/IP stacks: Several stacks are available, such as LwIP or NicheLite; partners offer more extensive protocol support, or other communication means such as Wi-Fi
- STemWin graphical library: based on Segger emWin graphical library, STemWin is a professional solution, enabling graphical user interface (GUI) implementation with any STM32, and LCD and controller, using STM32 hardware acceleration, whenever possible. It comes with a full set of widgets and services, such as remote display and developments tools as on PC simulator and screens designer. Finally, STemWin benefits from the STM32F429/F439 Chrom-ART accelerator.
- STM32 Bluetooth stack: iAnywhere full Bluetooth stack with many different profiles, with our partner Alpwise

APPLICATION FIELDS

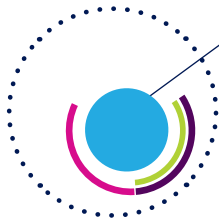
- STM32 audio solutions: Full range of audio software bricks, optimized for STM32 F4:
 - Adapted transport layers, such as USB synchronization, Bluetooth profiles, and more
 - Music codecs: MP3, WMA, AAC-LC, HE-AACv1, HE-AACv2, OGG Vorbis, SBC, and more
 - Speech codecs: Speex, G726, G711, G729, G722, and more
 - Post-processing algorithms such as sample rate converters, filters (enabling a graphical equalizer, loudness, bass mix, and more), stereo widening, smart volume control (digital volume control with no saturation), and more
 - Smartphone accessory libraries, such as iAP (iPod application protocol) interface or Android interfacingContact your sales office for information on availability for specific STM32 part numbers.
- STM32 industrial protocols: Full range of supported industrial protocols, including Profinet, EtherCAT, Modbus, DeviceNet, CANopen, and more, via our partner network, making the most of the STM32 F4 with, in particular, its IEEE 1588 feature for synchronized nodes

STM32F4 PORTFOLIO



STM32 F4





Device summary

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Package	Timer functions		12-bit channels		I/Os	Serial interface							Supply voltage (V)	Supply current (Icc)		
				16-/32-bit timers	Others	ADC	DAC		SPI	SAI	I ² S	I ² C	USART + UART ¹	USB OTG FS + FS/HS	CAN 2.0B		SDIO	Ethernet MAC10/100	Lowest power mode (µA)
STM32F401 line: USB OTG (FS), low power (11 µA typ. in Stop mode) - 84 MHz CPU																			
STM32F401CB	128	64	WLCSP49 UFQFPN48	6/2	2x WDG, RTC, 24-bit down counter	10		36	3	2	3	3	1			1.73 to 3.6	1.7	140	
STM32F401RB	128	64	LQFP64	6/2		16		48	3	2	3	3	1		1	1.8 to 3.6	1.7	140	
STM32F401VB	128	64	LQFP100 UFBGA100	6/2		16		79	4	2	3	3	1		1	1.73 to 3.6	1.7	140	
STM32F401CC	256	64	WLCSP49 UFQFPN48	6/2		10		36	3	2	3	3	1			1.8 to 3.6	1.7	140	
STM32F401RC	256	64	LQFP64	6/2		16		48	3	2	3	3	1		1	1.8 to 3.6	1.7	140	
STM32F401VC	256	64	LQFP100 UFBGA100	6/2		16		79	4	2	3	3	1		1	1.8 to 3.6	1.7	140	
STM32F405/415 line: USB OTG (FS/HS) ¹ , crypto/hash processor ² - 168 MHz CPU																			
STM32F4050E	512	192	WLCSP90	12/2	2x WDG, RTC, 24-bit down counter	13	2	72	3	2	2	4+2	2	2	1	1.7 ³ to 3.6	2.5	238	
STM32F4050G	1024	192	WLCSP90	12/2		13	2	72	3	2	2	4+2	2	2	1	1.7 ³ to 3.6	2.5	238	
STM32F4150G ²	1024	192	WLCSP90	12/2		13	2	72	3	2	2	4+2	2	2	1	1.7 ³ to 3.6	2.5	238	
STM32F405RG	1024	192	LQFP64	12/2		16	2	51	3	2	2	4+2	2	2	1	1.8 to 3.6	2.5	238	
STM32F415RG ²	1024	192	LQFP64	12/2		16	2	51	3	2	2	4+2	2	2	1	1.8 to 3.6	2.5	238	
STM32F405VG	1024	192	LQFP100	12/2		16	2	82	3	2	2	4+2	2	2	1	1.8 to 3.6	2.5	238	
STM32F415VG ²	1024	192	LQFP100	12/2		16	2	82	3	2	2	4+2	2	2	1	1.8 to 3.6	2.5	238	
STM32F405ZG	1024	192	LQFP144	12/2		24	2	114	3	2	2	4+2	2	2	1	1.7 ³ to 3.6	2.5	238	
STM32F415ZG ²	1024	192	LQFP144	12/2		24	2	114	3	2	2	4+2	2	2	1	1.7 ³ to 3.6	2.5	238	
STM32F407/417 line: 2x USB OTG (FS/HS) ¹ , camera IF, crypto/hash processor ² - 168 MHz CPU																			
STM32F407IE	512	192	UFBGA176 LQFP176	12/2	2x WDG, RTC, 24-bit down counter	24	2	140	3	2	2	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F417IE ²	512	192	UFBGA176 LQFP176	12/2		24	2	140	3	2	3	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F407VE	512	192	LQFP100	12/2		16	2	82	3	2	3	4+2	2	2	1	Yes	1.8 to 3.6	2.5	238
STM32F417VE ²	512	192	LQFP100	12/2		16	2	82	3	2	3	4+2	2	2	1	Yes	1.8 to 3.6	2.5	238
STM32F407ZE	512	192	LQFP144	12/2		24	2	114	3	2	3	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F417ZE ²	512	192	LQFP144	12/2		24	2	114	3	2	3	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F407IG	1024	192	UFBGA176 LQFP176	12/2		24	2	140	3	2	3	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F417IG ²	1024	192	UFBGA176 LQFP176	12/2		24	2	140	3	2	3	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F407VG	1024	192	LQFP100	12/2		16	2	82	3	2	3	4+2	2	2	1	Yes	1.8 to 3.6	2.5	238
STM32F417VG ²	1024	192	LQFP100	12/2		16	2	82	3	2	3	4+2	2	2	1	Yes	1.8 to 3.6	2.5	238
STM32F407ZG	1024	192	LQFP144	12/2		24	2	114	3	2	2	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238
STM32F417ZG ²	1024	192	LQFP144	12/2		24	2	114	3	2	2	4+2	2	2	1	Yes	1.7 ³ to 3.6	2.5	238

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Package	Timer functions		12-bit channels		I/Os	Serial interface							Supply voltage (V)	Supply current (Icc)			
				16-/32-bit timers	Others	ADC	DAC		SPI	SAI	I ² S	I ² C	USART + UART ¹	USB OTG FS + FS/HS	CAN 2.0B		SDIO	Ethernet MAC10/100	Lowest power mode (µA)	Run mode (per MHz) (µA)
STM32F427/437 line: 2x USB OTG (FS/HS ¹), camera IF, crypto/hash processor ² , SDRAM interface, dual-bank Flash - 180 MHz CPU																				
STM32F427IG	1024	256	UFBGA176 LQFP176	12/2	2x WDG, RTC, 24-bit down counter	24	2	140	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F427VG	1024	256	LQFP100	12/2		16	2	82	6	1	2	3	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F427ZG	1024	256	LQFP144	12/2		24	2	114	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F437IG ²	1024	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F437VG ²	1024	256	LQFP100	12/2		16	2	82	6	1	2	3	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F437ZG ²	1024	256	LQFP144	12/2		24	2	114	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F427II	2048	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F427VI	2048	256	LQFP100	12/2	2x WDG, RTC, 24-bit down counter	16	2	82	6	1	2	3	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F427ZI	2048	256	LQFP144	12/2		24	2	114	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F437II ²	2048	256	UFBGA176 LQFP176	12/2		24	2	168	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F437VI ²	2048	256	LQFP100	12/2		16	2	82	6	1	2	3	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F437ZI ²	2048	256	LQFP144	12/2		24	2	114	6	1	2	3	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429/439 line: Same as STM32F427/437 line + TFT LCD controller - 180 MHz CPU																				
STM32F429BG	1024	256	LQFP208	12/2	2x WDG, RTC, 24-bit down counter	24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429IG	1024	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429NG	1024	256	TFBGA216	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429VG	1024	256	LQFP100	12/2		16	2	82	6	1	2	2	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F429ZG	1024	256	LQFP144 WLCSP143	12/2		24	2	114	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439BG ²	1024	256	LQFP208	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439IG ²	1024	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439NG ²	1024	256	TFBGA216	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439VG ²	1024	256	LQFP100	12/2		16	2	82	6	1	2	2	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F439ZG ²	1024	256	LQFP144 WLCSP143	12/2		24	2	114	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429BI	2048	256	LQFP208	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429II ²	2048	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429NI	2048	256	TFBGA216	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F429VI	2048	256	LQFP100	12/2		16	2	82	6	1	2	2	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F429ZI	2048	256	LQFP144 WLCSP143	12/2		24	2	114	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439BI ²	2048	256	LQFP208	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439II ²	2048	256	UFBGA176 LQFP176	12/2		24	2	140	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439NI ²	2048	256	TFBGA216	12/2		24	2	176	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260
STM32F439VI ²	2048	256	LQFP100	12/2		16	2	82	6	1	2	2	4+4	2	2	1	Yes	1.8 to 3.6	2.5	260
STM32F439ZI ²	2048	256	LQFP144 WLCSP143	12/2		24	2	114	6	1	2	2	4+4	2	2	1	Yes	1.7 ³ to 3.6	2.5	260

Notes: Operating temperature: -40 to 85 °C for WLCSP packages and -40 to 105 °C for all other packages

- HS requires an external PHY connected to ULPI interface
- Crypto/hash processor on STM32F417, STM32F415, STM32F437, STM32F439
- 1.7 V requires external reset circuitry and the device operates in the 0 to 70 °C temperature range
- Marked in the table (3+2) means 3 USART and 2 UART. All UARTs have LIN master/slave function. All USARTs have IrDA, ISO 7816, modem control and LIN master/slave functions.

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