STM32 Cortex-M3

STM32 Releasing your creativity

- STM32F
- STM32L
- STM32W

STM32 Cortex-M3 **– introduction to family 1/2**

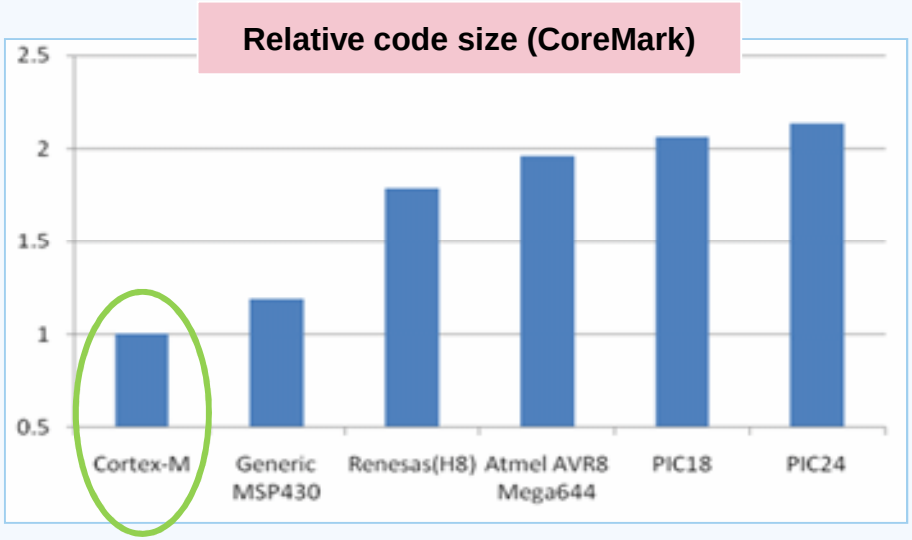
STM32F combine high performance with **first-class peripherals** and low-power, low-voltage operation. They offer the **maximum integration** at accessible prices with a simple architecture and **easy-to-use tools**.
With four lines, the STM32F products target a wide range of applications in the industrial, 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.

STM32 Cortex-M3 – introduction to family 2/2

- 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

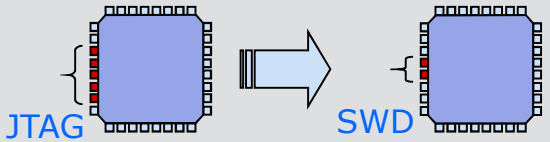
16 Channels DMA

2 WatchDog Timer

Integrated Power On Reset (POR)

Power Down Reset (PDR)

Programmable voltage detector (PVD)



More pins available for the application

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

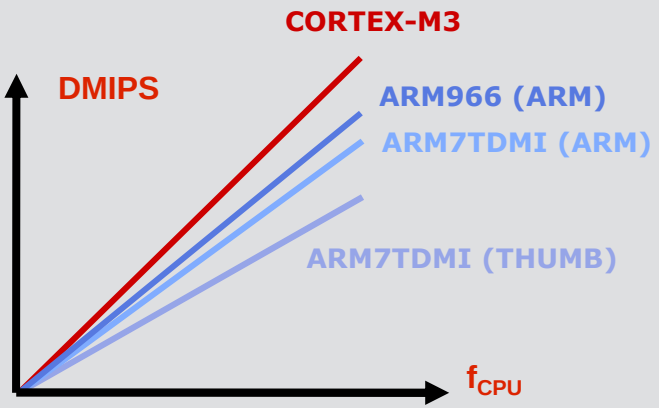
Up to 5 USARTs (LIN master/slave, IrDA, Smart Card, UART, Single Wire, SPI Master mode)

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)

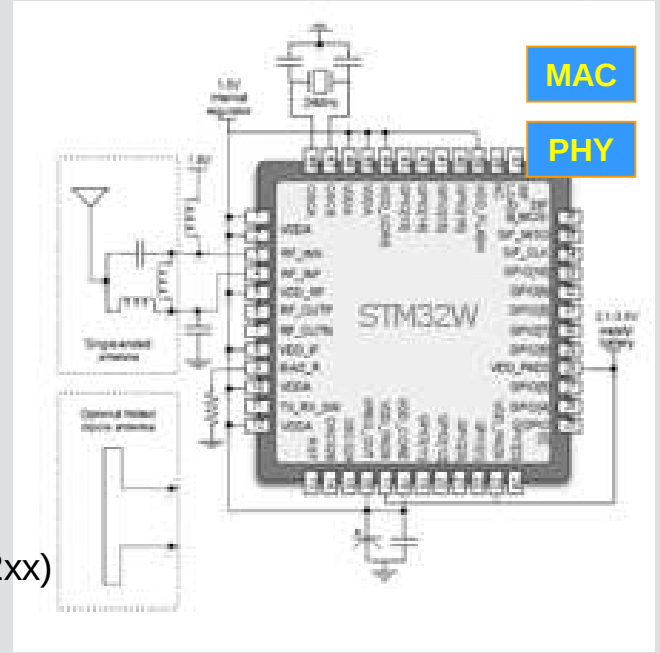
8- to 14-bit parallel Camera Interface:

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

Internal RC oscillator 8MHz +/- 1% over 0-70℃ 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

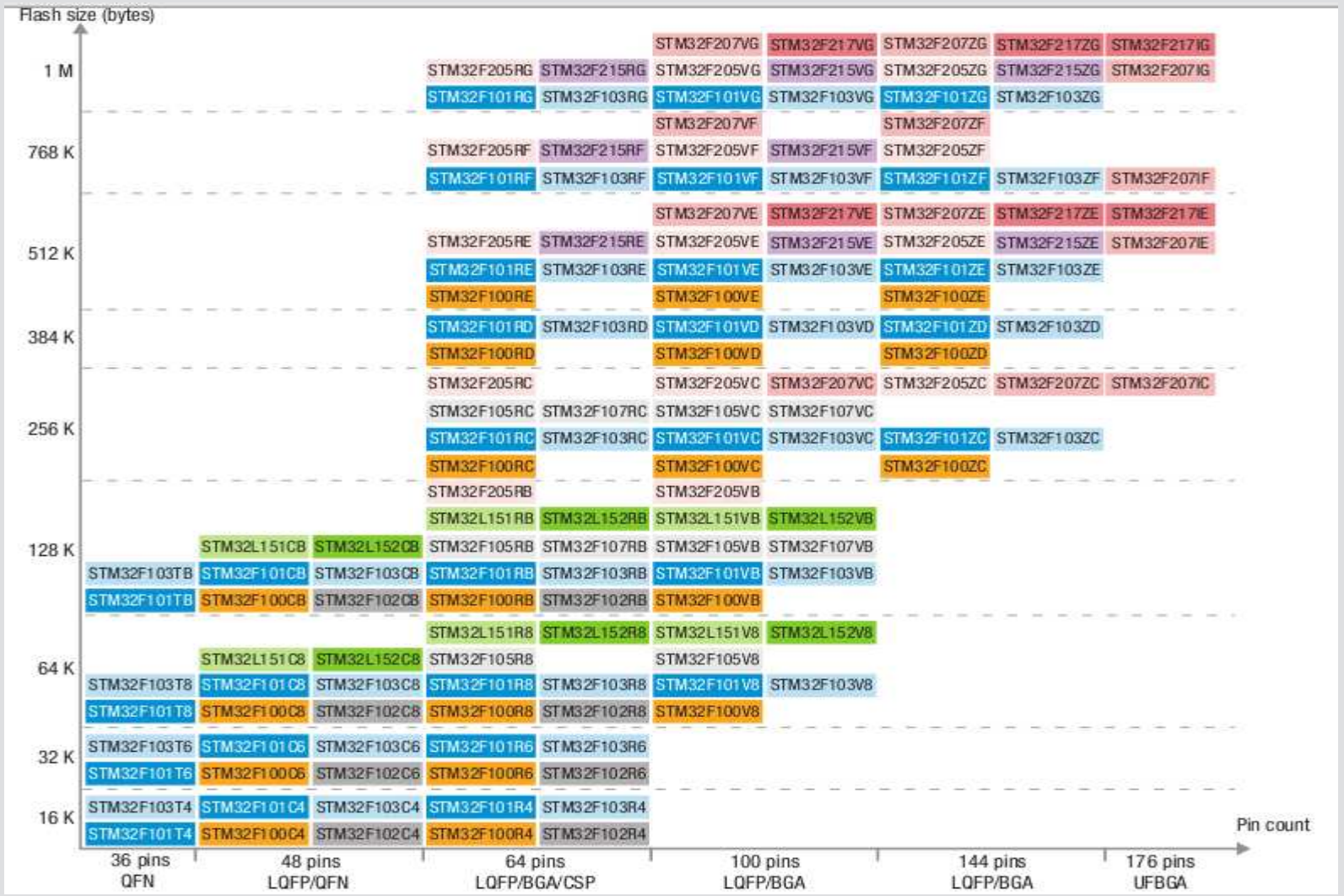
+

F-2 series - STM32F207/217 and STM32F205/215								
120 MHz Cortex-M3 CPU	Up to 128-Kbyte SRAM	Up to 1-Mbyte Flash	2x USB 2.0 OTG FS/HS	3-phase MC timer	2x CAN 2.0B	SDIO 2x I²S audio Camera IF	Ethernet IEEE 1588	Crypto/hash processor and RNG
F-1 series - Connectivity line STM32F105/STM32F107								
72 MHz Cortex-M3 CPU	Up to 64-Kbyte SRAM	Up to 256-Kbyte Flash	USB 2.0 OTG FS	3-phase MC timer	2x CAN 2.0B	2x I²S audio	Ethernet IEEE 1588	
F-1 series - Performance line STM32F103								
72 MHz Cortex-M3 CPU	Up to 96-Kbyte SRAM	Up to 1-Mbyte Flash	USB FS device	3-phase MC timer	CAN 2.0B	SDIO 2x I²S		
F-1 series - USB Access line STM32F102								
48 MHz Cortex-M3 CPU	Up to 16-Kbyte SRAM	Up to 128-Kbyte Flash	USB FS device					
F-1 series - Access line STM32F101								
36 MHz Cortex-M3 CPU	Up to 80-Kbyte SRAM	Up to 1-Mbyte Flash						
F-1 series - Value line STM32F100								
24 MHz Cortex-M3 CPU	Up to 32-Kbyte SRAM	Up to 512-Kbyte Flash	3-phase MC timer	CEC				
L-1 series - STM32L151/2								
32 MHz Cortex-M3 CPU	Up to 16-Kbyte SRAM	Up to 128-Kbyte Flash	USB FS device	Data EEPROM 4 Kbytes	LCD 8x40	Comparator	BOR MSI VScal	

Abbreviations:
FS: Full speed
HS: High speed
MC: Motor control
MSI: Multi-speed internal oscillator
RNG: Random number generator
SDIO: Secure digital input/output
VScal: Voltage scaling

STM32Fxxx STM32Lxxx Cortex-M3

Road Map 2/2



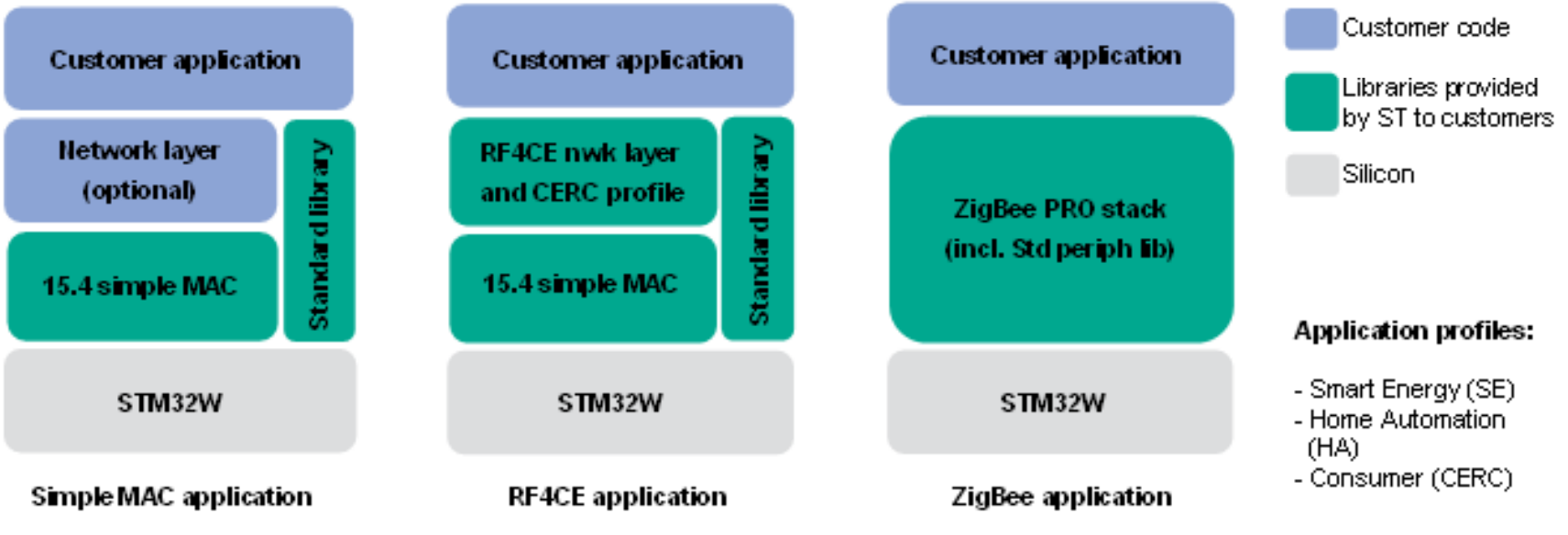
STM32F1xx (F-1) → STM32F2xx (F-2)

Superior and innovative peripherals

Peripherals	F-1 series	F-2 series
The need for speed		
USB FS	12 Mbit/s	12 Mbit/s
USB HS	-	480 Mbit/s
USART	Up to 4.5 Mbit/s	Up to 7.5 Mbit/s
SPI	Up to 18 Mbit/s	Up to 30 Mbit/s
I²C	400 kHz	400 kHz
GPIO	Up to 18 MHz	Up to 60 MHz
3-phase MC timer	72 MHz PWM timer clock input	120 MHz PWM timer clock input
SDIO	Up to 48 MHz	Up to 48 MHz
I²S	From 8 kHz to 96 kHz sampling frequencies	From 8 kHz to 96 kHz sampling frequencies
Camera interface	-	Up to 48 Mbytes/s at 48 MHz
Crypto/hash processor	-	AES 256 up to 106 Mbytes/s
FSMC	Up to 36 MHz	Up to 60 MHz
The need for analog		
ADC	1 µs conversion time (1 MSPS)	0.5 µs conversion time (2 MSPS)
DAC	2-channel, 12-bit	2 channel, 12-bit
The need for connectivity		
Dual CAN	Up to 2 independent CAN	Up to 2 independent CAN
Ethernet	10/100 Mbit/s MAC with hardware IEEE 1588	10/100 Mbit/s MAC with hardware IEEE 1588
USB OTG	Full speed host, device or OTG	Full speed and high speed host, device or OTG
CEC bus	Consumer electronic control for consumer devices	-
Flexible static memory interface	4 independent banks, 8/16-bit data bus, supports SRAM, PSRAM, NAND and NOR Flash, parallel graphic LCD	4 independent banks, 8/16-bit data bus, supports SRAM, PSRAM, NAND and NOR Flash, parallel graphic LCD
Camera interface	-	8- to 14-bit parallel

STM32WXXX – Cortex-M3
Road Map

Part number	Package	Flash	RAM	Rx sensitivity	Tx power	Frequency	Deep sleep	Supply voltage
STM32W108CBU6x	QFN48	128 KB	8 KB	99 dBm 101 dBm (boost)	32 dBm to 3 dBm 32 dBm to 8 dBm (boost)	2.4 to 2.5 GHz 16 x 5 MHz channels	1 µA max	2.1 to 3.6 V
STM32W108HBU6x	QFN40							



STM32W is Zigbee certified platform (PRO Stack)

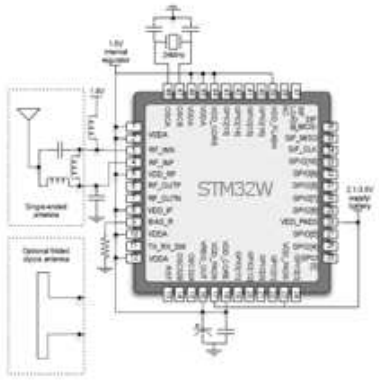
STM32W is ZigBee RF4CE certified platform

STM32W is IEEE 802.15.4 certified platform

STM32WXXX – Cortex-M3
Road Map

Mode	Regulators	Low-frequency 10 kHz RC oscillator	32 kHz crystal oscillator	High-frequency 12 MHz RC oscillator	24 MHz crystal oscillator	Power consumption
Deep sleep 2	off	off	off	off	off	0.7 µA
Deep sleep 1	off	off	optional	off	off	0.4 µA
Standby	on	on	optional	off	off	2 mA
Active at 12 MHz	on	on	optional	off	on	6 mA

Active mode	Sensitivity	Rx current	Tx current	Tx current
Radio peripheral	dBm	mA	mA at 0 dBm	mA at -32 dBm
	-100	20	24	15



STM32 in the future

NEW

Cortex-M4

"32-bit/DSC" applications

High-performance
DSP capability and FPU
STM32 for DSC and
leading edge applications

Sample Q3/11

NEW

Cortex-M3

Clock up to 120Mhz

"16/32-bit" applications

Sample end Q4/10

NEW

Cortex-M0

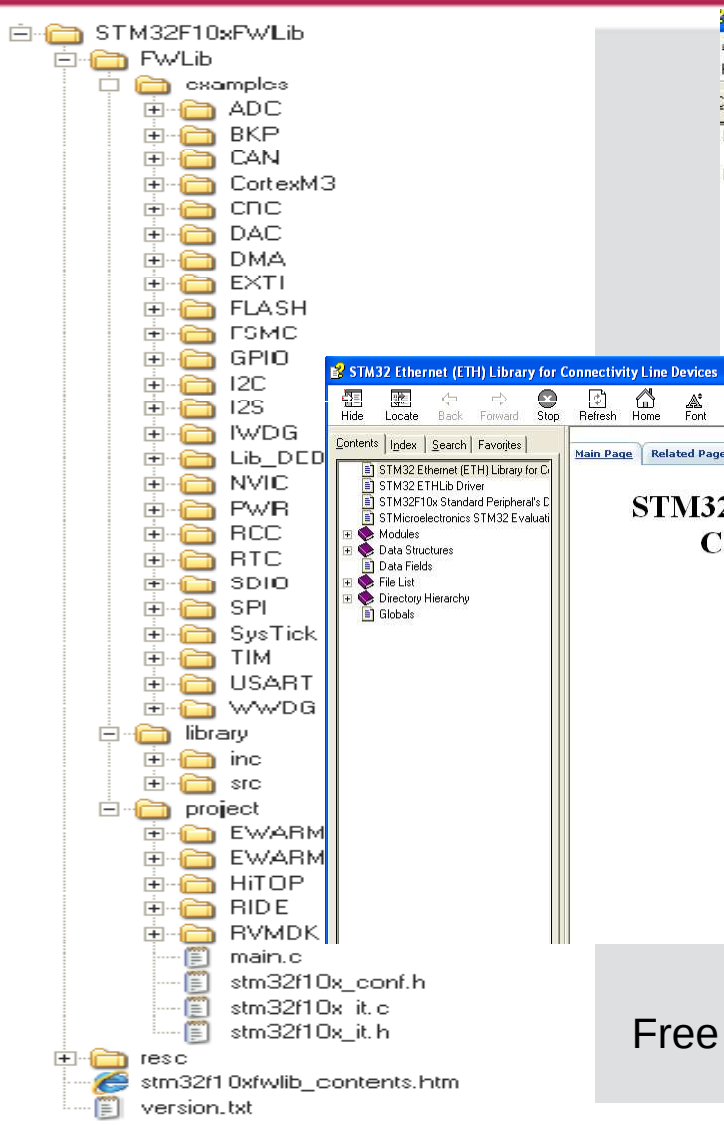
"8/16-bit" applications

Cost optimized

Sample Q2/11

Performance

STM32 Cortex-M3
Software Tools 1/3



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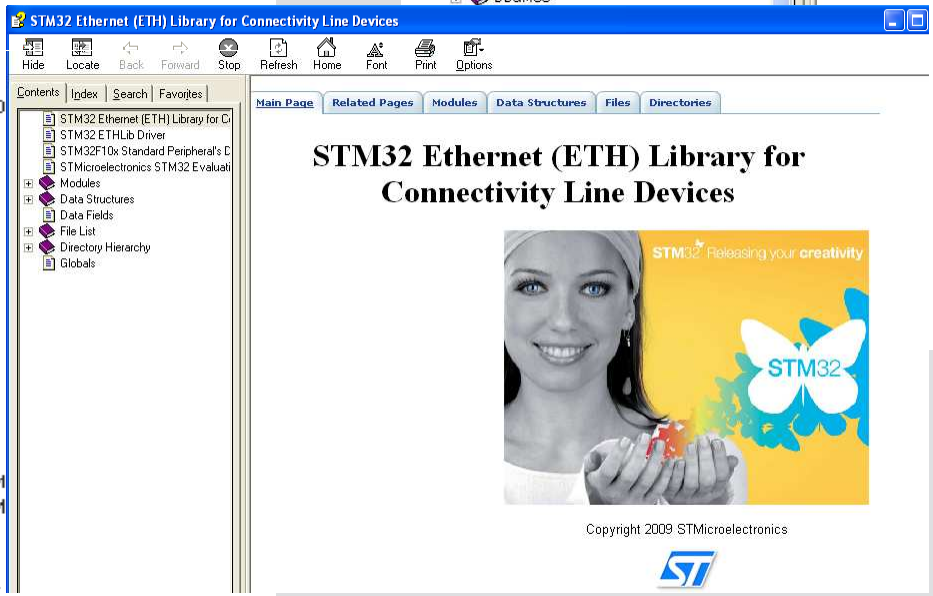

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Free **Motor Control Library**

Free Library
ANSI C compliant
MISRA C compliant
Class B IEC60335-1 approved

STM32 Cortex-M3

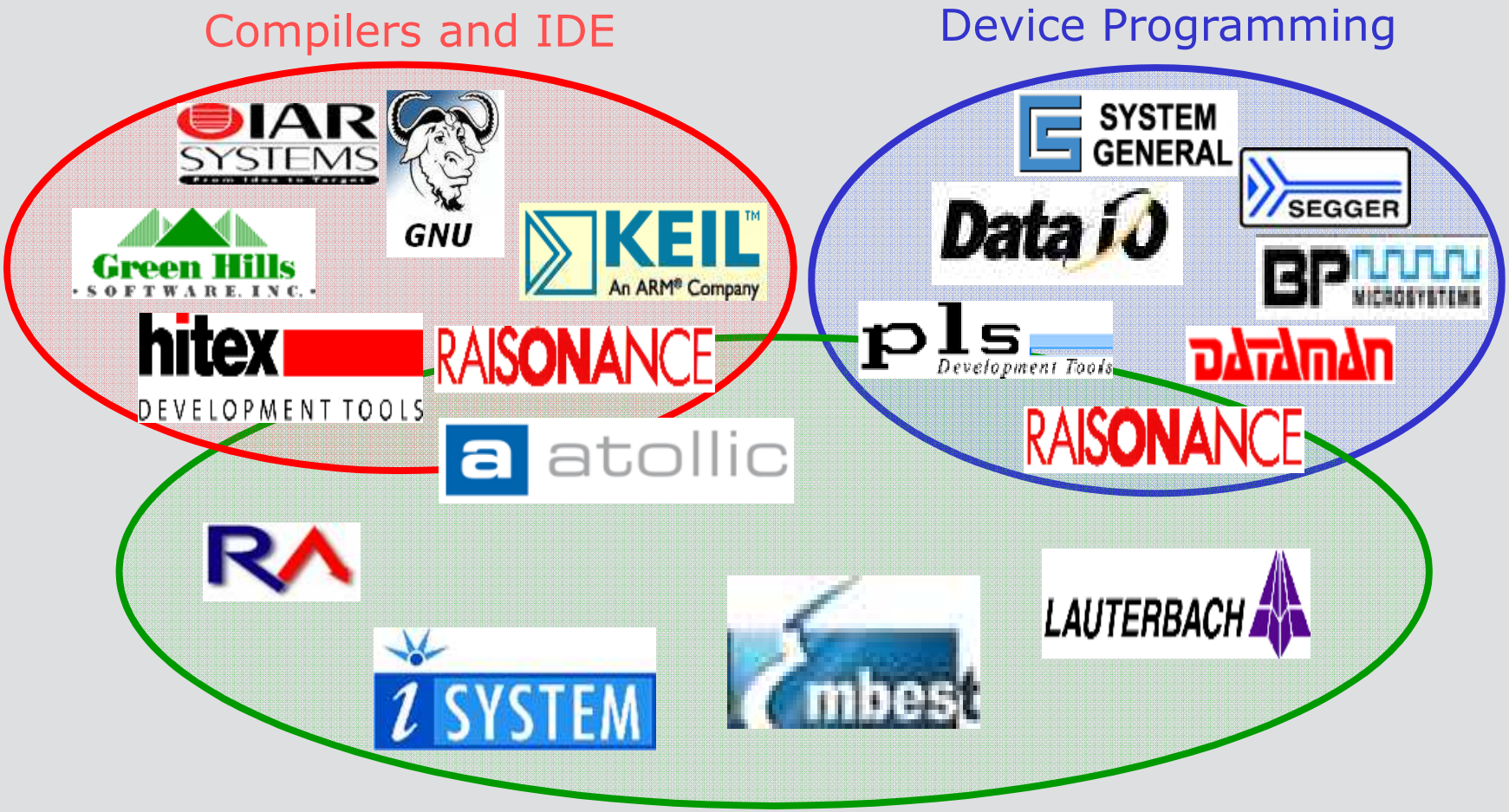
Software Tools 2/3

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



STM32 Cortex-M3

Hardware Tools 1/3

Remember to UpDate SW of ST-LINK

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.

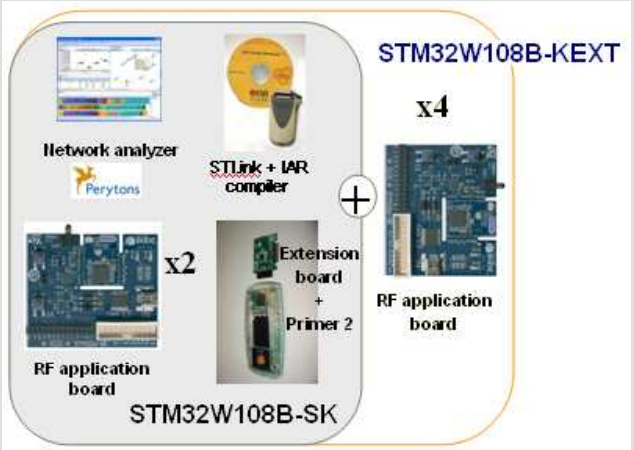
UpDate ST-Link

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

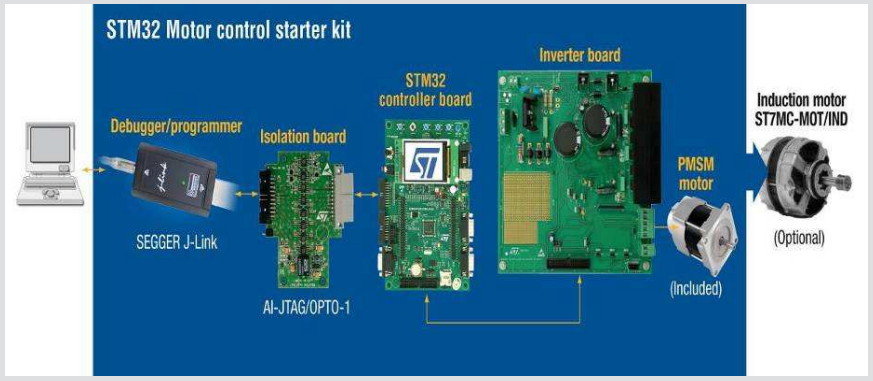


STM32W108B-SK, application board + Primer2 + Network Analyzer
STM32W108B-KEXT, set of 4 additional application board

Cod.Ord.
STM3210B-MCKIT

STM32F103ZET6
144 pin 512K flash
Performance Line

Cod.Ord. **STM3210E-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.

STM32F107VCT6

- NicheLite TCP/IP stack
- DHCP client
- Simple HTTP server
- TFTP client and server
- Virtual file system
- NicheTask OS kernel

Cod.Ord. **STM3210C-Eval**

STM32 Cortex-M3

Hardware Tools 3/3

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

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

STM32 Cortex-M3
LINK

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/STM-STM8.pdf

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

For more info contact your local SILICA FAE