



**INDUSTRIAL
SUMMIT 2024**
POWERING YOUR SUSTAINABLE INNOVATION



STM32 Industrial Solution

Eric HUANG



Agenda

- 1 STM32 Microprocessors
- 2 STM32H7R/S High-performance Lines
- 3 STM32G4 Mainstream Series Mixed Signal MCU
- 4 STM32Wx Wireless MCU Series
- 5 Functional Safety Packages For STM32 MCUs & MPUs, and STM8 MCUs



STM32 Portfolio



MPU

高性能 MCUs

主流 MCUs

超低功耗 MCUs

无线 MCUs

STM32MP1
Up to 1 GHz Cortex-A7
209 MHz Cortex-M4

STM32MP2
Dual 1.5 GHz Cortex-A35
400 MHz Cortex-M33

STM32F7
1082 CoreMark
216 MHz Cortex-M7

STM32H7
Up to 3224 CoreMark
Up to 550 MHz Cortex-M7
240 MHz Cortex-M4

STM32N6
600 Gops ST Neural-ART
800MHz Cortex-M55

STM32F2
Up to 398 CoreMark
120 MHz Cortex-M3

STM32F4
Up to 608 CoreMark
180 MHz Cortex-M4

STM32H5
Up to 1023 CoreMark
250 MHz Cortex-M33

STM32F3
245 CoreMark
72 MHz Cortex-M4

STM32G4
569 CoreMark
170 MHz Cortex-M4

Mixed-signal MCUs

STM32C0
114 CoreMark
48 MHz Cortex-M0+

STM32F0
106 CoreMark
48 MHz Cortex-M0

STM32G0
142 CoreMark
64 MHz Cortex-M0+

STM32F1
177 CoreMark
72 MHz Cortex-M3

STM32L0
75 CoreMark
32 MHz Cortex-M0+

STM32L4
273 CoreMark
80 MHz Cortex-M4

STM32L4+
409 CoreMark
120 MHz Cortex-M4

STM32L5
443 CoreMark
110 MHz Cortex-M33

STM32U5
651 CoreMark
160 MHz Cortex-M33

BlueNRG
Bluetooth LE 5.4
Up to 64MHz
Cortex-M0+

SPIRIT
sub-GHz ultralow
Power transceiver

STM32WL
162 CoreMark
48 MHz Cortex-M4
48 MHz Cortex-M0+

STM32WB
216 CoreMark
64 MHz Cortex-M4
32 MHz Cortex-M0+

STM32WBA
407 CoreMark
100 MHz Cortex-M33



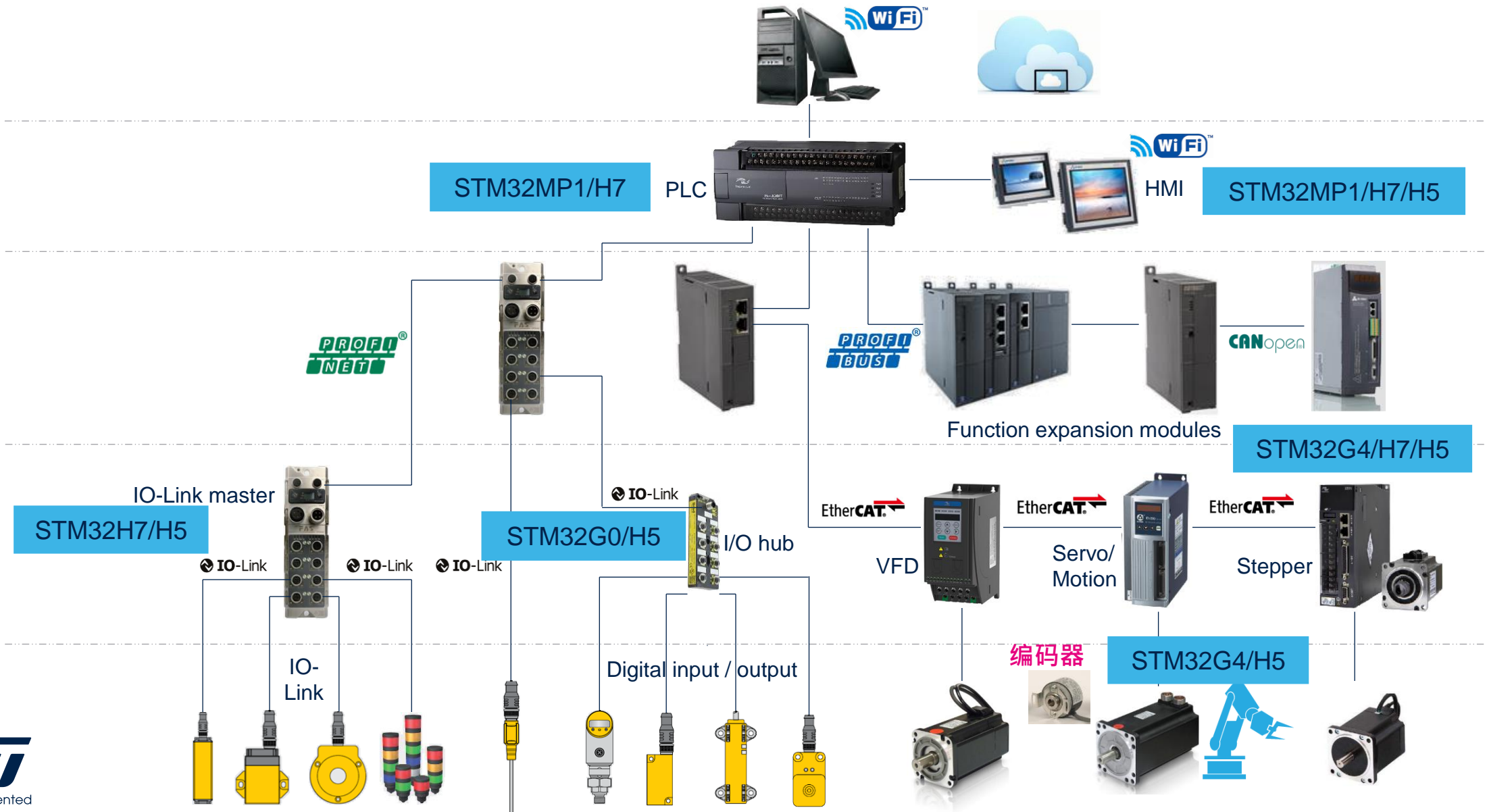
Latest product generation

Radio coprocessor only

New series introduced in 2023

Preannouncement

Basic Factory Automation System



STM32 Microprocessors



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In development

In production



MPU Lines Portfolio Offering

Next Gen



Edge AI
Connectivity



Edge AI
Graphic
Full HD HMI



Edge computing
Vision system

Heterogeneous
HMI

Low power
Secure
Cost optimized

	<p>STM32MP251 1xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 1xGigaETH RGB+CSI</p>			<p>STM32MP253 2xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 2xGigaETH 3xCAN RGB+CSI</p>		<p>STM32MP255 2xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 2xGigaETH 3xCAN RGB+DSI+LVDS+CSI GPU+VideoCodec+NPU</p>		<p>STM32MP257 2xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 2xGigaETH+switch 3xCAN RGB+DSI+LVDS+CSI GPU+VideoCodec+NPU</p>		<p>STM32MP3 Quad CPU, safety Industrial, security</p>
	<p>STM32MP231 1xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 1xGigaETH RGB</p>			<p>STM32MP233 2xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 2xGigaETH 2xCAN RGB</p>		<p>STM32MP235 2xCortex-A35 up to 1.5GHz Cortex-M33 @400MHz 2xGigaETH 2xCAN RGB+DSI+LVDS+CSI GPU+VideoDec+NPU</p>				
	<p>STM32MP211 1xCortex-A35 up to 1.5GHz Cortex-M33 @300MHz 1xGigaETH</p>	<p>STM32MP213 1xCortex-A35 up to 1.5GHz Cortex-M33 @300MHz 2xGigaETH 2xCAN</p>	<p>STM32MP215 1xCortex-A35 up to 1.5GHz Cortex-M33 @300MHz 2xGigaETH 2xCAN RGB+CSI</p>							
	<p>STM32MP151 1xCortex-A7 up to 800MHz Cortex-M4 @209MHz 1xGigaETH RGB+Camera</p>			<p>STM32MP153 2xCortex-A7 up to 800MHz Cortex-M4 @209MHz 1xGigaETH RGB+Camera</p>		<p>STM32MP157 2xCortex-A7 up to 800MHz Cortex-M4 @209MHz 1xGigaETH RGB+DSI+Camera GPU</p>				
	<p>STM32MP131 Cortex-A7 up to 1GHz 1xGigaETH</p>	<p>STM32MP133 Cortex-A7 up to 1GHz 2xGigaETH</p>	<p>STM32MP135 Cortex-A7 up to 1GHz 2xGigaETH RGB+Camera</p>							

Single Core

Dual Core

Quad Core



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STM32MPU Applications



Industry

- ✓ PLC/motion controller
- ✓ HMI
- ✓ Industrial gateway/switch
- ✓ Industrial printer

Smart infrastructure

- ✓ Smart lighting pole
- ✓ Fire alarm system
- ✓ Hydrologic monitoring system
- ✓ 5G base station



Medical device

- ✓ Patient monitor
- ✓ AED
- ✓ Electrocardiograph
- ✓ Biochemical analyzer

Power & Energy

- ✓ Charging pile
- ✓ Data collector
- ✓ EMS(Energy management system)
- ✓ PCS(Power conversion system)
- ✓ Power monitor



Factory Automation Architecture





The Best Of Three Worlds In A Cost-effective MPU

Arm Cortex®-A7 core
running up to 1 GHz



Accessible

- Strong, user-friendly ecosystem for STM32 MPUs (OpenSTLinux, Linux-RT, RTOS)
- PCB layout reference designs



Secure

- Strong robustness
- Certified for faster time to market



Efficient

- Best-in-class consumption in low power modes
- Over 90% energy savings in standby and V_{BAT} modes



STM32MP135 Block Diagram



Arm Cortex®-A7 @ 650 MHz from -40°C < T_J < 125°C
 Arm Cortex®-A7 @ 1GHz from -40°C < T_J < 105°C

available for STM32MP135C and STM32MP135F only

STM32 MPU Product Line Extension

New Generation 64-bit STM32MP2 Series

STM32MP1 series 32-bit microprocessor

STM32MP15



MP stage

STM32MP13



MP stage



STM32MP2 series 64-bit microprocessor



STM32MP25

A performance upgrade



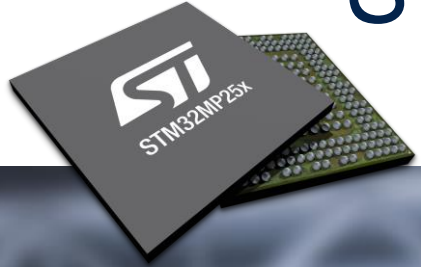
MP stage

Dual Arm Cortex®-A35 up to 1.5GHz Arm Cortex®-M33 up to 400 MHz

32-bit DDR3L/LPDDR3/ DDR4/LPDDR4



STM32MP2 Industrial-grade MPU for Industry 4.0



Robustness

- 100% operating time for 10 years
- Extended temperature range up to +125°C
- 10-year longevity program



Connectivity

- Time-Sensitive Networking (TSN)
- Up to 3 gigabit Ethernet ports (2-port switch)
- PCIe Gen2, USB 3.0, 3 x CAN-FD



Advanced security

- Target SESIP Level 3 certification
- TrustZone® on Cortex®-A & Cortex®-M
- Secure provisioning ecosystem





64-bit MPU With Advanced Edge AI Capabilities

Edge AI accelerators



- NPU accelerator: **up to 1.35 TOPS**
- Flexible ecosystem to run AI on CPU, GPU, or NPU

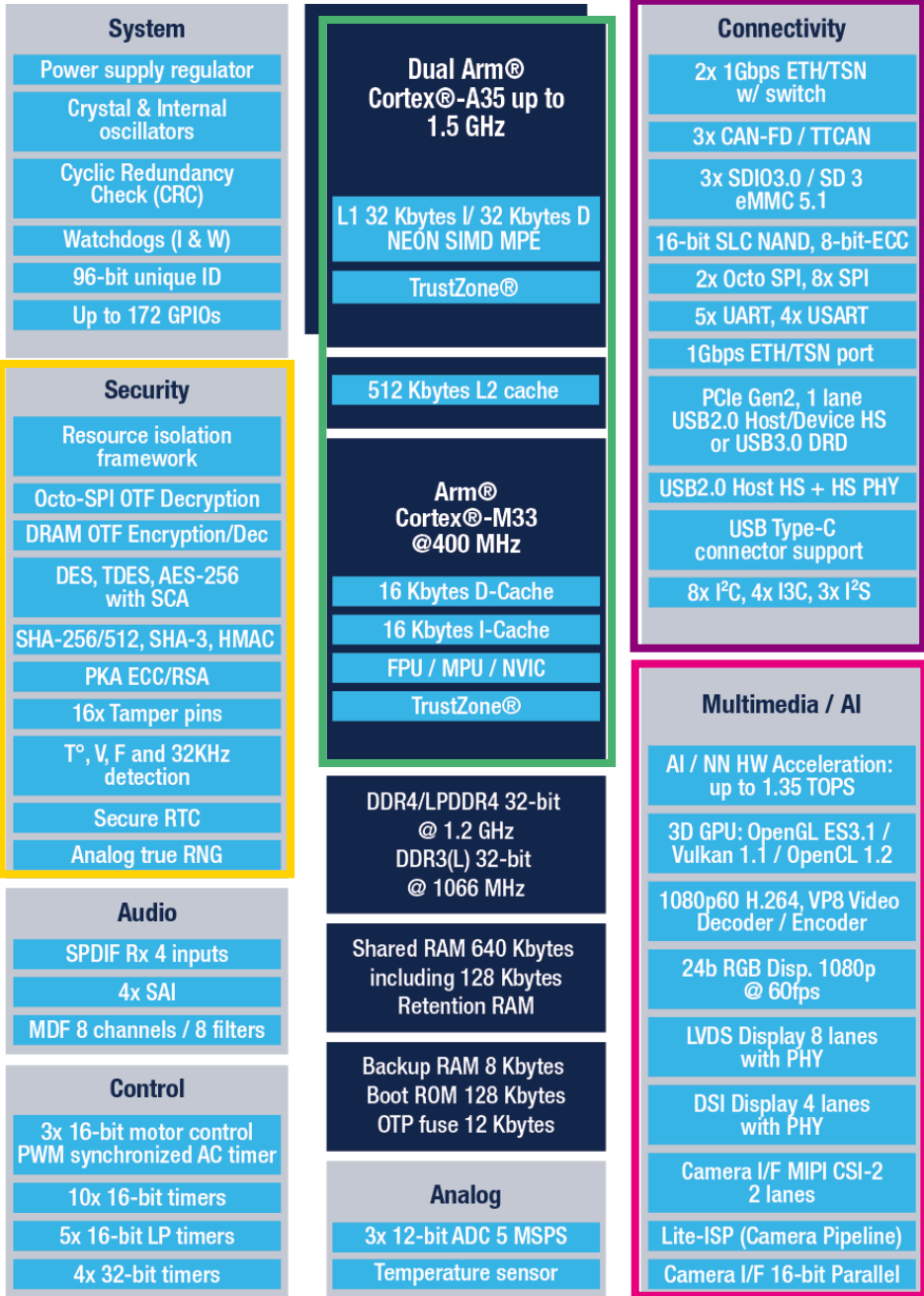
Multimedia capabilities for high-end use cases



- 3D GPU supports up to 1080p resolution
- Full HD video pipe with RGB, LVDS & DSI outputs
- MIPI CSI-2 camera interface with ISP



STM32MP257 Block Diagram



Processing

Enhanced security





Edge AI and multimedia

Connectivity

STM32MP25x

64 Orderable Variants

STM32MP257	1.2GHz / 1.5GHz	
Dual Cortex-A35 + Cortex-M33 3x Ethernet (2+1 switch) - 3x CAN FD – H.264 - 3D GPU – AI / NN – LVDS/DSI		
STM32MP255	1.2GHz / 1.5GHz	
Dual Cortex-A35 + Cortex-M33 2x Ethernet – 3x CAN FD - H.264 - 3D GPU – AI / NN – LVDS/DSI		
STM32MP253	1.2GHz / 1.5GHz	
Dual Cortex-A35 + Cortex-M33 2x Ethernet – 3x CAN FD		
STM32MP251	1.2GHz / 1.5GHz	
Single Cortex-A35 + Cortex-M33 1x Ethernet		

Compatible with STM32MP27 18x18		TFBGA436 18x18mm p0.8 172 GPIOs – 4 layers PTH PCB	16-bit DDR
Compatible with STM32MP23 16x16		TFBGA361 16x16mm p0.8 144 GPIOs – 4 layers PTH PCB	
Compatible with STM32MP27/23 14x14		VFBGA424 14x14mm p0.5 144 GPIOs – 4 layers PTH PCB	16-bit DDR
Compatible with STM32MP2x 10x10		VFBGA361 10x10mm p0.5 144 GPIOs – 6 layers HDI PCB	

Pin to pin & software compatible



4 product lines — CPU Freq. — Optional security — 4 packages

STM32H7R/S High-performance Lines Scalable & Secure Bootflash MCUs



STM32H7 Portfolio Overview

Bootflash Line

STM32H7R3/7S3	STM32H7R7/7S7
600 MHz	600 MHz
1284 DMIPS	1284 DMIPS
SRAM 620 KB	SRAM 620 KB
64K user flash	64K user flash
ST-iRoT	ST-iRoT
Chrom-ART	NeoChrom + LTDC

New

Dual-core Line

STM32H745/755	STM32H747/757
480 + 240 MHz	480 + 240 MHz
1027 + 300 DMIPS	1027 + 300 DMIPS
RAM 1 MB	RAM 1 MB
Flash up to 2 MB	Flash up to 2 MB

Single-core Line

STM32H7A3/B3	STM32H742	STM32H743/753	STM32H723/733	STM32H725/735
280 MHz	480 MHz	480 MHz	550 MHz	550 MHz
599 DMIPS	1027 DMIPS	1027 DMIPS	1177 DMIPS	1177 DMIPS
RAM 1.4 MB	RAM 692 KB	RAM 1 MB	RAM 564 KB	RAM 564 KB
Flash up to 2 MB	Flash up to 2 MB	Flash up to 2 MB	Flash up to 1 MB	Flash up to 1 MB

Value Line

STM32H7B0	STM32H750	STM32H730
280 MHz	480 MHz	550 MHz
599 DMIPS	1027 DMIPS	1177 DMIPS
RAM 1.4 MB	RAM 1 MB	RAM 564 KB
Flash 128 KB	Flash 128 KB	Flash 128 KB

Arm® Cortex®
core

Cortex®-M7

Cortex®-M7 & -
M4



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What the STM32H7R/S Lines Offer

Max performance: 600 MHz bootflash MCU

- Real-time execution from internal or external memories
- High speed serial & parallel memory interfaces up to 200 MHz DTR
- Large internal SRAM



High scalability to optimize your design & reduce costs

- Flexible external memory capacity and performance
- 10 packages: from cost-effective 68 pins to 225 pins



Security assurance: ready for future security directives

- Target security certifications: SESIP Level 3 and PSA certified L3.
- On-the-fly decrypt/encrypt & secure boot



Best-in-class platform for graphics applications

- Powerful 2.5D NeoChrom GPU - smart DMA architecture memory/GPU
- Enabling UIs with up to HD resolution.





STM32H7RS MCU Block Diagram



High performance

Scalable security

Large embedded RAM memory

Fast & flexible external memory I/F

Advanced graphic capabilities

STM32H7R/S 产品线

Cortex®-M7	Core, memories and acceleration <ul style="list-style-type: none"> Cortex-M7 600MHz 32KB I/D cache for internal and external memories acceleration Cordic DP-FPU DMAs Connectivity <ul style="list-style-type: none"> 1 UCPD IP for either FS or HS IPs 1x USB FS HY 2xSDMMC USART, UART, SPI, I²C 2xCAN (FD light) HDMI-CEC FMC 2 x 12-bit ADC Audio <ul style="list-style-type: none"> 3 x I²S + audio PLL 4 x SAI 2 x 12-bit DAC SPDIF-RX Graphic <ul style="list-style-type: none"> JPEG Codec Chrom-GRC Others <ul style="list-style-type: none"> Crypto/Hash (*) Security services (**) TRNG MDF 16 and 32-bit timers Low voltage 1.7 to 3.6V 	Product line	FCPU MHz (***)	Flash (bytes)	RAM (KB)	Hexa/Octal-SPI Flash/PSRAM	Ethernet I/F IEEE 1588	Camera I/F	1 x USB with HS PHY	2.5D GPU & RGB-TFT	LDO/SMPS
			STM32H7R7/S7 Graphic Line	600	64KB	620KB shared with TCM/AXI/AHB	1 octal + 1 octal / hexa on BGA	1	●	●*	●
	STM32H7R3/S3 GP Line	600	64KB	620KB shared with TCM/AXI/AHB	1 quad/ octal (from 68 to 176) 1 hexa + 1 octal on BGA225	1	●	●	N/A**	LDO + SMPS	

Version R	Non crypto
Version S	With crypto (AES, PKA, HUK, etc.)
GP Line	3
GFX Line	7

All part numbers available with Crypto/No crypto options

- *USB HS on superset only
- ** Chrom-ART available

STM32H5 Makes Performance & Security More Accessible



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STM32H5 Simplifies The Design Of Secure Industrial Applications



Smart homes

Air conditioning systems
fridges
alarm systems

Factory automation

PLCs
Motor control
Industrial pumps



Smart cities

Communication gateways
Light control
Energy conversion

Consumer

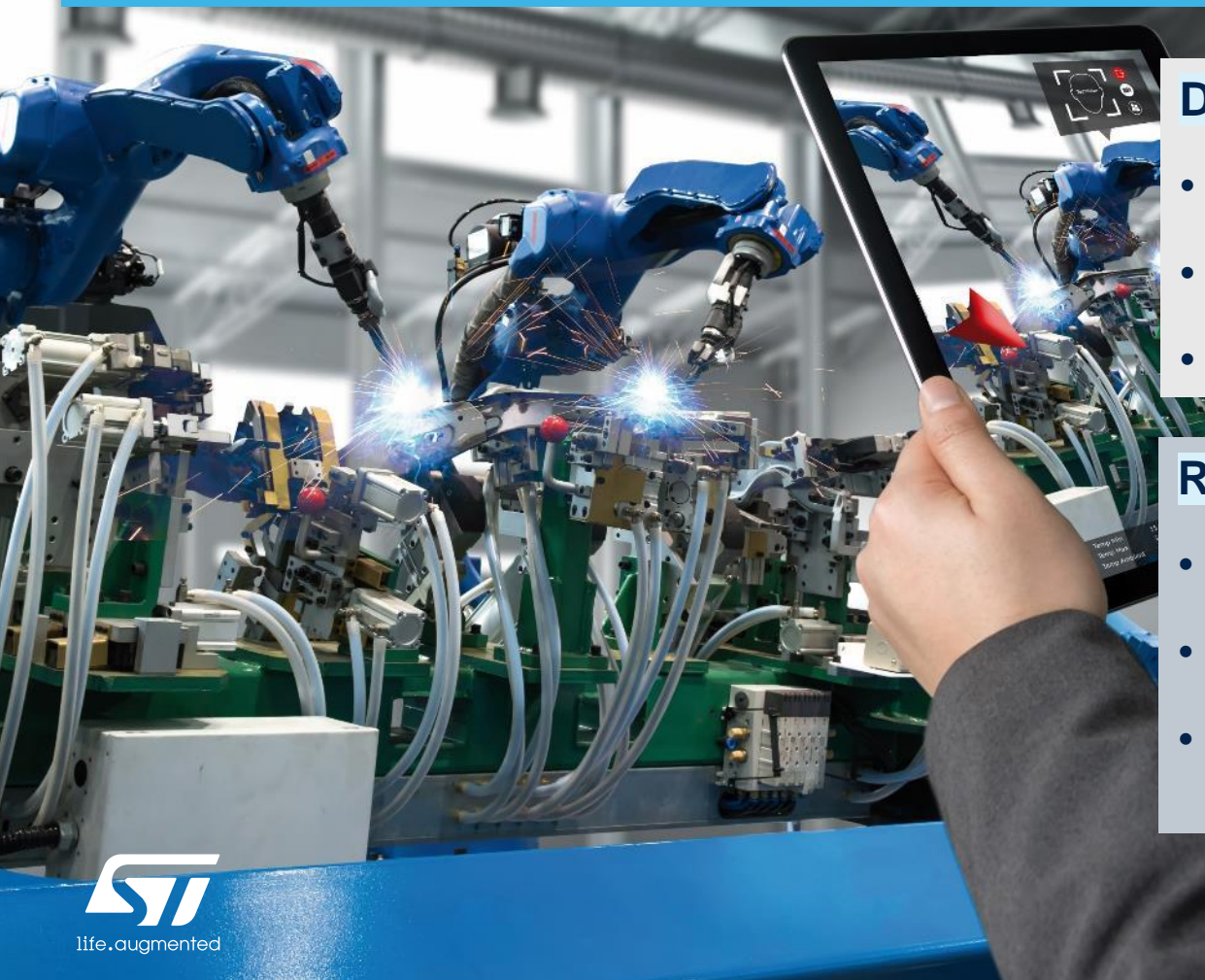
Keyboards, tracking devices
Medical accessories





Key Features For Factory Automation

STM32H5



Design freedom in harsh environments

- High performance core at 250 MHz
- Large and robust embedded memory
- Extended temperature range, up to 125°C

Ready for Industry 4.0

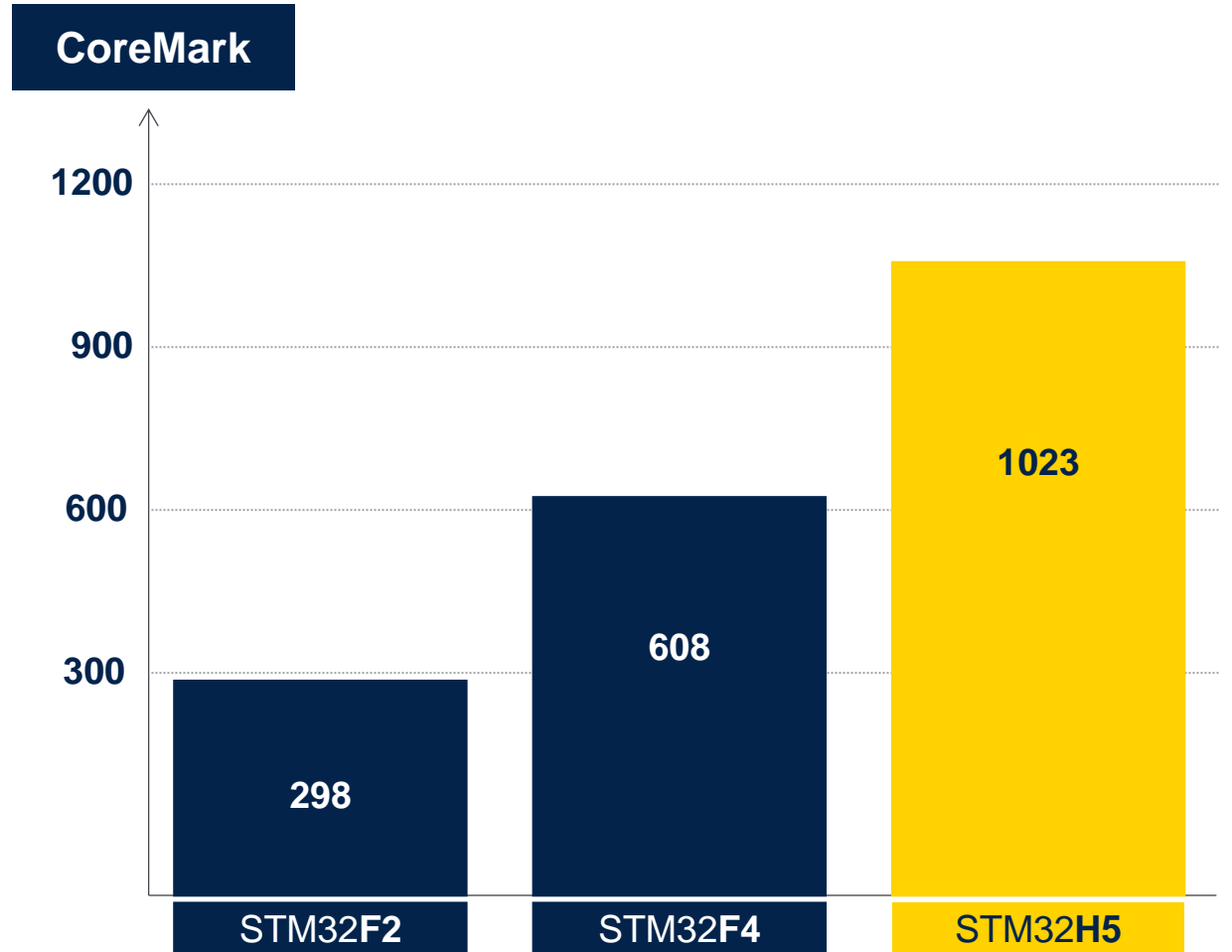
- PSA certified level 3 & SESIP3 target certifications
- SIL-ready enabled by native hardware features
- Extended connectivity (Ethernet MAC, FDCAN, MIPI-I3C, and USB)



STM32H5

- Arm Cortex[®]-M33 at **250 MHz**
375 DMIPS & 1023 CoreMark
- **Instruction and data cache** for internal and external memory (ART Accelerator)
- Mathematics accelerators: **FMAC** and **Cordic**

Boosting Application Performance





STM32H5 Series Scalable Portfolio

Expanding the STM32H5 series with STM32H523/533 MCUs

	STM32H503	STM32H523	STM32H533	STM32H562	STM32H563	STM32H573
Flash size (KB)	128	256 to 512	512	1024 to 2048	1024 to 2048	2048
RAM size (KB)	32	272	272	640	640	640
USB	FS	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD	FS/UCPD
12-bit ADC	1	2	2	2	2	2
Memory I/F		1x SDMMC, FMC, 1x octo-SPI	1x SDMMC, FMC, 1x octo-SPI	1x SDMMC, FMC, 1x octo-SPI	2x SDMMC, FMC, 1x octo-SPI	2x SDMMC, FMC, 1x octo-SPI
FDCAN	1	2	2	1	2	2
Ethernet					Yes	Yes
Power supply	LDO	LDO	LDO	LDO	SMPS, LDO	SMPS, LDO
TrustZone®		Yes	Yes	Yes	Yes	Yes
AES/SAES, PKA, OTFDEC, HUK, ST-iRoT			Yes			Yes

Latest release



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STM32G4 Mainstream Series Mixed Signal MCU



STM32G4 Series

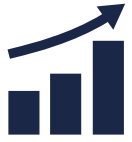
Ideal for applications requiring an MCU that offers advanced and rich analog peripherals



STM32G4

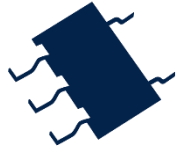
- Control applications (Motor control...)
- Industrial equipment
- Instrumentation and measurement
- Digital power
 - Digital SMPS (Switch mode power supply)
 - PFC (power factor correction)

Measurement And Control



High performance

Arm Cortex-M4 + FPU running @ 170 MHz
+ 3x accelerators: ART, routine booster (CCM), Math. Accel



7x comparators

Down to 19 ns propagation delay

5x ADC

5x12-bit, 16-bit oversampling
4 MSPS (0.25µs)



7xDAC

12-bit DAC 15 Msps



Motor control timer & High-resolution Timer

12 channels up to 184 ps resolution



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Power supply unit Power factor correction



USB Type-C Power Delivery



High robustness

Highly immune to fast transients
Robust I/Os against negative injections



Safety

Checksum by hardware
ECC on flash, parity on RAM
FuSa SW library (SIL)



FDCAN

Up to 3 instances
Payload bit rate 8 times bigger than standard CAN

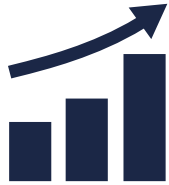


High temperature

from -40°C to + 125°C

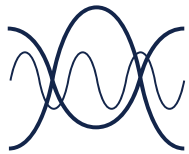


STM32G4 Series Key Features



Performance

- Arm Cortex[®]-M4 at 170 MHz
- 213 DMIPS and 550 CoreMark[®] results
- Better dynamic power consumption (163 μ A/MHz)
- ART **Accelerator**[™] (dynamic cache)
- CCM-SRAM routine **booster** (static cache)
- Mathematical **accelerators** (FMAC, CORDIC)



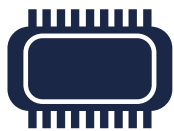
Rich integrated analog and digital

- Op amps (built-in gain), DACs, comparators
- 12-bit ADCs 4 Msps with hardware oversampling
- CAN-FD (flexible data rate – 8 Msps bit rate)
- High-resolution timer (184 ps)
- USB type-C Power Delivery 3.0
- 1% RC accuracy [-5[°]..90[°]C], 2% full T[°] range



Safety and security focus

- Dual bank flash with ECC (error code correction)
 - Securable memory area
 - Hardware encryption AES-256
 - SIL, class-b
 - SRAM with parity bit
- } Secure Live Upgrade
- } Functional safety design packages



Complete portfolio

- Complements existing STM32F3 Series portfolio
- From -40[°]C up to 85 or 125[°]C devices
- From 32- up to 128-pin
- From 32 KB to 512 KB flash

Rich, Advanced Analog

Mixed-signal SoC for wide variety of applications

ADC (up to 5)	Values
Topology	SAR 12-bit + HW oversampling → 16-bit
Sampling rate	Up to 4 Msps
Input	Single-ended and differential
Offset and Gain compensation	Autocalibration to reduce gain and offset

DAC (up to 7)	Values
Sampling rate	15 Msps (internal) 1 Msps (from buffered output)
Settling time	16 ns

Op amp (up to 6)	Values
GBW	13 MHz
Slew rate	45 V/μs
Offset	3 mV over full T° range 1.5 mV @ 25°C
PGA Gain (accuracy)	2, 4, 8, 16, -1, -3, -7, -15 (1%) 32, 64, -31, -63 (2%)

Comparator (up to 7)	Values
Power supply	1.62 .. 3.6 V
Propagation delay	16.7 ns
Offset	-6 .. +2 mV
Hysteresis	8 steps: 0, 9, 18, 27, 36, 45, 54, 63 mV



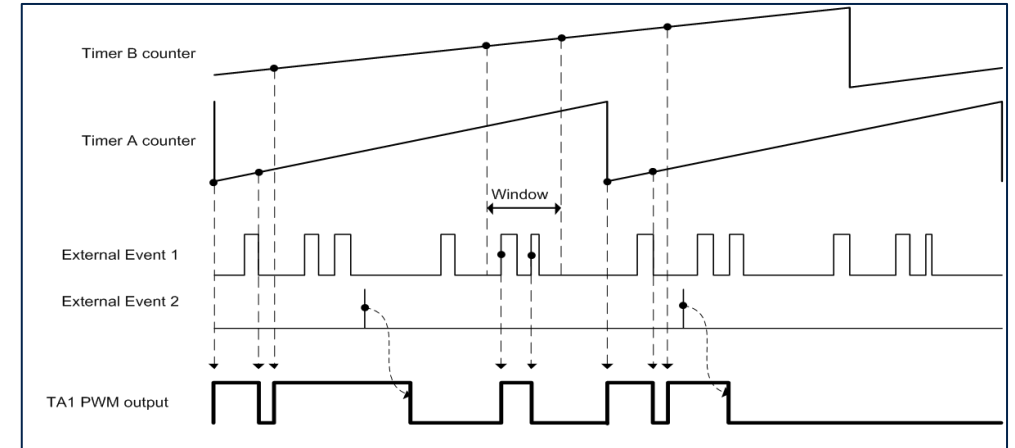
HRTimer – Not Only High Resolution...

High resolution PWM

- 12 channels with 184 ps resolution on frequency and duty cycle
- 184 ps is equivalent to 5.4 GHz timer clock

Flexible PWM generation

- 7x independent time base to create various shapes of PWM
- 6x complementary pair PWM outputs
- Up to 32 set/reset transition per PWM period due to the built-in crossbar
- Master/Slave configuration for multiphase converter



Multiple event handler

- 6x digital and analog fault input
- 10x Events cycle to cycle current control or PWM restart (constant Ton/Toff)
- Blanking, windowing, and digital filter

12 independent channels

- Any topology supported from 1x 12 PWM (triple interleaved LLC (servers' application) up to 12x1 PWM (multiple independent step-down converters (lighting))



STM32G4 Series Performance

STM32G431
STM32G441*

STM32G491
STM32G4A1*

STM32G473
STM32G483*

STM32G474
STM32G484*

Core performance	Cortex-M4 Math processor Main freq: 170 MHZ	Cortex-M4 Math processor Main freq: 170 MHZ	Cortex-M4 Math processor Main freq: 170 MHZ	Cortex-M4 Math processor Main freq: 170 MHZ
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Key features	Flash (up to): 128KB RAM (up to): 32KB 2*12-bit ADC 4*comparator 3*op amp 4*12-bit DAC 1*CAN-FD 2*MC-Timer	Flash (up to): 512KB RAM (up to): 112KB 3*12-bit ADC 4*comparator 4*op amp 4*12-bit DAC 2*CAN-FD 3*MC-Timer	Flash (up to):512KB RAM (up to):128KB 5*12-bit ADC 7*comparator 6*op amp 7*12-bit DAC 3*CAN-FD 3*MC-Timer	Flash (up to):512KB RAM (up to):128KB 5*12-bit ADC 7*comparator 6*op amp 7*12-bit DAC 3*CAN-FD 3*MC-Timer 12 Channel Hi-Res timer
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Total: 13 analogs

Total: 15 analogs

Total: 25 analogs

Total: 25 analogs





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STM32Wx Wireless MCU Series

ST CHINA
MDRF



**SALES
& —
MARKETING**





STM32 Wireless MCUs

32-bit Arm Cortex®-M

STM32WB0



- Arm Cortex®-M0+ at 64MHz
- From 192 Kbytes to 512 Kbytes of flash memory
- Output power +8 dBm
- Sensitivity: -97 dBm (1 Mbps) / -104 dBm(125 kbps)

STM32WL



- Arm Cortex®-M4 and M0+ 48 MHz supporting RF
- From 64 Kbytes to 256 Kbytes of flash memory
- Dual output power: Up to 15 dBm / up to 22 dBm
- Sensitivity LoRa®: -148 dBm

STM32WB

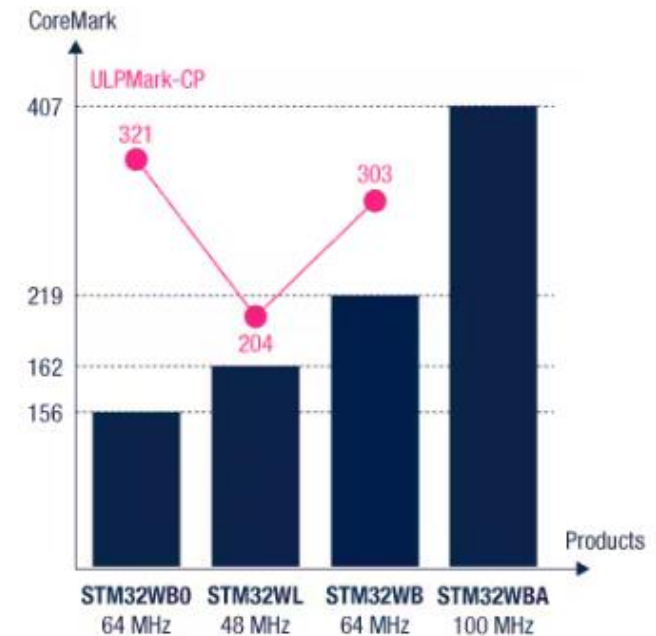


- Arm Cortex®-M4 at 64MHz and dedicated M0+ at 32 MHz supporting RF
- From 256 Kbytes to 1 Mbyte of flash memory
- Output power: +6 dBm
- Sensitivity BLE: -96 dBm, 802.15.4: -100 dBm

STM32WBA



- Arm Cortex®-M33 + FPU at 100 MHz
- From 512 Kbytes to 1 Mbyte of flash memory
- Output power: +10 dBm
- Sensitivity BLE: -96 dBm, 802.15.4: -97.5 dBm





A Wide 2.4 GHz BLE Portfolio

STM32WB series



MCU

STM32WB55

STM32WB35

STM32WB15

STM32WB50

STM32WB30

STM32WB10

Module

STM32WB5M

STM32WB1M

STM32WBA series



MCU

STM32WBA54/55

STM32WBA52

BlueNRG series



MCU

BlueNRG-1

BlueNRG-2/2N

Module

BlueNRG-M2SP/SA

STM32WB0 series



MCU

BlueNRG-LPS >> STM32WB05xZ

BlueNRG-LP >> STM32WB06 / STM32WB07 STM32WB09

Network Co-processor

STM32WB05xN

2.4 GHz BLE Product Overview

PERFORMANCE



High processing
Enhance security
High RF power output



Multiprotocol
Dual Core
Rich features set



Dual Core
Simpler applications



Single Core
Low-processing
requirements



Space-constrained
applications



Network processor
BLE add-on



STM32WBA5x

UFQFPN32, UFQFPN48, Thin
WLCSP41, UFBGA59, LGA module



STM32WB55/35

UFBGA129, WLCSP100, VQFN68,
UQFN48, module



STM32WB15

UQFN48, WLCSP49, module



STM32WB0x

VQFPN32/48, WLCSP3649



BlueNRG-1/2

QFN32, QFN48, WLCSP34,
module



STM32WB05xN

VQFPN32 · WLCSP36

BlueNRG-2N

QFN32 · WLCSP34

High-end applications

Low-end applications



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Competitive Sub-GHz Portfolio

PERFORMANCE

STM32WL55

Application processor
Cortex-M4 / M0+ @ 48 MHz

Build-in PA with 2x output power
Up to +15 dBm and up to +22 dBm
170 dB Link budget

Advanced security, hardware
isolation, Rich Analog
Flash: up to 256KB / RAM: up to 64KB

Up to 72 GPIOs,
UFQFPN48, BGA73

STM32WLE5

Application processor
Cortex-M4 @ 48 MHz

Build-in PA with 2x output power
Up to +15 dBm and up to +22 dBm
170 dB Link budget

Advanced security, Rich Analog
Flash: up to 256KB / RAM: up to 64KB

Up to 72 GPIOs,
UFQFPN48, BGA73

新

STM32WL3x

Application processor
Cortex-M0+ @ 64MHz

Build-in PA with 2x output power
Up to +14 dBm and up to +20 dBm
152dB Link budget, IQ interface

LCD driver, LP analog sensing
Flash up to 256KB / RAM 32KB

Up to 32 GPIOs
QFN32/48

SPIRIT2 (S2-LP)

Ultralow power transceiver

Up to +16dBm output power
146 dB Link budget
QFN24

SPIRIT1

Transceiver

Up to +16dBm output power
136 dB Link budget
QFN20

Application processor (SoC)

Transceiver





STM32 Sub-GHz Families

sub-GHz MCU dual core

sub-GHz MCU single core

sub-GHz transceiver

Supported modulation

Supported protocols



1st generation
SPIRIT1

General-purpose sub-GHz radio

2 (G)FSK
(G)MSK
-
OOK
ASK
-



3rd generation
STM32WL3x

2nd generation
S2-LP

Ultra-low-power sub-GHz radio

2/4 (G)FSK
(G)MSK
BPSK (Sigfox)
OOK
ASK
DSSS + IQ I/F (STM32WL3 only)



STM32WL55

STM32WLE5

2 (G)FSK
(G)MSK
BPSK (Sigfox)
-
-
LoRa ®





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Functional Safety Packages For STM32 MCUs and MPUs, and STM8 MCUs





Achieve Functional Safety Certification With ST MCUs And MPUs

With its **functional safety packages** based on robust built-in MCU and MPU safety features, ST provides a full set of **certified software libraries and documentation** for manufacturers to significantly **reduce the development effort, time, and cost** to achieve functional safety standard certifications.








SIL functional safety package
for industrial IEC 61508 (STM32)



Class B functional safety package
for household electrical appliances
IEC 60335-1/60730-1 (STM32 & STM8)



Functional Safety Packages For STM32 & STM8 MCUs

			
MCU support	STM32	STM32	STM8
Achievable safety standards	IEC 61508	IEC, UL, CSA 60335-1 60730-1	
Certification			 
Package content	<ul style="list-style-type: none">• Safety documentation• Self-test libraries	<ul style="list-style-type: none">• Safety documentation• Self-test libraries	<ul style="list-style-type: none">• Safety documentation• Self-test libraries
Package name	<u>X-CUBE-STL</u>	<u>X-CUBE-CLASSB</u>	<u>STM8-SafeCLASSB</u>



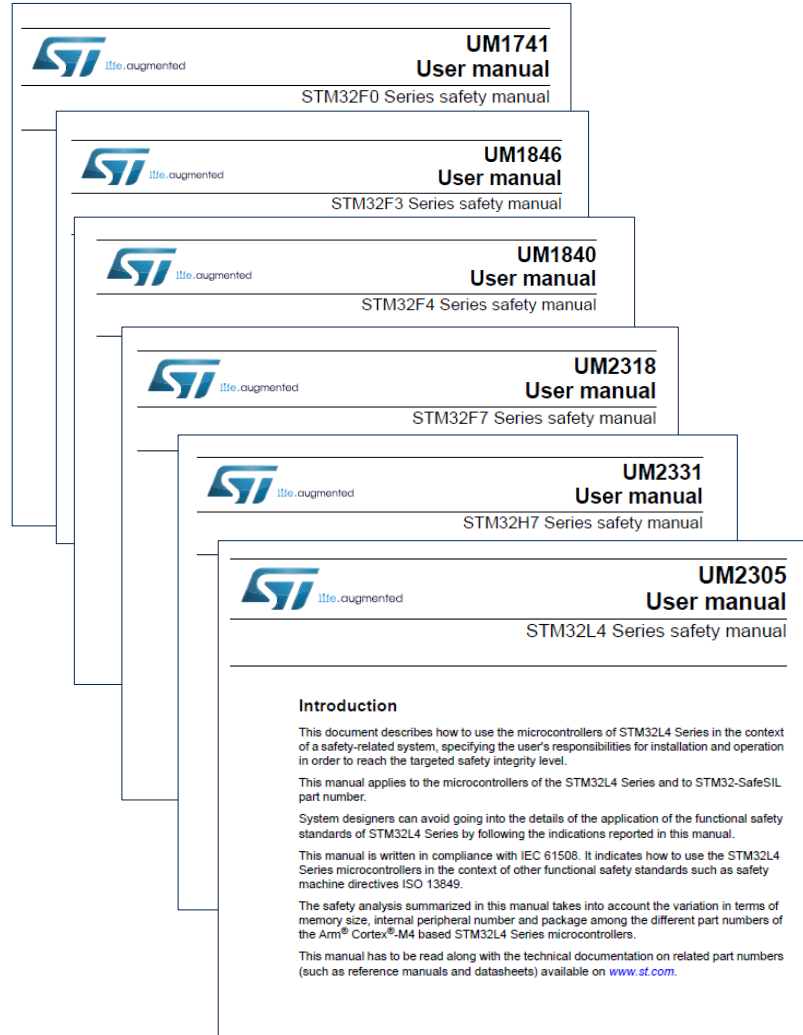
SIL Functional Safety Package For STM32

Reduce time and cost to build
STM32-based systems certified
to IEC 61508 industrial safety
standard





SIL Functional Safety For STM32 Safety Documentation



Safety manuals: detailed list of safety requirements (conditions of use) and examples to guide STM32 users to achieve safety integrity level certification in compliance with IEC 61508.

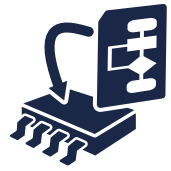
Available at STM32 series level for free download on www.st.com/x-cube-stl

FMEA: detailed list of MCU/MPU failure modes and related mitigation measures adopted
FMEDA: static snapshot reporting IEC 61,508 failure rates, computed at both MCU/MPU and basic function detail levels.

Available on demand at STM32 series level (*)(**) on www.st.com/x-cube-stl

(*) submitted to NDA

(**) FMEDA snapshot is generated for a specific set of part numbers



SIL Functional Safety Package for STM32 X-CUBE-STL Self-test Libraries



- A software diagnostic suite designed to detect random hardware failures in safety-critical STM32 core components (CPU + SRAM + flash memory)
- Diagnostic coverage verified by state-of-the-art ST proprietary fault injection methodology
- Application independent: can be potentially used in any end customer application
- Compiler independent: delivered as object code
- Certified by TÜV Rheinland ¹
- IEC 61508 SC3 compliant
- Provided with safety manual and user guide

Available on demand at STM32 series level²
www.st.com/x-cube-stl



(1) The original certificate and the updated list of certificated software versions can be downloaded from TÜV Rheinland websites: www.fsproducts.com, www.certipedia.com
(2) submitted to NDA



SIL Use Cases

Application: elevator

Certification standard: IEC61508(SIL2, SIL3),
GB/T 20438

STM32 safety package: X-CUBE-STL, safety documents(safety manual, FMEA, FMEDA, etc.)

STM32: STM32F4, STM32G4

Effect: Reduce design complexity, speed up customers' process for certification



Application: Servo, inverter, PLC

Certification standard: IEC61508(SIL2, SIL3)

STM32 safety package: X-CUBE-STL, safety documents (safety manual, FMEA, FMEDA, etc.)

STM32: STM32F4, STM32G4, STM32H7

Effect: Reduce design complexity, speed up customers' process for certification



Application: BMS, AGV, robotics, e-bike

Certification standard: IEC61508(SIL2, SIL3),
ISO13849

STM32 safety package: X-CUBE-STL, safety documents(safety manual, FMEA, FMEDA, etc.)

STM32: STM32G0, STM32G4

Effect: Reduce design complexity, speed up customers' process for certification





ClassB Use Cases

Application: PV energy storage, BMS

Certification standard: IEC60730, UL1998

STM32 safety package: X-CUBE-CLASSB, documents(user manual, LATs)

STM32: STM32F4, STM32G4, STM32H7

Effect: Reduce design complexity, speed up customers' process for certification



Application: Wash machine, robot vacuum, lawn mower

Certification standard: IEC60730, UL60730

STM32 safety package: X-CUBE-CLASSB, documents(user manual, LATs)

STM32: STM32F3, STM32G0

Effect: Reduce design complexity, speed up customers' process for certification



Application: Drone

Certification standard: IEC60730

STM32 safety package: X-CUBE-CLASSB, documents(user manual, LATs)

STM32: STM32F0, STM32G4

Effect: Reduce design complexity, speed up customers' process for certification





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