

# STM8 8-bit MCU family

## Come grow with us!

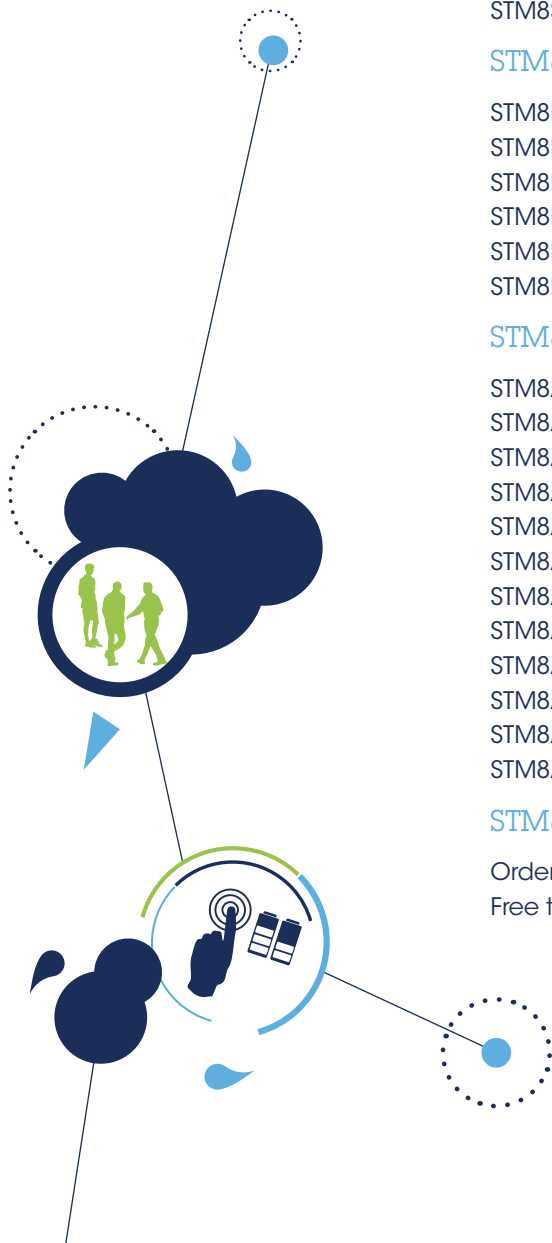
### Simply Smarter





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# STM8 series

**One million units delivered worldwide every day!  
We plan for longevity with a sustainable growth**

## STM8 MCU LONGEVITY COMMITMENT

STMicroelectronics provides a minimum longevity of 10 years for its below listed STM8 microcontrollers!

- STM8AF Series
- STM8AL Series
- STM8L Series
- STM8S Series

## STM8 CORE

The STM8 core is an evolution of the industry-standard ST7. It has been significantly improved to reach 1.6 cycles per instruction and up to 24 MHz clock frequency, allowing customers to run their applications at low speed with enough performance.

The flexibility of the architecture minimizes switching noise, so improving the system robustness and power consumption.

An innovative clock implementation provides strong benefits such as fast wake-up in 4  $\mu$ s. It enables immediate clock switching on the fly to allow clock accelerations for PWM or calculation routines.

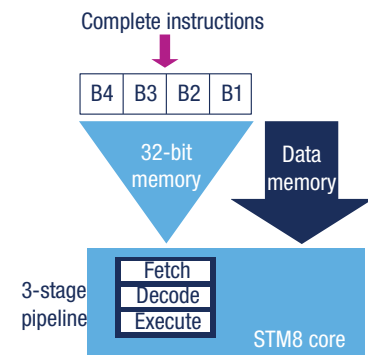
The 32-bit robust NVM memory addressed through a 3-stage pipeline interface, the 16-bit index registers and stack pointers and the advanced instruction set with hardware multiplication/division are key elements that significantly improve the efficiency of this 8-bit device family.

ST's 8-bit microcontroller platform is implemented around a high-performance 8-bit core and a state-of-the-art set of peripherals. This platform is manufactured using an ST-proprietary 130 nm embedded non-volatile memory technology.


The STM8 allows fast and safe development through enhanced stack pointer operations, advanced addressing modes and new instructions.

The STM8 platform supports three product series:

- STM8S, mainstream MCU
- STM8AF and STM8AL, automotive MCU
- STM8L, ultra-low-power MCU




**STM8S  
Mainstream**




Data EEPROM,  
3 and 5 V family, precise RC

**STM8A  
Automotive**



Data EEPROM,  
3 and 5 V family, precise RC,  
LIN, CAN, grade 0

**STM8L  
Ultra-low-power**



Data EEPROM,  
1.65 and 3 V family,  
strong analog, LCD drivers,  
low-leakage technology

**Best market value**

Robust and reliable  
Up to 125 °C  
[www.st.com/stm8s](http://www.st.com/stm8s)

**Long term guarantee**

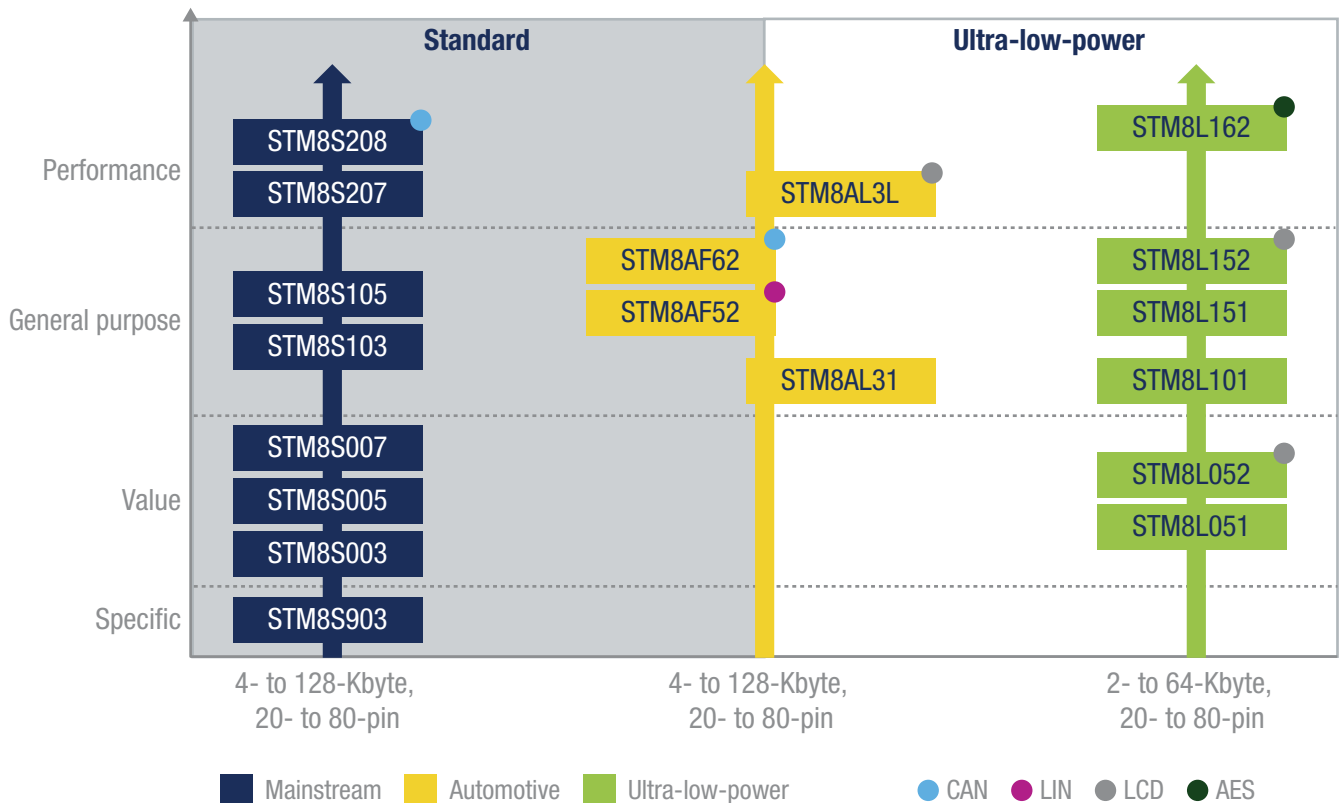
AEC-Q100  
Up to 150 °C  
[www.st.com/stm8af](http://www.st.com/stm8af)  
[www.st.com/stm8al](http://www.st.com/stm8al)

**Ideal combination of low-power performance and features**

High en analog IPs  
Active halt <1µA  
[www.st.com/stm8l](http://www.st.com/stm8l)

## TOP VIEW PORTFOLIO

A large product portfolio to meet all your needs



## SUPERIOR AND INNOVATIVE CAPABILITIES

Parameters	STM8S	STM8A		STM8L
		STM8AF	STM8AL	
<b>Global features</b>				
<b>Voltage domain</b>	2.95 to 5.5 V	3.0 to 5.5 V	1.65 to 3.6 V	1.65 to 3.6 V
<b>Max. temperature</b>	- 40 to +125 °C	- 40 to +150 °C	- 40 to +125 °C	- 40 to +125 °C
<b>Internal clock, high speed</b>	Internal RC up to 16 MHz 1%			
<b>Internal clock, low speed</b>	RC 128 KHz	RC 128 KHz	RC 128 KHz	RC 38 KHz
<b>Max. clock speed</b>	24 MHz	16 MHz	16 MHz	16 MHz
<b>Min. clock speed</b>	128 KHz	128 KHz	128 KHz	300 KHz
<b>Watchdog</b>	2 Watchdogs (One window)			
<b>Low power, Halt</b>	0.5 µA	5 µA	0.5 µA	0.3 µA
<b>Low power, Active Halt</b>	10 µA (Run in 50 µs)	25 µA (Run in 50 µs)	0.8 µA (Run in 4 µs)	0.8 µA (Run in 4 µs)
<b>Power consumption, Run</b>	1.8 mA @ 16 MHz from RAM	4.4 mA @ 16 MHz from RAM	1.6 mA @ 16 MHz from RAM	1.6 mA @ 16 MHz from RAM
<b>Data EEPROM endurance</b>	Independent 300-kcycle EEPROM			
<b>SAE EMI level</b>	2.5 (24 MHz)	2.5 (24 MHz)	2.5 (24 MHz)	1.5 (16 MHz)
<b>DMA</b>	No	No	Yes, 4 channels	Yes, 4 channels
<b>Boot ROM</b>	Yes			
<b>RTC</b>	No	No	Yes, +/- 0.5 ppm	Yes, +/- 0.5 ppm
<b>The need for speed</b>				
<b>USART</b>	1 Mbit/s, up to 2 UARTs	1 Mbit/s, up to 2 UARTs	1 Mbit/s, up to 2 UARTs	1 Mbit/s
<b>SPI</b>	10 Mbit/s			
<b>I<sup>2</sup>C</b>	100 and 400 Kbit/s			
<b>3-phase MC timer</b>	12 MHz max PWM	12 MHz max PWM	8 MHz max PWM	8 MHz max PWM
<b>CAN</b>	1Mbit/s, up to 3 mailboxes	1Mbit/s, up to 3 mailboxes	1Mbit/s, up to 3 mailboxes	-
<b>The need for analog</b>				
<b>ADC</b>	Up to 16 channels, 10 bits, 2.3 µs, TUE 2.2 mV	Up to 16 channels, 10 bits, 3.5 µs, TUE 2.2 mV	28 channels, 12 bits, 1 µs, TUE 0.4 mV	28 channels, 12 bits, 1 µs, TUE 0.4 mV
<b>DAC</b>	-	-	2 channels, 12 bits, 1 MSPS, TUE 3.5 mV	2 channels, 12 bits, 1 MSPS, TUE 3.5 mV
<b>Comparators</b>	-	-	3 µs propagation delay, 0.2 µA consumption	3 µs propagation delay, 0.2 µA consumption
<b>Touch Sensing</b>	STM8S RC library	-	STM8L CT library	STM8L CT library
<b>Internal voltage reference</b>	1.8 V or + 1.2V +/-2.5% on STM8S903	1.22V +/-2.4%	1.22 V +/-1.6%	1.22 V +/-1.6%
<b>Temperature sensor</b>	-	-	+/-1 °C	+/-1 °C
<b>The need for connectivity</b>				
<b>CAN</b>	BeCAN 2.0B	BeCAN 2.0B	BeCAN 2.0B	-
<b>UART</b>	Smartcard, IrDA, single wire, LIN 2.1	LIN 2.1 compliant (master/slave)	LIN 2.1 compliant (master/slave)	Smartcard, IrDA, single wire, LIN 2.0
<b>SPI</b>	Yes			
<b>I<sup>2</sup>C</b>	Yes			
<b>CEC</b>	Software IP			
<b>DALI</b>	Software IP			
<b>SWIM</b>	Non-intrusive debug and programming			
<b>IR interface</b>	-	-	-	Hardware IP
<b>LCD</b>	Software IP	Software IP	4 x 28 (112 pixels)	4 x 44 or 8 x 40 segments (320 pixels)
<b>Unique ID</b>	Individual die identification on 96 bits			
<b>LNB</b>	STM8SPLNB1 DiSEqC™	-	-	-

Note: Typical values are indicated. Depending on part numbers, other characteristics may be found, refer to datasheet.



# STM8S mainstream series

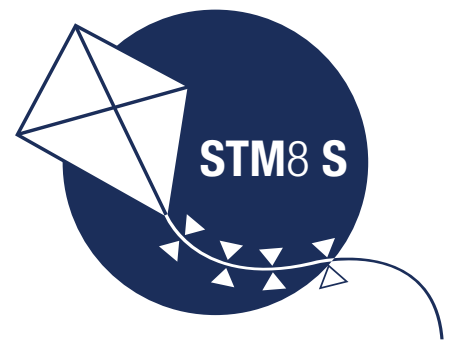
ST's STM8S series of mainstream 8-bit microcontrollers covers a large variety of applications in the industrial, consumer and computer markets, particularly where large volumes are concerned. Based on the STM8 proprietary core, the STM8S series benefits from ST's 130 nm technology and advanced core architecture performing up to 20 MIPS at 24 MHz. Embedded EEPROM, RC oscillators and a full set of standard peripherals provide a robust and reliable solution for designers.

The associated toolchain, from affordable Discovery kits to more complex evaluation kits and third-party tools, make it easy to develop with STM8S microcontrollers.

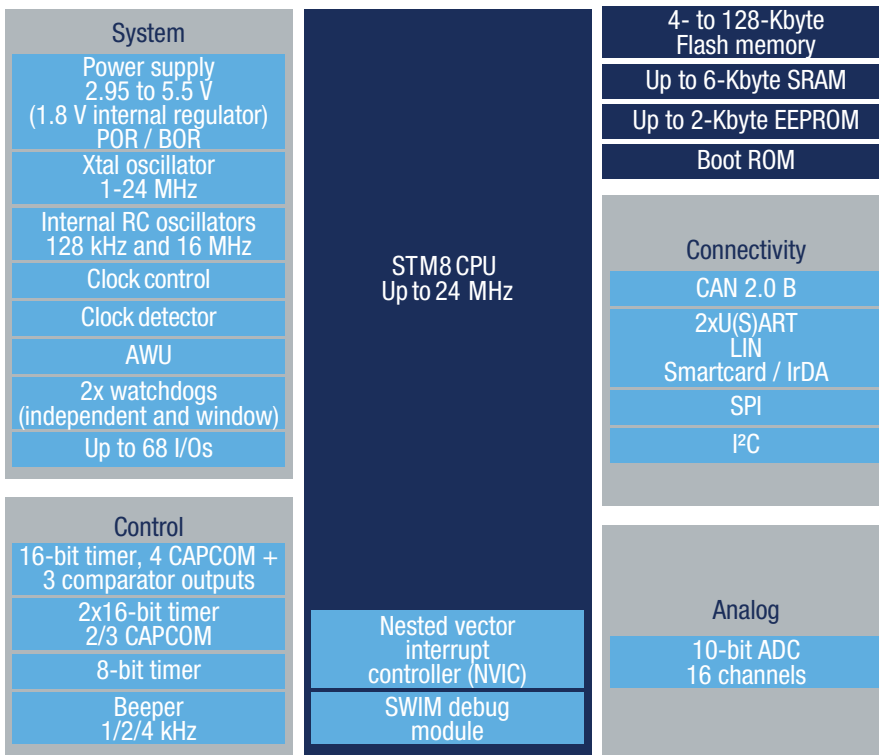
## STM8S DESCRIPTION

Upgrade to a higher or downgrade to a lower memory size, or use a different package across lines without changing the initial layout or software.

- STM8 24 MHz CPU
- 4 to 128 Kbytes of embedded Flash, up to 6 Kbytes of SRAM
- Supply voltage: 2.95 to 5.5 V
- Up to four low-power modes: down to 4  $\mu$ A with complete context retention
- State-of-the-art digital and analog peripherals
- Specific interfaces such as IrDA and smartcard for support of consumer applications
- -40 to +85 °C, or up to 125 °C temperature range
- Free class B self-diagnostic library for IEC 60335/IEC 60730 compliant applications
- Many software libraries and examples for download



## STM8S BLOCK DIAGRAM



## STM8S APPLICATIONS

- Appliances, power tools
- HVAC
- Power management
- Lighting
- Factory automation
- Devices with rechargeable batteries
- Motor control
- e-vehicles
- Toys and games
- Sensors
- Power supplies
- User interfaces

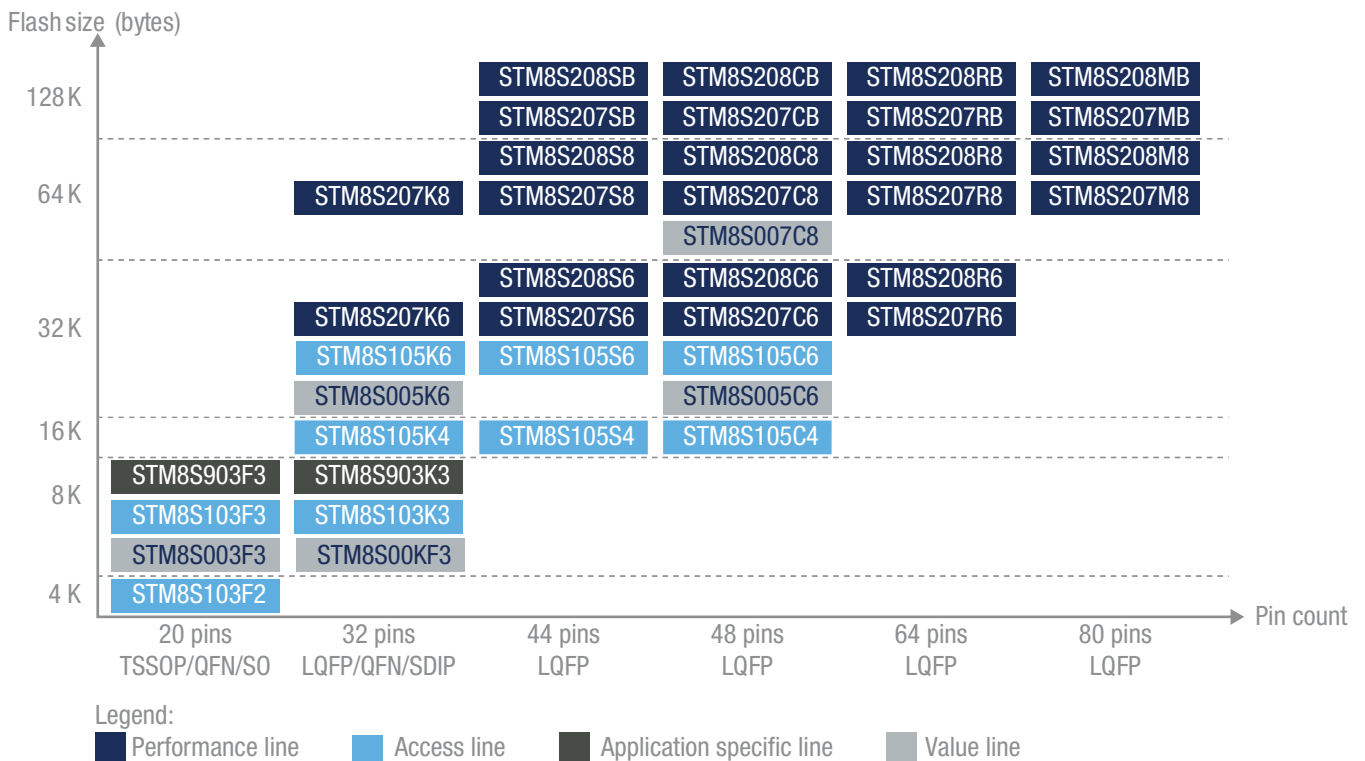
## STM8S PRODUCT LINES

The STM8S series consists of four lines with differentiated features with full compatibility and upgradability to simplify design changes.

- The STM8S003/005/007 Value line is the entry-level series with a basic features set.
- The STM8S103/105 Access line offers more features and a larger variety of packages.
- The STM8S207/208 Performance line features a full set of peripherals and provides performance for medium to higher-end applications.
- The STM8S Application specific line provides more analog features and dedicated firmware solutions.

<b>STM8 core - Up to 24 MHz</b> <ul style="list-style-type: none"> <li>• 10-bit ADC</li> <li>• USART, SPI, I<sup>2</sup>C</li> <li>• 8- and 16-bit timers</li> <li>• Crystal 16 MHz and 128 KHz internal RC oscillators</li> <li>• SWIM debug module</li> </ul>	Product line	FCPU (MHz)	FLASH (KB)	RAM (KB)	Data EEPROM (bytes)	CAN 2.0B	2 <sup>nd</sup> UART	Additional analog channels	LNB firmware
	<b>STM8S003/005/007 Value line</b>	16	8 to 64	1 to 6	128				
	<b>STM8S103/105</b>	16	4 to 32	1 to 2	640 to 1024				
	<b>STM8S207/208</b>	24	32 to 128	6	1024 to 2048	•	•	•	
	<b>STM8S Application Specific Line</b>	16	8	1	640			•	•

## STM8S PORTFOLIO





# STM8L ultra-low-power series

STMicroelectronics proposes an ultra-low-power series of MCUs based on 8-bit and 32-bit cores. The STM8L MCU series is based on the STM8 proprietary core and is the entry point of our low-power MCU solutions.

The STM8L series combines high performance and ultra-low power consumption using a new proprietary ultra low leakage process and optimized architecture. This series is declined in four different lines, making the STM8L an optimal series to support many applications with special care on power savings.

The STM8L101 is the entry-line for the ultra low power 8-bit portfolio. It is cost optimized and offers a high level of integration in an ultra small footprint. The STM8L151/152 and STM8L162 performance lines offer more features with advanced digital and analog features. The STM8L051/52 value line is a streamlined version of STM8L151 series, offering the best price/performance ratio.

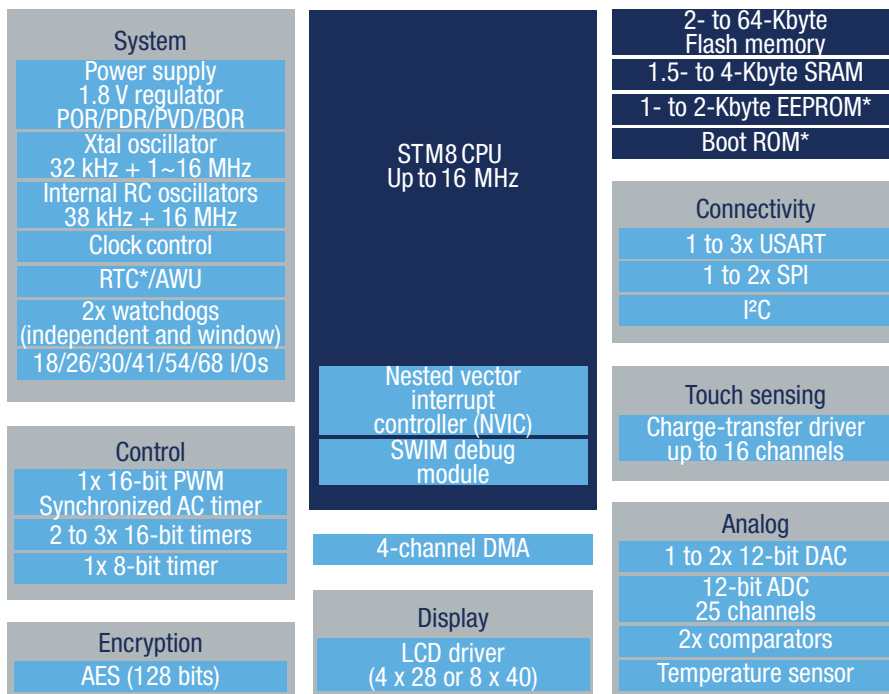
## STM8L DESCRIPTION

Upgrade or downgrade to a different memory size, or package across lines without changing your initial design or software.

- STM8 16 MHz CPU
- 2 to 64 Kbytes of embedded Flash, up to 4 Kbytes of SRAM and up to 2 Kbytes of EEPROM
- Four lines: pin-to-pin, software and peripheral compatibility
- Supply voltage: 1.65 to 3.6 V
- Up to four ultra-low-power modes: down to 350 nA with SRAM and context retention
- Run mode dynamic consumption down to 150  $\mu$ A/MHz
- State-of-the-art digital and analog peripherals
- -40 to +85 °C, or up to 125 °C operating temperature range
- Free touch-sensing library
- LCD driver
- AES 128 encryption



## STM8L BLOCK DIAGRAM



## STM8L APPLICATIONS

- Medical equipment
  - Glucose meters, insulin pumps
  - Blood pressure and cholesterol monitors
  - Patient monitoring
- Metering (electricity/gas/water/heat meters, scales)
- Alarm systems (central units, sensors, door locks, fire alarms)
- GP portable devices
  - Mobile phones, accessories
  - Gaming, remote controls
- GPS watches, sports equipment

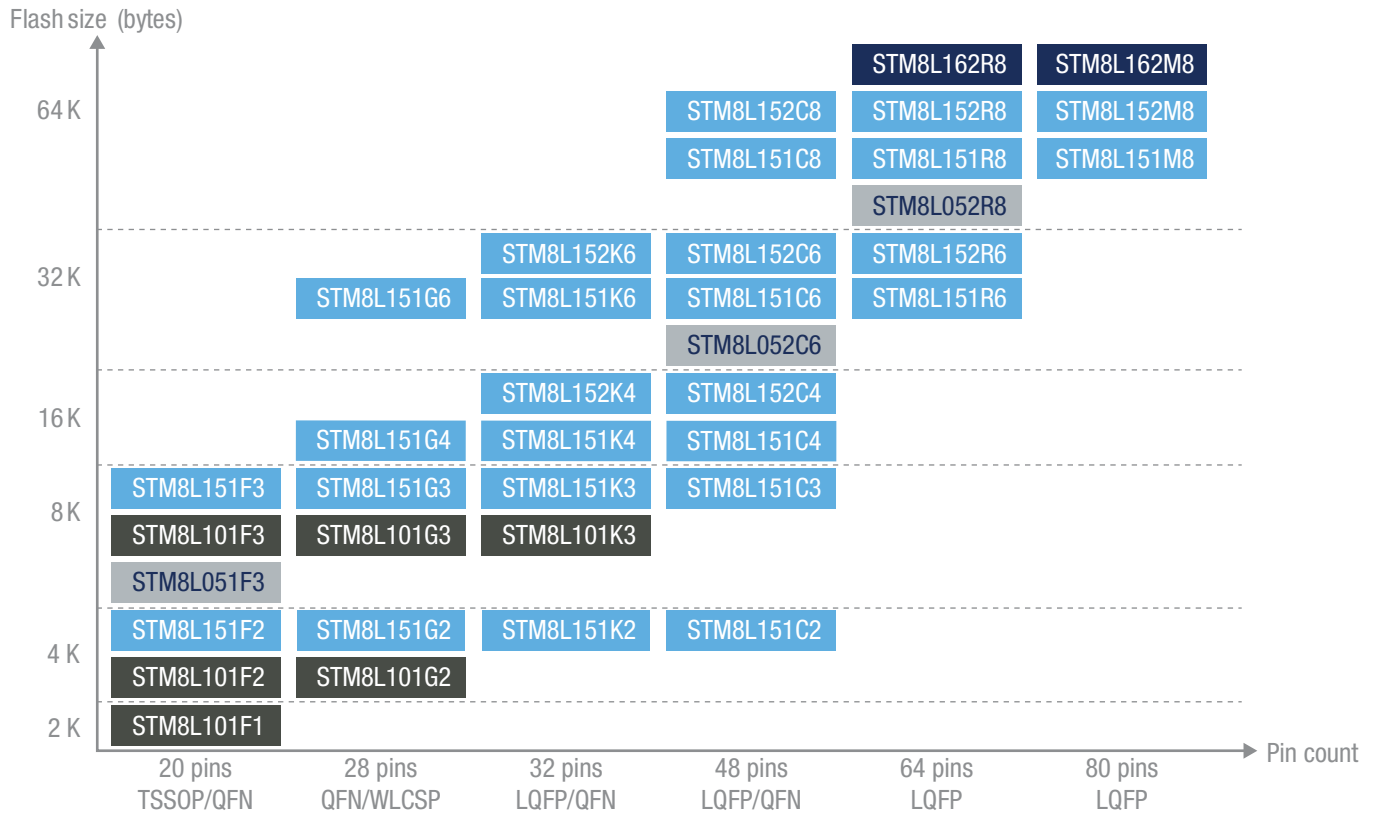
Note: \* STM8L15x/STM8L16x only



## STM8L PRODUCT LINES

STM8 core – Up to 16 MHz	Product line	FLASH (KB)	RAM (KB)	Data EEPROM (bytes)	Four DMA channels	LCD interface	AES 128-bit crypto
	STM8L051/052 Value line	8 to 64	1 to 4	256	•	•	
	STM8L101	2 to 8	1.5				
	STM8L151/152	4 to 64	1 to 4	256 to 2048	•	•	
	STM8L162	64	2	2048	•	•	•

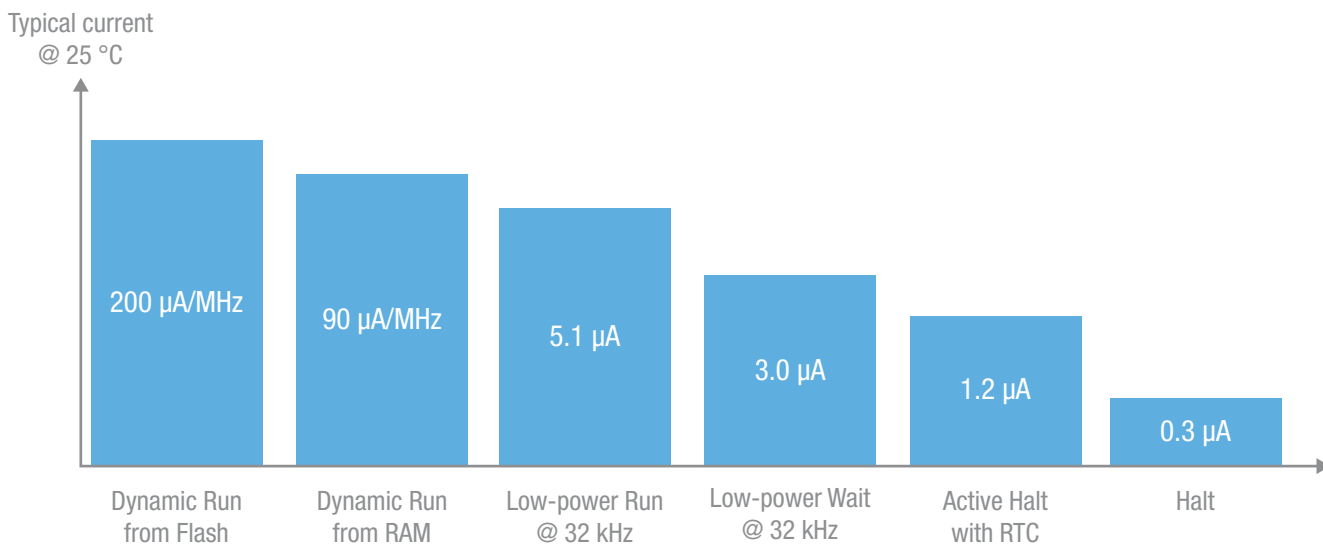
## STM8L PORTFOLIO



Legend:

Performance line with LCD and AES
  Performance line with LCD (LCD only on STM8L152xx)
  Entry-line
  Value line

## STM8L ULTRA-LOW-POWER MODES



### Notes:

- POR/PDR on
- RAM content preserved
- BOR option at 2.4 µA
- Startup time from active Halt 5 µs



The STM8L series is available in four different lines making the STM8L an optimal series to support many applications requiring special care on power savings.

- STM8L101 line
  - Lowest power mode: 0.30 µA
  - Dynamic run mode: 150 µA/MHz
- STM8L151/152 line
  - Lowest power mode: 0.35 µA
  - Dynamic run mode: 180 µA/MHz
- STM8L162 line
  - Lowest power mode: 0.35 µA
  - Dynamic run mode: 180 µA/MHz
- STM8L051/052 Value line
  - Lowest power mode: 0.35 µA
  - Dynamic run mode: 180 µA/MHz



# STM8A automotive series

This series of 8-bit Flash microcontrollers responds to the specific needs of automotive applications. From product specifications on through design and manufacturing, the focus is on reliability, application robustness and system cost improvement.

The integrated true data EEPROM features top notch endurance and data retention throughout the full temperature range. With its extended temperature range up to 150 °C ambient temperature, the STM8A is the ideal and economic solution for the growing market of 8-bit automotive applications.

The ultra-low-power STM8AL is now available. With the multiplication of electronic subsystems, saving power is becoming a key consideration, and this series responds to the specific needs of low power in automotive applications.

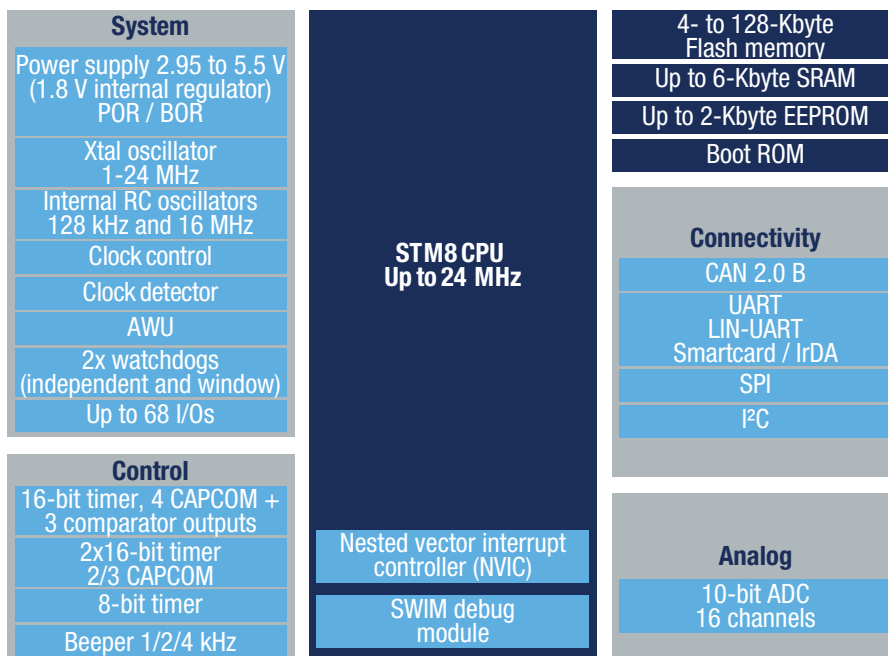
## STM8A DESCRIPTION

Upgrade to a higher or downgrade to a lower memory size or use a different package across lines without changing the initial layout or software.

- STM8 up to 24 MHz CPU
- 8 to 128 Kbytes of embedded Flash, up to 6 Kbytes of SRAM and up to 2 Kbytes of data EEPROM
- Packages up to 80 pins
- Supply voltage: 2.95 to 5.5 V for STM8AF, 1.65 to 3.6 V for STM8AL
- Up to four low-power modes: down to 1 µA with complete context retention
- State-of-the-art digital and analog peripherals
- Up to 150 °C ambient temperature
- Qualified to AEC-Q100
- Certified CAN drivers
- Free certified LIN drivers
- Touch-sensing and LCD lines



## STM8AF BLOCK DIAGRAM



## STM8AF APPLICATIONS

- CAN controllers
- LIN nodes
- Actuators
- Sensors
- Safety microcontrollers
- Car radios
- Immobilizers
- DC motor control
- HVAC

## STM8AF DESCRIPTION

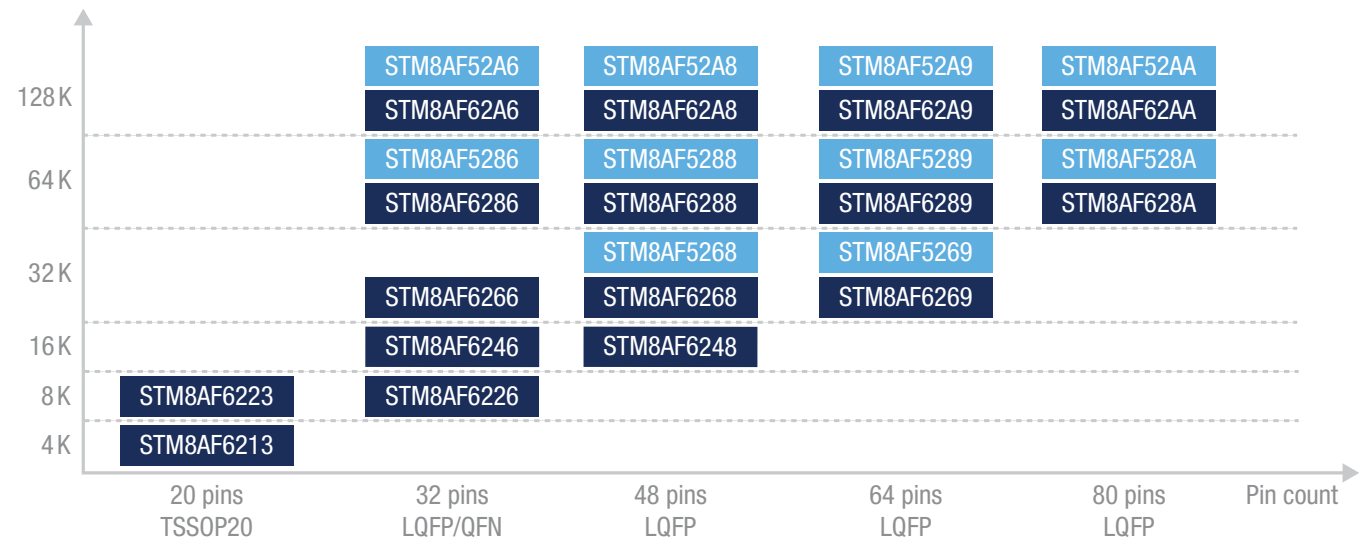
STM8AF62 is the mainstay of the STM8A multi-purpose 8-bit microcontrollers for automotive applications. Based on our proprietary STM8 core able to deliver up to 20 MIPS at 24MHz, the STM8AF62 line features a full set of timers, interfaces (LIN 2.1, UART, SPI, I<sup>2</sup>C), 10-bit ADC, internal and external clock control system, watchdogs, auto wake-up unit, and an integrated single-wire debug module. Conceived to offer a smart combination of features, to be easy to use and reliable, it covers a wide-range of operating conditions such as up to 150 °C ambient temperature and down to 3.0 V supply. It is the perfect solution for automotive applications where no compromises can be made.

## STM8AF PRODUCT LINES

STM8 core - 24 MHz	Product line	FLASH (KB)	RAM (KB)	Data EEPROM (bytes)	CAN 2.0B	LIN 2.1	Additional analog channels	Automotive Grade 0 (150 °C)
	STM8AF52	32 to 128	6	1024 to 2048	•	•		•
	STM8AF62	4 to 128	1 to 6	640 to 2048		•	•	•

## STM8AF PORTFOLIO

Flash size (bytes)



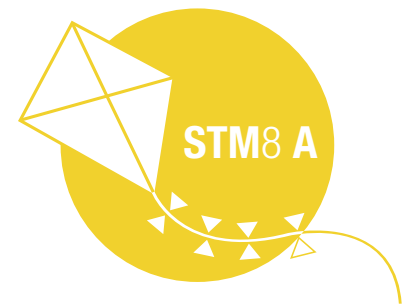
Legend:

■ CAN ■ LIN

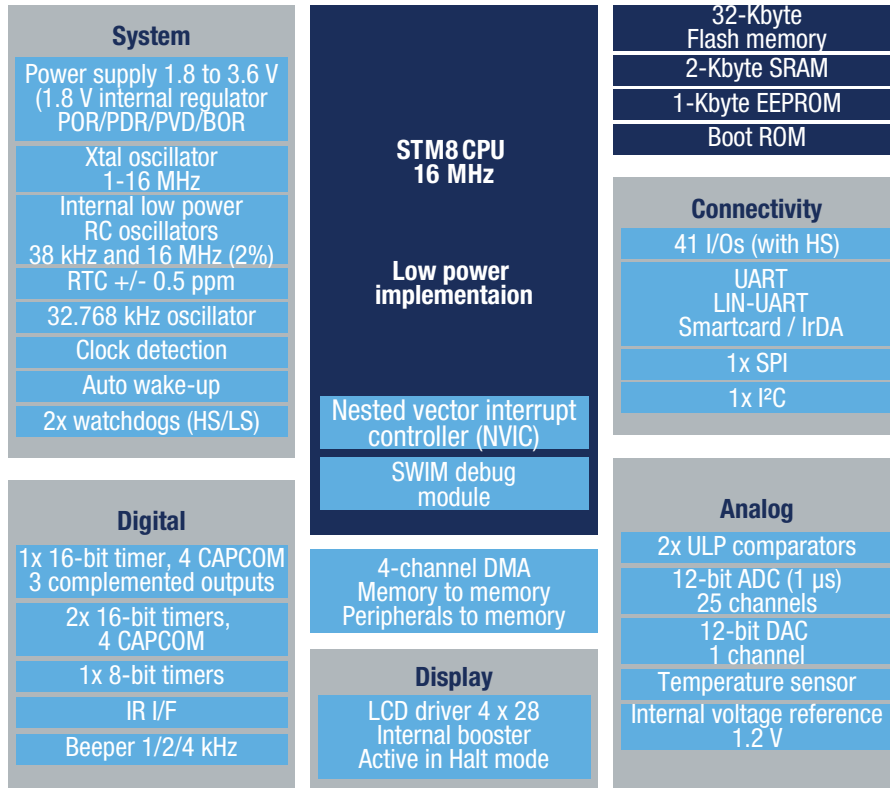
## STM8AL DESCRIPTION

ST's STM8AL ultra-low-power series for automotive applications puts green energy, application safety and power efficiency at the forefront. It is particularly suited to battery-operated functions such as remote keyless entry and tire pressure monitoring, as well as for applications where power consumption is critical over time: companion microcontroller, immobilizers and sensors.

Based on the STM8A embedded features for system cost reduction and reliability, the STM8AL series supports LIN communications and offers more features to increase computation performance, save power consumption and save memory space, using the LCD driver, RTC, DMA, comparators, 12-bit ADC and DAC. It offers a unique combination of flexible, innovative and cost-effective solutions for automotive applications.



## STM8AL3L68 BLOCK DIAGRAM



## STM8AL APPLICATIONS

- Remote keyless entry
- Tire pressure monitors
- Alarms
- BLDC electric motor control
- Sensors

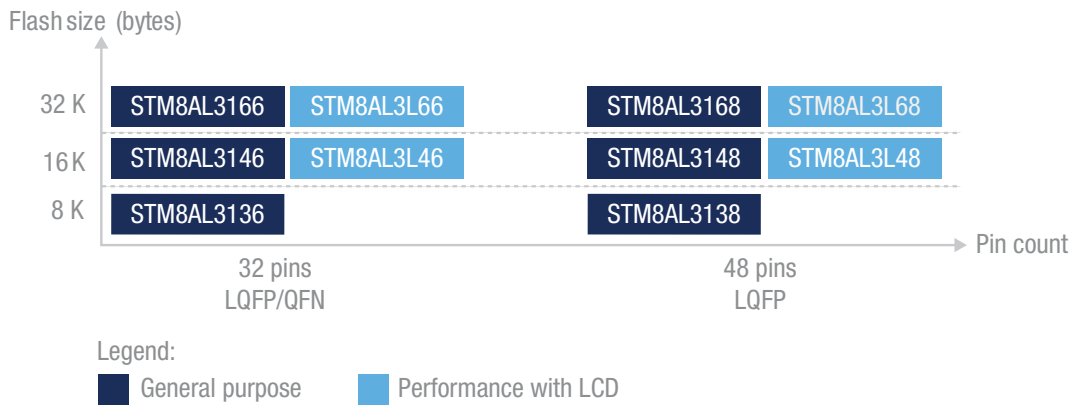
## STM8AL PRODUCT LINES

Product line	FLASH (KB)	RAM (KB)	Data EEPROM (bytes)	Four DMA channels	LCD interface
STM8AL31	16 to 32	2	2048	•	
STM8AL3L	16 to 32	2	2048	•	•

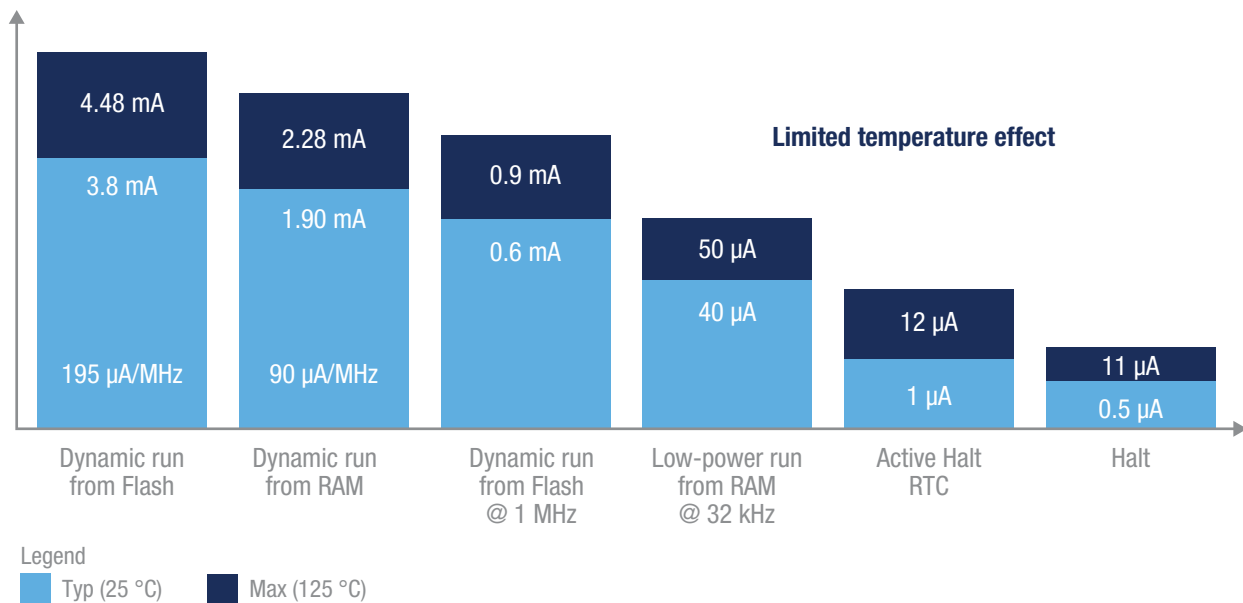
**STM8 core - 16 MHz**

- 12-bit ADC
- 12-bit DAC
- USART, SPI, I<sup>2</sup>C
- RTC with 32 KHz oscillator
- 8- and 16-bit timers
- Temperature sensor
- Comparators
- SWIM debug module

## STM8AL PORTFOLIO



## STM8AL ULTRA-LOW-POWER MODES



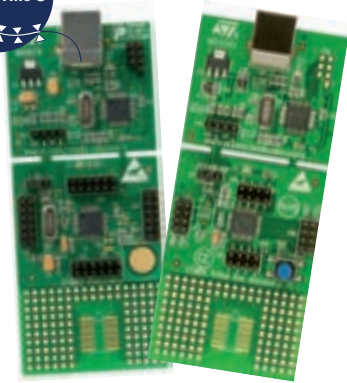
### Notes:

- POR/PDR on
- RAM content preserved
- BOR option at 2.4  $\mu$ A
- Startup time from active Halt 5  $\mu$ s
- Run and Wait consumption values are independent of  $V_{DD}$
- Active Halt and Halt values measured at  $V_{DD} = 1.8$  V



# STM8 tools

All families are supported with affordable kits and hardware solutions



STM8S-DISCOVERY  
STM8SVL-DISCOVERY



STM8A-DISCOVERY






STM8L-DISCOVERY

## ORDERING INFORMATION

Order number	Description
STM8S-DISCOVERY	Discovery kit for STM8S series with STM8S105C6 MCU
STM8SVL-DISCOVERY	Discovery kit for STM8S Value Line with STM8S105C6 MCU
STM8L-DISCOVERY	Discovery kit for STM8L series with STM8L152C6 MCU
STM8A-DISCOVERY	Discovery kit for STM8A Automotive series with STM8AF52C6 and STM8AL3L68 MCUs

## FREE TOOLS SUITES, SOFTWARE LIBRARIES AND EXAMPLES

Development environment	C-Compilers	IDE
 life.augmented	NA	STVD
	Free up to 32-Kbyte One year renewable	IDEA
	Free up to 8-Kbyte One month full size	EWSTM8

# life.augmented



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