STM32 Cortex-M3

STM32 Releasing your creativity

STM32F
STM32L
STM32W
STM32F combine high performance with first-class peripherals and low-power, low-voltage operation. They offer the maximum integration at accessible prices with a simple architecture and easy-to-use tools. With four lines, the STM32F products target a wide range of applications in the industrial, medical and consumer markets. **STM32F2xx** new high performance Cortex-M3 available before the end of Q4/10

**STM32L** family, based on the Cortex-M3 core, extends the ultra-low-power portfolio in performance, features, memory size and package pin count.

**STM32W** The STM32 family is expanding to the wireless network domain bringing outstanding radio and low-power microcontroller performances. With a configurable total link budget up to 109 dB and the efficiency of the ARM Cortex-M3 core, the STM32W is a perfect fit for the wireless sensor network market. Compliant with the **IEEE 802.15.4** radio standard, this open and flexible platform supports the most popular protocol stacks such as **RF4CE**, **ZigBee-PRO**, **6LoWPAN** and more.
• Cortex-M **smallest code size** of any microcontroller! Reducing code → minimum amount of flash

• High performance **1.25 Dhrystone MIPS/MHz**

*Code size comparison using relative EEMBC CoreMark test size.*

http://www.arm.com/products/processors/cortex-m/cortex-m3.php
STM32 Cortex-M3 – Key Features 1/2

High performance 1.25 Dhrystone MIPS/MHz 32bit mcu with Thumb2 mode up to 150DMIPS
Low power 188uA at 1MHz
16 Channels DMA
2 WatchDog Timer
Integrated Power On Reset (POR)
Power Down Reset (PDR)
Programmable voltage detector (PVD)
Up to 1MB embedded Flash
Up to 128KB of RAM + 4K SRam (under RTC battery)
Up to 3 ADC 12-bit up to 0,5uS conversion rate (6 MSPS in triple interleaved mode, max 24ch)
Up to 2 DAC 12Bit
Up to 5 USARTs (LIN master/slave, IrDA, Smart Card, UART, Single Wire, SPI Master mode)
Up to 3 SPIs (18MHz master/slave)
Up to 3 I²C
Up to 2 I2S for high quality audio
Up to 17 Timer (8/16-bit) + dedicated 16-bit timers with 6-PWM (max 2)
timer with embedded dead times for motor control vector drive applications
STM32 Cortex-M3 – Key Features 2/2

**External BUS** upto 60MHz that supports Compact Flash, SRAM, PSRAM, NOR and NAND memories

Up to **140** I/O

**System Timer** (SysTick)

Up to **1** USB 2.0 OTG full speed

Up to **1** USB 2.0 OTG high speed

Up to **2** CAN 2.0A/B active

**MAC** for Ethernet

**IEEE 802.15.4 / 2.4Ghz Radio** (STM32W)

AES encryption HW accelerator:
- AES 128, 192, 256, Triple DES, HASH (MD5, SHA-1)
- Analog true random number generator (STM32W & STM32F2xx)

**CRC calculation unit,** **96-bit unique ID**

**4K EEPROM** (STM32L)

**LCD** 8 × 40 or 4 × 44 (STM32L)

8- to 14-bit parallel **Camera Interface:**

- up to 27 Mbyte/s at 27 MHz or 48 Mbyte/s at 48 MHz

**Internal RC oscillator 8MHz +/- 1% over 0-70°C temp range + CSS**

**RTC** + Battery input + **20byte** of RAM + **4K** SRam under Vbat + Tamper detection

**Fast Interrupt Controller** (inside the mcu-core)
### STM32Fxxx STM32Lxxx Cortex-M3 Road Map 1/2

**Common core peripherals and architecture:**

- Communication peripherals: USART, SPI, I2C
- Multiple general-purpose timers
- Integrated reset and brown-out warning
- Multiple DMA
- 2x watchdogs
- Real-time clock
- Integrated regulator
- PLL and clock circuit
- External memory interface (FSMC)
- Dual 12-bit DAC
- Up to 3x 12-bit ADC
  - (1 μs or 0.5 μs for F-2 series)
- Main oscillator and 32 kHz oscillator
- Low-speed and high-speed internal RC oscillators
- -40 to +85 °C and up to 105 °C operating temperature range
- Low voltage 2.0 to 3.6 V or 1.65 to 3.6 V (L-1 and F-2 series)
  - 5.0 V tolerant I/Os
- Temperature sensor

#### F-2 series - STM32F207/217 and STM32F205/215

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>USB</th>
<th>CAN</th>
<th>Ethernet</th>
<th>Crypto/Hash</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 MHz</td>
<td>Up to 128-Kbyte</td>
<td>Up to 1-Mbyte</td>
<td>2x</td>
<td>2x</td>
<td>2x CAN 2.0B</td>
<td></td>
<td>processor</td>
</tr>
<tr>
<td></td>
<td>OTG FS/HS</td>
<td></td>
<td></td>
<td>3-phase</td>
<td>2x</td>
<td>IEEE 1588</td>
<td>and RNG</td>
</tr>
</tbody>
</table>

#### F-1 series - Connectivity line STM32F103/STM32F107

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>USB</th>
<th>CAN</th>
<th>Ethernet</th>
<th>Crypto/Hash</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 MHz</td>
<td>Up to 64-Kbyte</td>
<td>Up to 256-Kbyte</td>
<td>USB 2.0 OTG FS</td>
<td>2x</td>
<td>2x CAN 2.0B</td>
<td></td>
<td>IEEE 1588</td>
</tr>
</tbody>
</table>

#### F-1 series - Performance line STM32F103

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>USB</th>
<th>CAN</th>
<th>SDIO</th>
<th>2x PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 MHz</td>
<td>Up to 96-Kbyte</td>
<td>Up to 1-Mbyte</td>
<td>USB FS device</td>
<td>3-phase</td>
<td>CAN 2.0B</td>
<td></td>
<td>SDIO 2x PS</td>
</tr>
</tbody>
</table>

#### F-1 series - USB Access line STM32F102

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>USB</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 MHz</td>
<td>Up to 16-Kbyte</td>
<td>Up to 128-Kbyte</td>
<td>USB FS device</td>
<td></td>
</tr>
</tbody>
</table>

#### F-1 series - Access line STM32F101

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 MHz</td>
<td>Up to 80-Kbyte</td>
<td>Up to 1-Mbyte</td>
<td></td>
</tr>
</tbody>
</table>

#### F-1 series - Value line STM32F100

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>3-phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 MHz</td>
<td>Up to 32-Kbyte</td>
<td>Up to 512-Kbyte</td>
<td>MC timer</td>
<td></td>
</tr>
</tbody>
</table>

#### L-1 series - STM32L151/2

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Cortex-M3 CPU</th>
<th>SRAM</th>
<th>Flash</th>
<th>USB</th>
<th>Data</th>
<th>LCD</th>
<th>Comparator</th>
<th>BOR</th>
<th>MSI</th>
<th>VScal</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 MHz</td>
<td>Up to 16-Kbyte</td>
<td>Up to 128-Kbyte</td>
<td>USB FS device</td>
<td>EEPROM</td>
<td>4 Kbytes</td>
<td>8x40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:**

- **MC**: Motor control
- **FS**: Full speed
- **HS**: High speed
- **MD**: Multi-speed internal oscillator
- **BOR**: Brown-out reset
- **RAR**: Random number generator
- **SDIO**: Secure digital input/output
- **VScal**: Voltage scaling
STM32Fxxx STM32Lxxx Cortex-M3
Road Map 2/2
## Superior and innovative peripherals

<table>
<thead>
<tr>
<th>Peripherals</th>
<th>F-1 series</th>
<th>F-2 series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The need for speed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB FS</td>
<td>12 Mbit/s</td>
<td>12 Mbit/s</td>
</tr>
<tr>
<td>USB HS</td>
<td>-</td>
<td>480 Mbit/s</td>
</tr>
<tr>
<td>USART</td>
<td>Up to 4.5 Mbit/s</td>
<td>Up to 7.5 Mbit/s</td>
</tr>
<tr>
<td>SPI</td>
<td>Up to 18 Mbit/s</td>
<td>Up to 30 Mbit/s</td>
</tr>
<tr>
<td>I2C</td>
<td>400 kHz</td>
<td>400 kHz</td>
</tr>
<tr>
<td>GPIO</td>
<td>Up to 18 MHz</td>
<td>Up to 60 MHz</td>
</tr>
<tr>
<td>3-phase MC timer</td>
<td>72 MHz PWM timer clock input</td>
<td>120 MHz PWM timer clock input</td>
</tr>
<tr>
<td>SDIO</td>
<td>Up to 48 MHz</td>
<td>Up to 48 MHz</td>
</tr>
<tr>
<td>PS</td>
<td>From 8 kHz to 96 kHz sampling frequencies</td>
<td>From 8 kHz to 96 kHz sampling frequencies</td>
</tr>
<tr>
<td>Camera interface</td>
<td>-</td>
<td>Up to 48 Mbytes/s at 48 MHz</td>
</tr>
<tr>
<td>Crypto/hash processor</td>
<td>-</td>
<td>AES 256 up to 106 Mbytes/s</td>
</tr>
<tr>
<td>FSMC</td>
<td>Up to 36 MHz</td>
<td>Up to 60 MHz</td>
</tr>
<tr>
<td><strong>The need for analog</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADC</td>
<td>1 μs conversion time (1 MSPS)</td>
<td>0.5 μs conversion time (2 MSPS)</td>
</tr>
<tr>
<td>DAC</td>
<td>2-channel, 12-bit</td>
<td>2 channel, 12-bit</td>
</tr>
<tr>
<td><strong>The need for connectivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual CAN</td>
<td>Up to 2 independent CAN</td>
<td>Up to 2 independent CAN</td>
</tr>
<tr>
<td>Ethernet</td>
<td>10/100 Mbit/s MAC with hardware IEEE 1588</td>
<td>10/100 Mbit/s MAC with hardware IEEE 1588</td>
</tr>
<tr>
<td>USB OTG</td>
<td>Full speed host, device or OTG</td>
<td>Full speed and high speed host, device or OTG</td>
</tr>
<tr>
<td>CEC bus</td>
<td>Consumer electronic control for consumer devices</td>
<td>-</td>
</tr>
<tr>
<td>Flexible static memory interface</td>
<td>4 independent banks, 8/16-bit data bus, supports SRAM, PSRAM, NAND and NOR Flash, parallel graphic LCD</td>
<td>4 independent banks, 8/16-bit data bus, supports SRAM, PSRAM, NAND and NOR Flash, parallel graphic LCD</td>
</tr>
<tr>
<td>Camera interface</td>
<td>-</td>
<td>8- to 14-bit parallel</td>
</tr>
<tr>
<td>Part number</td>
<td>Package</td>
<td>Flash</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>STM32W108CBU6x</td>
<td>QFN48</td>
<td>128 KB</td>
</tr>
<tr>
<td>STM32W108HBU6x</td>
<td>QFN40</td>
<td></td>
</tr>
</tbody>
</table>

**Customer application**
- Network layer (optional)
- 15.4 simple MAC

**STM32W**
- Simple MAC application
- RF4CE application
- ZigBee application

**Customer application**
- RF4CE nwk layer and CERC profile
- 15.4 simple MAC

**STM32W**
- RF4CE application

**Customer application**
- ZigBee PRO stack (incl. Std periph lib)

**STM32W**
- ZigBee application

STM32W is Zigbee certified platform (PRO Stack)
STM32W is ZigBee RF4CE certified platform
STM32W is IEEE 802.15.4 certified platform
### STM32WXXX – Cortex-M3 Road Map

<table>
<thead>
<tr>
<th>Mode</th>
<th>Regulators</th>
<th>Low-frequency 10 kHz RC oscillator</th>
<th>32 kHz crystal oscillator</th>
<th>High-frequency 12 MHz RC oscillator</th>
<th>24 MHz crystal oscillator</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep sleep 2</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>0.7 μA</td>
</tr>
<tr>
<td>Deep sleep 1</td>
<td>off</td>
<td>off</td>
<td>optional</td>
<td>off</td>
<td>off</td>
<td>0.4 μA</td>
</tr>
<tr>
<td>Standby</td>
<td>on</td>
<td>on</td>
<td>optional</td>
<td>off</td>
<td>off</td>
<td>2 mA</td>
</tr>
<tr>
<td>Active at 12 MHz</td>
<td>on</td>
<td>on</td>
<td>optional</td>
<td>off</td>
<td>on</td>
<td>6 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Active mode</th>
<th>Sensitivity</th>
<th>Rx current</th>
<th>Tx current</th>
<th>Tx current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio peripheral</td>
<td>dBm</td>
<td>mA</td>
<td>mA at 0 dBm</td>
<td>mA at -32 dBm</td>
</tr>
<tr>
<td>-100</td>
<td>20</td>
<td>24</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
STM32 in the future

Cortex-M0
“8/16-bit” applications
Cost optimized
Sample Q2/11

Cortex-M3
Clock up to 120Mhz
“16/32-bit” applications
Sample end Q4/10

Cortex-M4
“32-bit/DSC” applications
High-performance
DSP capability and FPU
STM32 for DSC and
leading edge applications
Sample Q3/11
STM32 Cortex-M3
Software Tools 1/3

STM32F10x Standard Peripherals Library

Free Motor Control Library
ANSI C compliant
MISRA C compliant
Class B IEC60335-1 approved
Free development tools because it has no optimizations. Optimizations are charged.
http://www.atollic.com/

The GNU world, now available for STM32 with examples.
http://developers.stf12.net/home
STM32 Cortex-M3
Software Tools 3/3

Compilers and IDE
- IAR Systems
- GNU
- KEIL
- Green Hills Software
- hitex
- RAISONANCE
- atollic

Device Programming
- SEGGER
- PLS
- Datum
- LAUTERBACH
- iSYSTEM
- mbest

IDE and debuggers, GNU compilers
Supported Families: STM8 and STM32 Microcontrollers

STM8 SWIM specific features
1.65 V to 5.5 V application voltage supported
SWIM cable provided for connection to an application with an ERNI standard vertical or horizontal connector
SWIM cable for connection to an application with pin headers or 2.54 mm pitch connector

STM32 JTAG specific features
3 V to 3.6 V application voltage supported on JTAG interface and 5 V tolerant inputs
JTAG cable provided for connection to a standard JTAG 20-pin 2.54 mm pitch connector

IDE supported:
ST Visual Develop (STVD) and ST Visual Program (STVP) software from STMicroelectronic's for the STM8 family.
ATOLLIC, IAR and KEIL Integrated Development Environments for the STM32.

UpDate ST-Link
http://www.st.com/internet/com/SOFTWARE_RESOURCES/SW_COMPONENT/FIRMWARE/stlinkupgrade.zip
Link:
http://www.st.com/internet/evalboard/product/219866.jsp
STM32 Cortex-M3 Hardware Tools 2/3

**STM32W108B-SK**, application board + Primer2 + Network Analyzer  
**STM32W108B-KEXT**, set of 4 additional application boards

**STM32F103ZET6**  
144 pin 512K flash Performance Line  
Cod.Ord. **STM3210E-EVAL**

**STM32F107VCT6**  
- NicheLite TCP/IP stack  
- DHCP client  
- Simple HTTP server  
- TFTP client and server  
- Virtual file system  
- NicheTask OS kernel  
Cod.Ord. **STM3210C-Eval**

**STM32L15x low-power board**

Ultra-low-power and low-cost board for STM32L15x to demonstrate all different low-power modes and functionalities and provide a means to measure current sourced by the battery while paused in each of the modes.
The **STM32F Discovery Value line** evaluation board helps you discover the STM32 Value line features and to develop and share your applications. It is based on an **STM32F100RBT6B** and includes **ST-Link embedded debug tool** interface, LEDs and push buttons.  

[http://www.emcu.it/STM32Discovery/STM32ValueLineDiscovery.html](http://www.emcu.it/STM32Discovery/STM32ValueLineDiscovery.html)

**STM8S Discovery** is a evaluation board helps you discover the STM8S family and to develop and share your applications. It is based on an **STM8S105C6T6**, with a LED and a **touch button** operated by STM8S. It also includes **ST-Link embedded debug tool** interface.  

[http://www.emcu.it/STM8/STM8-Discovery/STM8SDiscovery.html](http://www.emcu.it/STM8/STM8-Discovery/STM8SDiscovery.html)
STM32 Cortex-M3

STM32
http://www.emcu.it/STM32.html
http://www.emcu.it/STM32/Intro_MKT_STM32x-CORTEX.pdf
http://www.emcu.it/STM32Discovery/STM32ValueLineDiscovery.html

STM8
http://www.emcu.it/STM8.html
http://www.emcu.it/STM8/STM8L/STM8L_page.html
http://www.emcu.it/STM8/STM8-Discovery/STM8SDiscovery.html

For more info contact your local SILICA FAE