

STM32 F3 series Cortex-M4 MCUs Releasing your creativity





STM32 F3 series

32-bit MCUs with DSP instructions and FPU plus optimum analog integration to complement STM32 F1 and F4 series

The STM32 F3 series of microcontrollers combines a 32-bit ARM® Cortex™-M4 core with DSP and FPU instructions running at 72 MHz with advanced analog peripherals for more flexibility at a competitive cost.

The STM32 F3 series innovates in embedded digital signal control (DSC) design by combining a Cortex-M4 core with fast 12-bit, 5 MSPS and precise 16-bit sigma-delta ADCs, programmable gain amplifiers, fast comparators and versatile time control units, giving optimum integration.

The STM32 F3 series supports the STM32 F1 series, keeping pinout compatibility, and enlarges the STM32's Cortex-M4 portfolio, which now offers both entry-level cost with the F3 series and highest performance with the F4 series. The full STM32 portfolio now covers more than 350 devices.

The STM32 F3 series includes devices with 64 to 256 Kbytes of on-chip Flash memory, and up to 48 Kbytes of SRAM. WLCSP66 (< 4.3 x 4.3 mm), LQPF48, LQFP64, LQFP100, UFBGA100 packages are available.

STM32 F3 PRODUCT LINES

Both product lines include:

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Cortex-M4 + FPU Fmax = 72 MHz
MPU
PLL
ETM
Reset + BOR PVD
Low and high speed internal oscillators
2x watchdogs + RTC (real-time clock)
HW CRC
Reset circuitry POR/PDR
Multiple DMA
Communication peripherals USART, SPI, I ² C
Multiple 16-bit timers
1x 32-bit timer
Temperature sensor
Backup registers

+

STM32F302/303/313 lines

Up to 256-Kbyte Flash	Up to 40-Kbyte SRAM	8-Kbyte code SRAM	2x DAC 12-bit	7x comparator	4x 12-bit ADC 5 MSPS SAR	4x PGA	CAN 2.0B	USB 2.0 FS	2x16-bit AMC timer
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STM32F372/373/383 lines

Up to 256-Kbyte Flash	Up to 32-Kbyte SRAM	3x 16-bit $\Sigma\Delta$ ADC	3x DAC 12-bit	2x comparator	1x 12-bit ADC 1 MSPS SAR	CEC	CAN 2.0B	USB 2.0 FS
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Abbreviations:

FS: full speed
 AMC: advanced motor control
 SDIO: secure digital input/output
 FPU: floating point unit

DSC: digital signal controller
 SAR: successive approximation register
 BOR: brown-out reset
 PVD: power voltage detector

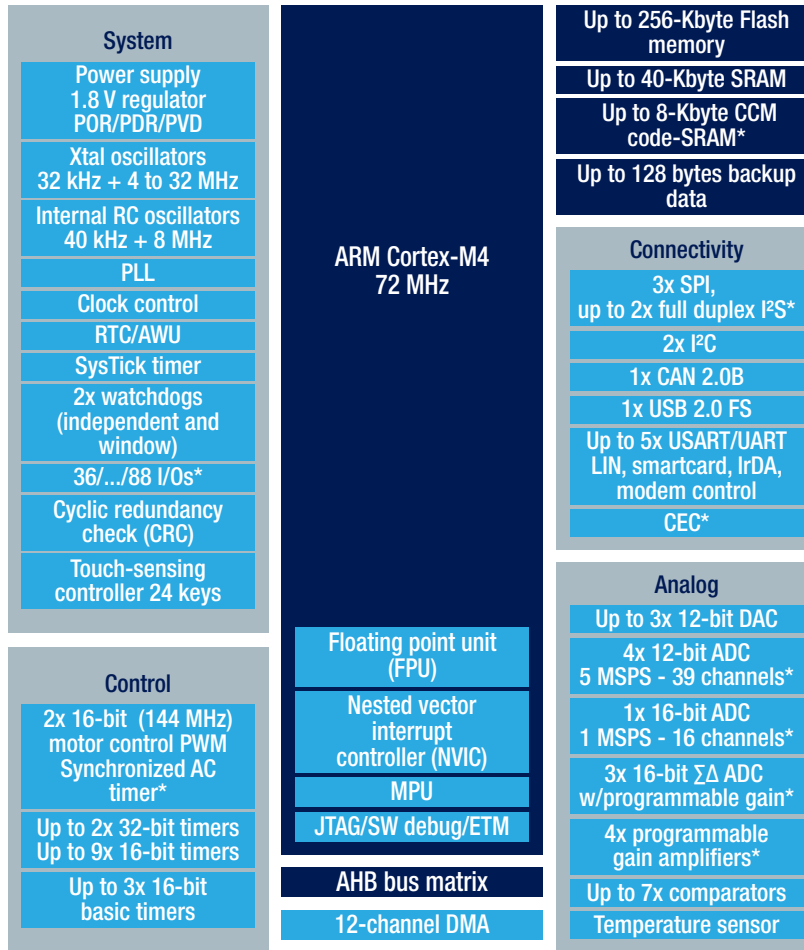
MPU: memory protection unit
 CEC: consumer electronic control
 ETM: Embedded Trace Macrocell

FEATURES AND BENEFITS

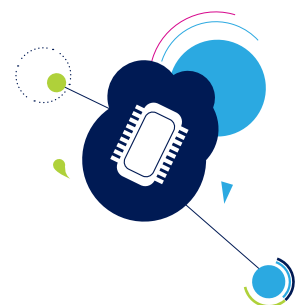
Features	Benefits
<p>Performance</p> <p>72 MHz/62 DMIPS (from Flash) or 94 DMIPS (from CCM-SRAM*) Cortex-M4 with single cycle DSP MAC and floating point unit</p>	<ul style="list-style-type: none"> • Boosted execution of control algorithms • More features possible for your applications • Ease of use • Better code efficiency • Faster time to market • Elimination of scaling and saturation • Easier support for meta-language tools
<p>Real-time performance</p> <ul style="list-style-type: none"> • CCM-SRAM* (core coupled memory): 8 Kbytes of SRAM mapped to the instruction bus; critical routines loaded in the 8-Kbyte CCM at startup can be completed at full speed with zero wait states, achieving 94 Dhrystone MIPS and CoreMark score 155 at 72 MHz • SRAM and CCM-SRAM with parity bit • 32-bit, AHB bus matrix • DMA controllers • Memory protection unit (MPU) 	<p>More performance for critical routines with zero-wait state execution from safe CCM-SRAM</p>
<p>Outstanding power efficiency</p> <ul style="list-style-type: none"> • Stop mode down to 5.1 μA typ • RTC down to 0.5 μA typ in V_{BAT} mode • 2.0 to 3.6 V or 1.8 V +/-8% power supply range 	<ul style="list-style-type: none"> • Flexibility to reduce power consumption for applications requiring advanced analog peripherals and low-power modes • Running at low voltage or on a rechargeable battery
<p>Maximum integration</p> <p>Up to 256 Kbytes of on-chip Flash memory, up to 48 Kbytes of SRAM, reset circuit, internal RCs, PLLs, WLCSP package available</p>	<p>More features in space-constrained applications</p>
<p>Superior and innovative peripherals</p> <ul style="list-style-type: none"> • Analog: 4x 12-bit ADC 5 MSPS* reaching 18 MSPS in interleaved mode, 3x 16-bit sigma-delta* ADC up to 50 KSPS, fast comparators* (50 ns), programmable gain amplifiers* (4 gains, 1% accuracy), 12-bit DACs • Up to 17 timers: 16 and 32 bits running up to 144 MHz* • Audio: simplex or full duplex I²S interfaces* • Up to 12 communication interfaces including 5x USART (9 Mbit/s), 3x SPI/I²S (18 Mbit/s), 2x I²C (1 MHz fast mode plus), CAN (1 Mbit/s), USB full speed • Consumer electronic control (CEC)* • Cyclic redundancy check (CRC) • RTC/AWU • Capacitive touch sensing (24 keys) 	<ul style="list-style-type: none"> • Full set of integration features on chip resulting in simplified board designs and fewer external components • BOM cost reduced
<p>STM32 Compatibility</p> <p>Pin compatibility and same API for peripherals as F1 series</p>	<ul style="list-style-type: none"> • More than 350 Cortex-M based compatible STM32 devices • More than 70 Cortex-M4 based compatible STM32 devices • Digital signal processing (DSP) capability at competitive price

Note: *Product dependent

STM32 F3 BLOCK DIAGRAM



Note: *Product dependent





STM32 F3 applications

KEY FOCUS AREAS

- Digital signal control
- Home appliances
 - Dual/single advanced motor control
- Medical
 - Portable devices
- Consumer
 - Gaming
 - Entry level audio
 - Biometric sensors
 - Portable fitness
- Industrial
- Metering
- Solar microinverter
- Digital power conversion
 - Entry-level digital power supplies (DSMPS)
- LED lighting



STM32 F3 SERIES - ARM CORTEX™-M4 MIXED-SIGNAL MCUS WITH DSP AND FPU

Part number	Flash size (Kbytes)	Internal RAM size (Kbytes)	Package	Timer functions			ADC 16-bit/12-bit	DAC	I/Os	Serial interface	Supply voltage (V)	Supply current (Icc)		Operating temperature (°C)		
				16-bit timers	32-bit timers	Others						Lowest power mode (µA)	Run mode (per MHz) (µA)			
STM32F302/303/313 line – 72 MHz with 8-Kbyte CCM-SRAM and 12-bit ADC (5 MSPS)																
STM32F302CB	128	32	LQFP48	8x16-bit	1x32-bit		9x12-bit	1x12-bit	37		2.0 to 3.6	1.1	416	-40 to +85 or -40 to +105		
STM32F302RB	128	32	LQFP64	8x16-bit	1x32-bit		16x12-bit	1x12-bit	53		2.0 to 3.6					
STM32F302VB	128	32	LQFP100	8x16-bit	1x32-bit		17x12-bit	1x12-bit	88		2.0 to 3.6					
STM32F303CB	128	40	LQFP48	9x16-bit	1x32-bit		15x12-bit	2x12-bit	37		2.0 to 3.6					
STM32F303RB	128	40	LQFP64	9x16-bit	1x32-bit		22x12-bit	2x12-bit	53	3xSPI, 2xI ² C, 5xUSART (IrDA, ISO 7816), 1xUSB, 1xCAN	2.0 to 3.6					
STM32F303VB	128	40	LQFP100	9x16-bit	1x32-bit		39x12-bit	2x12-bit	88		2.0 to 3.6					
STM32F302CC	256	40	LQFP48	8x16-bit	1x32-bit	SysTick, 2 x WDG, RTC	9x12-bit	1x12-bit	37		2.0 to 3.6					
STM32F302RC	256	40	LQFP64	8x16-bit	1x32-bit		16x12-bit	1x12-bit	53		2.0 to 3.6					
STM32F302VC	256	40	LQFP100	8x16-bit	1x32-bit		17x12-bit	1x12-bit	88		2.0 to 3.6					
STM32F303CC	256	48	LQFP48	9x16-bit	1x32-bit		15x12-bit	2x12-bit	37		2.0 to 3.6					
STM32F303RC	256	48	LQFP64	9x16-bit	1x32-bit		22x12-bit	2x12-bit	53		2.0 to 3.6					
STM32F303VC	256	48	LQFP100	9x16-bit	1x32-bit		39x12-bit	2x12-bit	88		2.0 to 3.6					
STM32F313CC	256	48	LQFP48	9x16-bit	1x32-bit			15x12-bit	2x12-bit		37				3xSPI, 2xI ² C, 5xUSART (IrDA, ISO 7816), 1xCAN	1.65 to 1.95
STM32F313RC	256	48	LQFP64	9x16-bit	1x32-bit			22x12-bit	2x12-bit		53					1.65 to 1.95
STM32F313VC	256	48	LQFP100	9x16-bit	1x32-bit			39x12-bit	2x12-bit	88	1.65 to 1.95					
STM32F372/373/383 line – 72 MHz with 16-bit $\Sigma\Delta$ ADC																
STM32F372C8	64	16	LQFP48	9x16-bit	2x32-bit		5x16-bit/ 9x12-bit	1x12-bit	36		2.0 to 3.6	1.2	430	-40 to +85 or -40 to +105		
STM32F372R8	64	16	LQFP64	9x16-bit	2x32-bit		5x16-bit/ 16x12-bit	1x12-bit	52		2.0 to 3.6					
STM32F372V8	64	16	LQFP100	9x16-bit	2x32-bit		9x16-bit/ 16x12-bit	1x12-bit	84		2.0 to 3.6					
STM32F373C8	64	16	LQFP48	9x16-bit	2x32-bit		8x16-bit/ 9x12-bit	3x12-bit	36		2.0 to 3.6					
STM32F373R8	64	16	LQFP64	9x16-bit	2x32-bit		8x16-bit/ 16x12-bit	3x12-bit	52		2.0 to 3.6					
STM32F373V8	64	16	LQFP100	9x16-bit	2x32-bit		21x16-bit/ 16x12-bit	3x12-bit	84		2.0 to 3.6					
STM32F372CB	128	24	LQFP48	9x16-bit	2x32-bit		5x16-bit/ 9x12-bit	1x12-bit	36		2.0 to 3.6					
STM32F372RB	128	24	LQFP64	9x16-bit	2x32-bit		5x16-bit/ 16x12-bit	1x12-bit	52		2.0 to 3.6					
STM32F372VB	128	24	LQFP100	9x16-bit	2x32-bit		9x16-bit/ 16x12-bit	1x12-bit	84	2xSPI, 2xI ² C, 3xUSART (IrDA, ISO 7816), 1xUSB, 1xCAN	2.0 to 3.6					
STM32F373CB	128	24	LQFP48	9x16-bit	2x32-bit		8x16-bit/ 9x12-bit	3x12-bit	36		2.0 to 3.6					
STM32F373RB	128	24	LQFP64	9x16-bit	2x32-bit	SysTick, 2 x WDG, RTC	8x16-bit/ 16x12-bit	3x12-bit	52		2.0 to 3.6					
STM32F373VB	128	24	LQFP100	9x16-bit	2x32-bit		21x16-bit/ 16x12-bit	3x12-bit	84		2.0 to 3.6					
STM32F373VC	128	24	LQFP100 UFPGA100	9x16-bit	2x32-bit		21x16-bit/ 16x12-bit	3x12-bit	84		2.0 to 3.6					
STM32F372CC	256	32	LQFP48	9x16-bit	2x32-bit		5x16-bit/ 9x12-bit	1x12-bit	36		2.0 to 3.6					
STM32F372RC	256	32	LQFP64	9x16-bit	2x32-bit	5x16-bit/ 16x12-bit	1x12-bit	52	2.0 to 3.6							
STM32F372VC	256	32	LQFP100 UFPGA100	9x16-bit	2x32-bit	9x16-bit/ 16x12-bit	1x12-bit	84	2.0 to 3.6							
STM32F373CC	256	32	LQFP48	9x16-bit	2x32-bit	8x16-bit/ 9x12-bit	3x12-bit	36	2.0 to 3.6							
STM32F373RC	256	32	LQFP64	9x16-bit	2x32-bit	8x16-bit/ 16x12-bit	3x12-bit	52	2.0 to 3.6							
STM32F373VC	256	32	LQFP100	9x16-bit	2x32-bit	21x16-bit/ 16x12-bit	3x12-bit	84	2.0 to 3.6							
STM32F383CC	256	32	LQFP48	9x16-bit	2x32-bit		8x16-bit/ 9x12-bit	3x12-bit	36	2xSPI, 2xI ² C, 3xUSART (IrDA, ISO 7816), 1xCAN	1.65 to 1.95					
STM32F383RC	256	32	LQFP64 WLCSP66	9x16-bit	2x32-bit		8x16-bit/ 16x12-bit	3x12-bit	52		1.65 to 1.95					
STM32F383VC	256	32	LQFP100 UFPGA100	9x16-bit	2x32-bit		21x16-bit/ 16x12-bit	3x12-bit	84		1.65 to 1.95					

Notes:

- Supply voltage 2.0 to 3.6 V for all devices or 1.8 V +/-8% dedicated sales type
- WLCSP66 package available in 1.8 V +/-8% dedicated sales type only



Development tools

A complete offer of development tools is available, including the following kits and evaluation boards:

- Low-cost STM32F3-Discovery kit featuring an STM32F30x MCU, ST's MEMS 3-axis digital output gyroscope and e-compass (3D digital linear accelerometer and 3D digital magnetic sensor).
- Two full-featured boards for demonstration and evaluation purposes:
 - STM32F303 line: STM32F303VCT6 MCU with two inductor-motor-control 34-pin connectors, a humidity sensor, 1-Mbit SPI, serial Flash (order code: STM32F303C-EVAL*)
 - STM32F373 line: STM32F373VCT6 MCU with ECG (electrocardiogram) sensor, pressure sensor and PT100 temperature sensor connected to the 3 16-bit sigma-delta ADCs, a touch slider, HDMI connectors (CEC and DDC), light dependent resistor (LDR) (order code: STM32373C-EVAL)

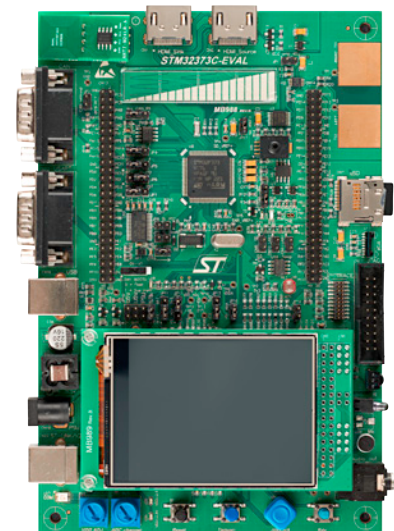
Both boards feature standard peripherals such as 240x320 TFT color LCD, 2 Gbyte or more byte microSD card (SPI interface), I²C compatible temperature sensor, EEPROM and RF Dual Interface EEPROM (I²C and RF), RS-232 communication and IrDA transceiver, USB FS connector, CAN 2.0A/B compliant connection, potentiometer, JTAG/SWD and ETM connectors, and an embedded ST-LINK/V2 for easy debugging and programming.

Note: * Available in Q4/2012

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STM32F3DISCOVERY



STM32373C-EVAL

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