

# STM32 CubeMX

## 1. Description

### 1.1. Project

Project Name	InzStm
Board Name	custom
Generated with:	STM32CubeMX 6.11.1
Date	05/25/2024

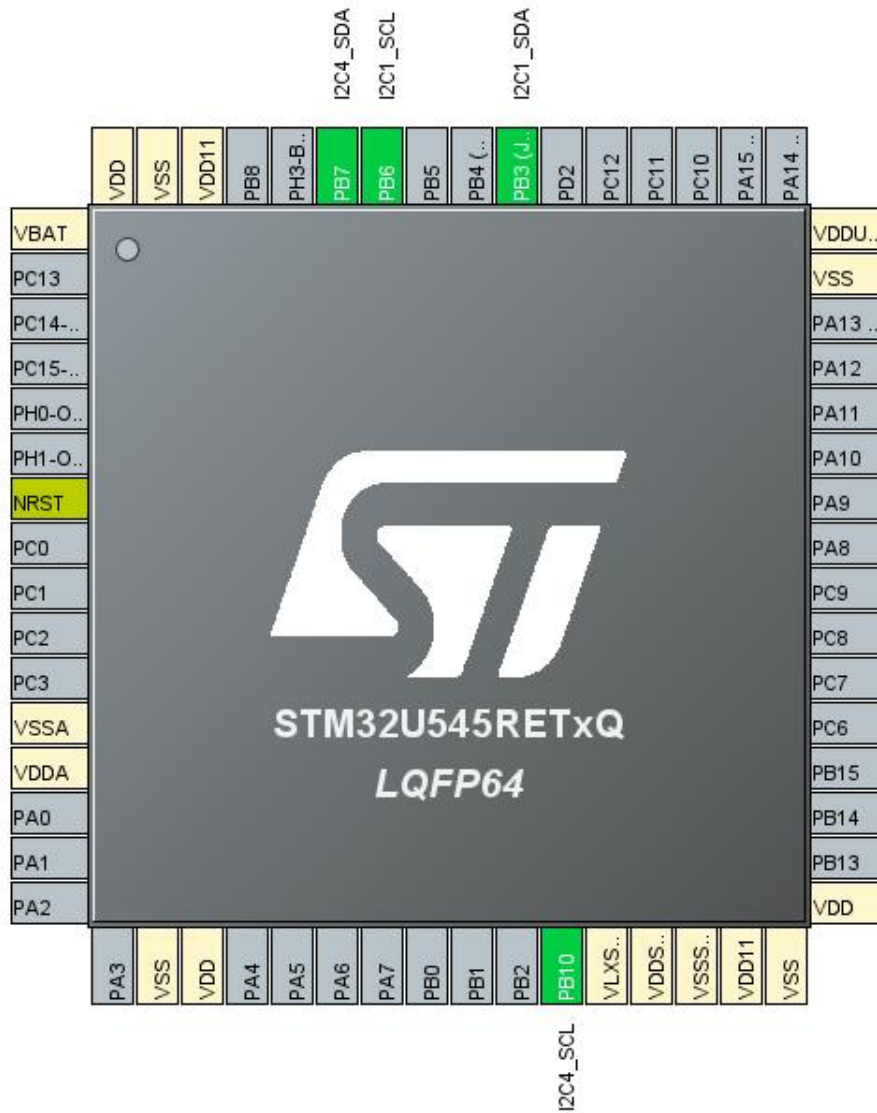
### 1.2. MCU

MCU Series	STM32U5
MCU Line	STM32U5x5
MCU name	STM32U545RETxQ
MCU Package	LQFP64
MCU Pin number	64

### 1.3. Core(s) information

Core(s)	ARM Cortex-M33
---------	----------------

## 2. Pinout Configuration



### 3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
7	NRST	Reset		
12	VSSA	Power		
13	VDDA	Power		
18	VSS	Power		
19	VDD	Power		
27	PB10	I/O	I2C4_SCL	
28	VLXSMPS	Power		
29	VDDSMPS	Power		
30	VSSSMPS	Power		
31	VDD11	Power		
32	VSS	Power		
33	VDD	Power		
47	VSS	Power		
48	VDDUSB	Power		
55	PB3 (JTDO/TRACESWO)	I/O	I2C1_SDA	
58	PB6	I/O	I2C1_SCL	
59	PB7	I/O	I2C4_SDA	
62	VDD11	Power		
63	VSS	Power		
64	VDD	Power		



## 5. Software Project

### 5.1. Project Settings

Name	Value
Project Name	InzStm
Project Folder	C:\Users\dawid\Desktop\PracaInzynierska\INZYNIERKA\APP_STM
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_U5 V1.5.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

### 5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Copy only the necessary library files
Generate peripheral initialization as a pair of '.c/.h' files	Yes
Backup previously generated files when re-generating	No
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

### 5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_I2C1_Init	I2C1
4	MX_I2C4_Init	I2C4
5	MX_ICACHE_Init	ICACHE

## 1. Power Consumption Calculator report

### 1.1. Microcontroller Selection

Series	STM32U5
Line	STM32U5x5
MCU	STM32U545RETxQ
Datasheet	not yet available

### 1.2. Parameter Selection

Temperature	25
Vdd	3.0

### 1.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

### 1.4. Sequence

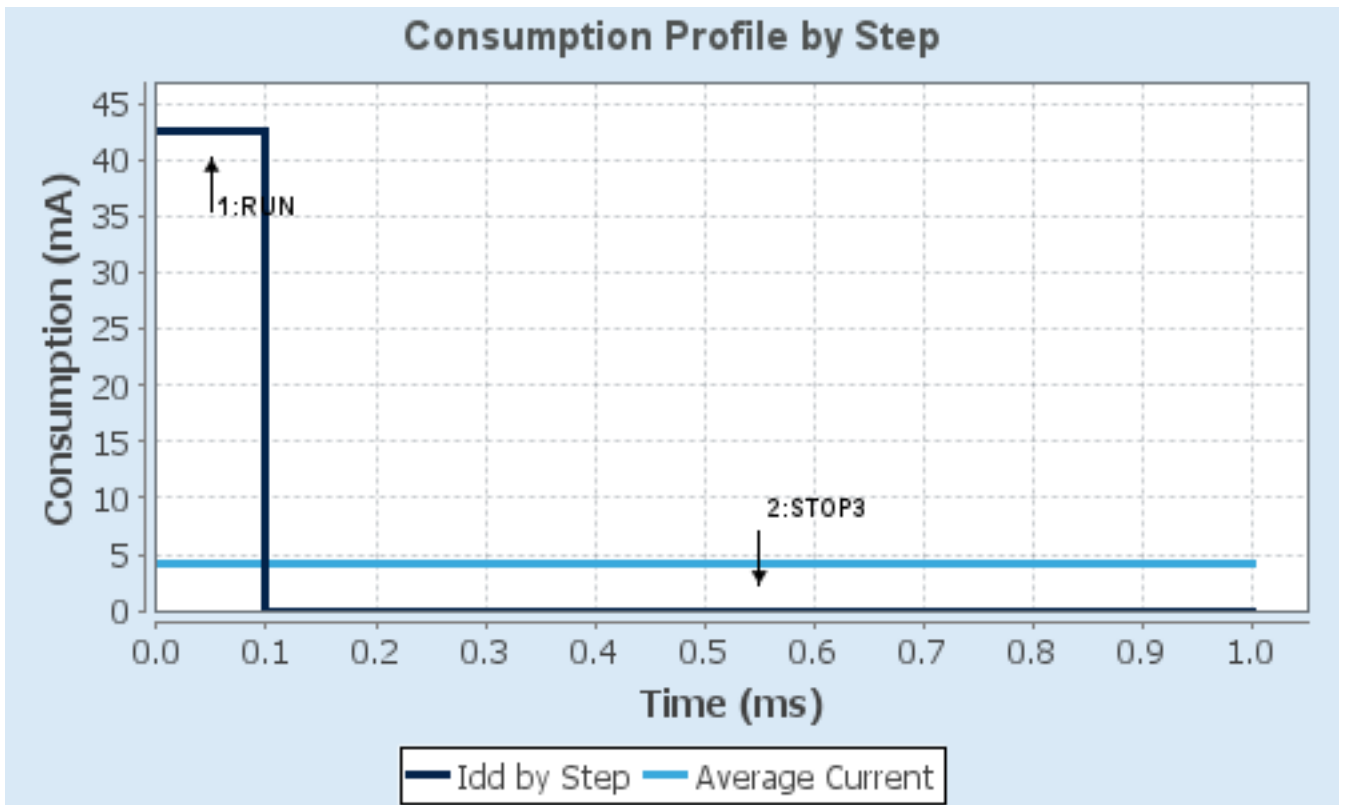
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP3
<b>Vdd</b>	3.0	3.0
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	Range1-High	NoRange/SMPS
<b>Fetch Type</b>	FLASH- PwrDwnBank2/ART/Cache- 1Way/AlgoType- ReducedCode	FLASH
<b>CPU Frequency</b>	160 MHz	0 Hz
<b>Clock Configuration</b>	HSE BYP PLL ALL_IPs_ON ALL RAM RETENTION	ALL_CLOCKS_OFF
<b>Clock Source Frequency</b>	16 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	42.5 mA	1.3 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	200.0	0.0
<b>Ta Max</b>	99.9	105
<b>Category</b>	In DS Table	In DS Table

### 1.5. Results

Sequence Time	1 ms	Average Current	4.25 mA
Battery Life	1 month, 2 days, 21 hours	Average DMIPS	20.0 DMIPS

### 1.6. Chart





## 2. Peripherals and Middlewares Configuration

### 2.1. I2C1

#### I2C: I2C

##### 2.1.1. Parameter Settings:

###### Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	<b>0x30909DEC *</b>

###### Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

###### Autonomous Mode:

Autonomous Mode	Disable
-----------------	---------

### 2.2. I2C4

#### I2C: I2C

##### 2.2.1. Parameter Settings:

###### Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	<b>0x30909DEC *</b>

###### Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled
Primary Address Length selection	7-bit

Dual Address Acknowledged	Disabled
Primary slave address	0
<b>Autonomous Mode:</b>	
Autonomous Mode	Disable

## 2.3. ICACHE

**mode: Memory address remap**

**Mode: 1-way (direct mapped cache)**

### 2.3.1. Parameter Settings:

#### **Region 0:**

Region	Disable
--------	---------

#### **Region 1:**

Region	Disable
--------	---------

#### **Region 2:**

Region	Disable
--------	---------

#### **Region 3:**

Region	Disable
--------	---------

## 2.4. LPBAM

**mode: LPBAM Scenario uses resources from Smart Run Domain only**

**mode: LPBAM Scenario is hosted by LPDMA1**

## 2.5. LPBAMQUEUE

**mode: QUEUE MODE**

### 2.5.1. Parameter Settings:

#### **DMA Channel Configuration:**

Priority	Low
----------	-----

#### **DMA Channel Interrupt Configuration:**

Data Transfer Error Interrupt	Disable
-------------------------------	---------

Update Link Error Interrupt	Disable
-----------------------------	---------

User Setting Error Interrupt	Disable
------------------------------	---------

Transfer Complete Interrupt	Disable
-----------------------------	---------

Trigger Overrun Interrupt	Disable
---------------------------	---------

## 2.6. MEMORYMAP

mode: Activated

## 2.7. PWR

mode: Power saving mode

mode: Privilege attributes

### 2.7.1. Power Saving:

#### System power supply:

Power Regulator **SMPS \***

#### SRAM power down in Run mode:

SRAM1 power down in Run mode	Disable
SRAM2 power down in Run mode	Disable
SRAM4 power down in Run mode	Disable

#### SRAM power down in Stop mode:

SRAM1 Page1 power down in Stop (0, 1, 2, 3) mode	Disable
SRAM1 Page2 power down in Stop (0, 1, 2, 3) mode	Disable
SRAM1 Page3 power down in Stop (0, 1, 2, 3) mode	Disable
SRAM2 Page1 power down in Stop (0, 1, 2) mode	Disable
SRAM2 Page2 power down in Stop (0, 1, 2) mode	Disable
SRAM4 power down in Stop (0, 1, 2, 3) mode	Disable
ICACHE power down in Stop (0, 1, 2, 3) mode	Disable
DCACHE1 power down in Stop (0, 1, 2, 3) mode	Disable
PKA32 RAM power down in Stop (0, 1, 2, 3) mode	Disable
PERIPH RAM power down in Stop (0, 1, 2, 3) mode	Disable

#### SRAM fast wakeup:

SRAM4 fast wakeup from Stop (0, 1, 2, 3) modes	Disable
--	---------

### 2.7.2. PWR Privilege :

#### Privilege PWR:

Privilege of PWR Secure Items	Disable
Privilege of PWR Non-Secure Items	Disable
PWR Privilege	Disable

### 2.7.3. PWR Security:

**Secure PWR:**

Wake-Up 1 secure protection	Disable
Wake-Up 2 secure protection	Disable
Wake-Up 3 secure protection	Disable
Wake-Up 4 secure protection	Disable
Wake-Up 5 secure protection	Disable
Wake-Up 6 secure protection	Disable
Wake-Up 7 secure protection	Disable
Wake-Up 8 secure protection	Disable
Voltage detection and monitoring secure protection	Disable
Pull-up/pull-down secure protection	Disable
Low power modes secure protection	Disable
Backup domain secure protection	Disable

**2.8. RCC**

2.8.1. RCC Privilege :

**Privilege RCC:**

Privilege of RCC Non-Secure Items	Disable
-----------------------------------	---------

2.8.2. Parameter Settings:

**System Parameters:**

VDD voltage (V)	3.3
Flash Latency(WS)	4 WS (5 CPU cycle)

**RCC Parameters:**

HSI Calibration Value	16
MSI Calibration Value	16
MSIS/MSIK Auto Calibration	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

**Power Parameters:**

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
-------------------------------	---------------------------------

**PLL1/2/3 Parameters:**

PLL1M BOOST EPOD Clock Divider	4
PLL1 input frequency range	Between 8 and 16 MHz

**Low Power Parameters:**

MSI in Stop mode	Disabled
------------------	----------

HSI in Stop mode

Disabled

## 2.9. SYS

**Timebase Source: SysTick**

\* User modified value

## 3. System Configuration

### 3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB3 (JTDO/TRACESWO)	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
I2C4	PB10	I2C4_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	
	PB7	I2C4_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	

### 3.2. GPDMA1

### 3.3. LINKEDLIST

### 3.4. LPDMA1

### 3.5. NVIC configuration

#### 3.5.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
Prefetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
System service call via SWI instruction	true	0	0
Debug monitor	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	15	0
I2C1 Event interrupt	true	0	0
I2C1 Error interrupt	true	0	0
I2C4 Event interrupt	true	0	0
I2C4 Error interrupt	true	0	0
PVD/PVM through EXTI Line detection Interrupt		unused	
Flash non-secure global interrupt		unused	
RCC non-secure global interrupt		unused	
FPU global interrupt		unused	
Instruction cache global interrupt		unused	

#### 3.5.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Prefetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
I2C1 Event interrupt	false	true	true
I2C1 Error interrupt	false	true	true
I2C4 Event interrupt	false	true	true
I2C4 Error interrupt	false	true	true



\* User modified value

## 4. System Views

### 4.1. Category view

#### 4.1.1. Current

Middleware

System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing	Trace and Debug	Power and Thermal	Utilities	Other
CORTEX_M33 ✓			I2C1 ✓					PWR ✓	LINKEDLIST	
GPDMA1			I2C4 ✓							
GPIO ✓										
ICACHE ✓										
LPDMA1										
NVIC ✓										
RCC ✓										
SYS ✓										

## 5. Docs & Resources

Type	Link
BSDL files	<a href="https://www.st.com/resource/en/bsdl_model/stm32u5_bsdI.zip">https://www.st.com/resource/en/bsdl_model/stm32u5_bsdI.zip</a>
IBIS models	<a href="https://www.st.com/resource/en/ibis_model/stm32u5-ibis.zip">https://www.st.com/resource/en/ibis_model/stm32u5-ibis.zip</a>
System View Description	<a href="https://www.st.com/resource/en/svd/stm32u5_svd.zip">https://www.st.com/resource/en/svd/stm32u5_svd.zip</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf">https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32_eval_tools_portfolio.pdf">https://www.st.com/resource/en/product_presentation/stm32_eval_tools_portfolio.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf">https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf">https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/microcontrollers_stm32u5_series_product_overview.pdf">https://www.st.com/resource/en/product_presentation/microcontrollers_stm32u5_series_product_overview.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf">https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/stm32u5-mcu-lines-for-advanced-graphics.pdf">https://www.st.com/resource/en/product_presentation/stm32u5-mcu-lines-for-advanced-graphics.pdf</a>
Brochures	<a href="https://www.st.com/resource/en/brochure/brstm32ulp.pdf">https://www.st.com/resource/en/brochure/brstm32ulp.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32nucleo.pdf">https://www.st.com/resource/en/flyer/flstm32nucleo.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32u5.pdf">https://www.st.com/resource/en/flyer/flstm32u5.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-and-mpus-stmicroelectronics.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an2867-oscillator-">https://www.st.com/resource/en/application_note/an2867-oscillator-</a>

- design-guide-for-stm8afals-stm32-mcus-and-mpus-stmicroelectronics.pdf
- Application Notes [https://www.st.com/resource/en/application\\_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3156-usb-dfu-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3236-increase-the-number-of-touchkeys-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3960-esd-considerations-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4229-how-to-implement-a-vocoder-solution-using-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4229-how-to-implement-a-vocoder-solution-using-stm32-microcontrollers-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4286-spi-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4286-spi-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4299-improve-conducted-noise-robustness-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4299-improve-conducted-noise-robustness-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4310-sampling-capacitor-selection-guide-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4310-sampling-capacitor-selection-guide-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4312-design-with-](https://www.st.com/resource/en/application_note/an4312-design-with-)

surface-sensors-for-touch-sensing-applications-on-mcus-stmicroelectronics.pdf

Application Notes [https://www.st.com/resource/en/application\\_note/an4316-tuning-a-touch-sensing-application-on-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4316-tuning-a-touch-sensing-application-on-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4566-extending-the-dac-performance-of-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4566-extending-the-dac-performance-of-stm32-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4635-minimization-of-power-consumption-using-lpuart-for-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4635-minimization-of-power-consumption-using-lpuart-for-stm32-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-applications-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-applications-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4750-handling-of-soft-errors-in-stm32-applications-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4750-handling-of-soft-errors-in-stm32-applications-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4759-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4759-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4776-generalpurpose-timer-cookbook-for-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4776-generalpurpose-timer-cookbook-for-stm32-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4803-highspeed-si-simulations-using-ibis-and-boardlevel-simulations-using-hyperlynx-si-on-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4803-highspeed-si-simulations-using-ibis-and-boardlevel-simulations-using-hyperlynx-si-on-stm32-mcus-and-mpus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4908-stm32-usart-automatic-baud-rate-detection-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4908-stm32-usart-automatic-baud-rate-detection-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4989-stm32-microcontroller-debug-toolbox-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4989-stm32-microcontroller-debug-toolbox-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5020-digital-camera-interface-dcmi-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5020-digital-camera-interface-dcmi-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5105-getting-started-with-touch-sensing-control-on-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5105-getting-started-with-touch-sensing-control-on-stm32-microcontrollers-stmicroelectronics.pdf)

- Application Notes [https://www.st.com/resource/en/application\\_note/an5543-enhanced-methods-to-handle-spi-communication-on-stm32-devices-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5543-enhanced-methods-to-handle-spi-communication-on-stm32-devices-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5447-overview-of-secure-boot-and-secure-firmware-update-solution-on-arm-trustzone-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5447-overview-of-secure-boot-and-secure-firmware-update-solution-on-arm-trustzone-stm32-microcontrollers-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4943-using-the-stm32-chromart-accelerator-to-refresh-an-lcdtft-display-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4943-using-the-stm32-chromart-accelerator-to-refresh-an-lcdtft-display-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5347-arm-trustzone-features-for-stm32l5-and-stm32u5-series-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5347-arm-trustzone-features-for-stm32l5-and-stm32u5-series-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5676-how-to-calibrate-internal-rc-oscillators-on-stm32u5-series-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5676-how-to-calibrate-internal-rc-oscillators-on-stm32u5-series-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5645-stm32u5-series-power-optimization-using-lpbam-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5645-stm32u5-series-power-optimization-using-lpbam-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4899-stm32-microcontroller-gpio-hardware-settings-and-lowpower-consumption-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5612-esd-protection-of-stm32-mcus-and-mpus-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5795-sound-capture-with-multifunction-digital-filter-on-stm32u5-series-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5795-sound-capture-with-multifunction-digital-filter-on-stm32u5-series-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5593-how-to-use-the-gpdma-for-stm32u5-series-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5593-how-to-use-the-gpdma-for-stm32u5-series-microcontrollers-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5156-introduction-to-stm32-microcontrollers-security-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5156-introduction-to-stm32-microcontrollers-security-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5212-using-stm32-cache-to-optimize-performance-and-power-efficiency-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5212-using-stm32-cache-to-optimize-performance-and-power-efficiency-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an5834-lc-sensor-metering-implementation-on-stm32u5-series-featuring-lpbam-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5834-lc-sensor-metering-implementation-on-stm32u5-series-featuring-lpbam-stmicroelectronics.pdf)
- Application Notes [https://www.st.com/resource/en/application\\_note/an4991-how-to-wake-](https://www.st.com/resource/en/application_note/an4991-how-to-wake-)

up-an-stm32-microcontroller-from-lowpower-mode-with-the-usart-or-the-lpuart-stmicroelectronics.pdf

Application Notes [https://www.st.com/resource/en/application\\_note/an5766-migrating-within-stm32u5-series-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5766-migrating-within-stm32u5-series-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4838-introduction-to-memory-protection-unit-management-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4838-introduction-to-memory-protection-unit-management-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5325-how-to-use-the-cordic-to-perform-mathematical-functions-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5325-how-to-use-the-cordic-to-perform-mathematical-functions-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5348-introduction-to-fdcan-peripherals-for-stm32-product-classes-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5348-introduction-to-fdcan-peripherals-for-stm32-product-classes-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5050-getting-started-with-octospi-and-hexadecapi-interface-on-stm32-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5050-getting-started-with-octospi-and-hexadecapi-interface-on-stm32-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5371-migration-from-stm32l5-series-to-stm32u5-series-microcontrollers-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5371-migration-from-stm32l5-series-to-stm32u5-series-microcontrollers-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4879-introduction-to-usb-hardware-and-pcb-guidelines-using-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4879-introduction-to-usb-hardware-and-pcb-guidelines-using-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5373-getting-started-with-stm32u5-mcu-hardware-development-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5373-getting-started-with-stm32u5-mcu-hardware-development-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5372-migrating-from-stm32l4-and-stm32l4--to-stm32u5-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5372-migrating-from-stm32l4-and-stm32l4--to-stm32u5-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5342--how-to-use-error-correction-code-ecc-management-for-internal-memories-protection-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5342--how-to-use-error-correction-code-ecc-management-for-internal-memories-protection-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5652-how-to-optimize-power-consumption-on-stm32u5-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5652-how-to-optimize-power-consumption-on-stm32u5-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5701-introduction-to-](https://www.st.com/resource/en/application_note/an5701-introduction-to-)

stm32cube-mcu-package-examples-for-stm32u5-mcus-stmicroelectronics.pdf

Application Notes [https://www.st.com/resource/en/application\\_note/an4894-how-to-use-eeeprom-emulation-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4894-how-to-use-eeeprom-emulation-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an2834-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an2834-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5537-how-to-use-adc-oversampling-techniques-to-improve-signaltonoise-ratio-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5036-guidelines-for-thermal-management-on-stm32-applications-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4992-introduction-to-secure-firmware-install-sfi-for-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4992-introduction-to-secure-firmware-install-sfi-for-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5405-how-to-use-fdcan-bootloader-protocol-on-stm32-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5405-how-to-use-fdcan-bootloader-protocol-on-stm32-mcus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5690-how-to-use-vrefbuf-peripheral-on-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5690-how-to-use-vrefbuf-peripheral-on-stm32-mcus-and-mpus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an4230-introduction-to-random-number-generation-validation-using-the-nist-statistical-test-suite-for-stm32-mcus-and-mpus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an4230-introduction-to-random-number-generation-validation-using-the-nist-statistical-test-suite-for-stm32-mcus-and-mpus-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an5816-how-to-build-a-lpbam-application-on-stm32u5-mcus-using-stm32cubemx-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an5816-how-to-build-a-lpbam-application-on-stm32u5-mcus-using-stm32cubemx-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an1202\\_freertos\\_guide-for\\_related\\_Tools\\_freertos-guide-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an1202_freertos_guide-for_related_Tools_freertos-guide-stmicroelectronics.pdf)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an1602\\_semihosting\\_in\\_for\\_related\\_Tools\\_truestudio-how-to-do-semihosting-in-truestudio-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an1602_semihosting_in_for_related_Tools_truestudio-how-to-do-semihosting-in-truestudio-stmicroelectronics.pdf)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an1801\\_stm32cubeprog\\_for\\_related\\_Tools\\_rammer\\_in\\_truestudio-installing-stm32cubeprogrammer-in-truestudio-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an1801_stm32cubeprog_for_related_Tools_rammer_in_truestudio-installing-stm32cubeprogrammer-in-truestudio-stmicroelectronics.pdf)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/atollic\\_editing\\_keyboard](https://www.st.com/resource/en/application_note/atollic_editing_keyboard)



for related Tools [\\_shortcuts-atollic-editing-keyboard-shortcuts-stmicroelectronics.pdf](#)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/iar\\_to\\_atollic\\_truестudio](https://www.st.com/resource/en/application_note/iar_to_atollic_truестudio)  
for related Tools [\\_migration\\_guide-truестudio-for-arm-migration-guide-iar-embedded-](#)  
& Software [workbench-to-truестudio-stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/stm32cubemx\\_installatio](https://www.st.com/resource/en/application_note/stm32cubemx_installatio)  
for related Tools [n\\_in\\_truестudio-stm32cubemx-installation-in-truестudio-](#)  
& Software [stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/an4657-stm32-](https://www.st.com/resource/en/application_note/an4657-stm32-)  
for related Tools [inapplication-programming-iap-using-the-usart-stmicroelectronics.pdf](#)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an4841-digital-signal-](https://www.st.com/resource/en/application_note/an4841-digital-signal-)  
for related Tools [processing-for-stm32-microcontrollers-using-cmsis-stmicroelectronics.pdf](#)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an5054-secure-](https://www.st.com/resource/en/application_note/an5054-secure-)  
for related Tools [programming-using-stm32cubeprogrammer-stmicroelectronics.pdf](#)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an5360-getting-started-](https://www.st.com/resource/en/application_note/an5360-getting-started-)  
for related Tools [with-projects-based-on-the-stm32mp1-series-in-stm32cubeide-](#)  
& Software [stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/an5361-getting-started-](https://www.st.com/resource/en/application_note/an5361-getting-started-)  
for related Tools [with-projects-based-on-dualcore-stm32h7-microcontrollers-in-](#)  
& Software [stm32cubeide-stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/an5394-getting-started-](https://www.st.com/resource/en/application_note/an5394-getting-started-)  
for related Tools [with-projects-based-on-the-stm32l5-series-in-stm32cubeide-](#)  
& Software [stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/an5418-how-to-build-a-](https://www.st.com/resource/en/application_note/an5418-how-to-build-a-)  
for related Tools [simple-usbpd-sink-application-with-stm32cubemx-stmicroelectronics.pdf](#)  
& Software

Application Notes [https://www.st.com/resource/en/application\\_note/an5426-migrating-](https://www.st.com/resource/en/application_note/an5426-migrating-)  
for related Tools [graphics-middleware-projects-from-stm32cubemx-540-to-stm32cubemx-](#)  
& Software [550-stmicroelectronics.pdf](#)

Application Notes [https://www.st.com/resource/en/application\\_note/an5564-getting-started-](https://www.st.com/resource/en/application_note/an5564-getting-started-)  
for related Tools [with-projects-based-on-dualcore-stm32wl-microcontrollers-in-](#)

& Software	<a href="#">stm32cubeide-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an4865-lowpower-timer-lptim-applicative-use-cases-on-stm32-mcus-and-mpus-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an4865-lowpower-timer-lptim-applicative-use-cases-on-stm32-mcus-and-mpus-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an5698-adapting-the-xcubestl-functional-safety-package-for-stm32-iec-61508-compliant-to-other-safety-standards-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an5698-adapting-the-xcubestl-functional-safety-package-for-stm32-iec-61508-compliant-to-other-safety-standards-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an5731-stm32cubemx-and-stm32cubeide-threadsafe-solution-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an5731-stm32cubemx-and-stm32cubeide-threadsafe-solution-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an4502-stm32-smbuspmbus-expansion-package-for-stm32cube-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an4502-stm32-smbuspmbus-expansion-package-for-stm32cube-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an4879-introduction-to-usb-hardware-and-pcb-guidelines-using-stm32-mcus-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an4879-introduction-to-usb-hardware-and-pcb-guidelines-using-stm32-mcus-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an5701-introduction-to-stm32cube-mcu-package-examples-for-stm32u5-mcus-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an5701-introduction-to-stm32cube-mcu-package-examples-for-stm32u5-mcus-stmicroelectronics.pdf</a>
Application Notes for related Tools & Software	<a href="https://www.st.com/resource/en/application_note/an5952-how-to-use-cmake-in-stm32cubeide-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an5952-how-to-use-cmake-in-stm32cubeide-stmicroelectronics.pdf</a>
Errata Sheets	<a href="https://www.st.com/resource/en/errata_sheet/es0587-stm32u535xx-and-stm32u545xx-device-errata-stmicroelectronics.pdf">https://www.st.com/resource/en/errata_sheet/es0587-stm32u535xx-and-stm32u545xx-device-errata-stmicroelectronics.pdf</a>
Datasheet	<a href="https://www.st.com/resource/en/datasheet/dm00943054.pdf">https://www.st.com/resource/en/datasheet/dm00943054.pdf</a>
Programming Manuals	<a href="https://www.st.com/resource/en/programming_manual/pm0264-stm32-cortexm33-mcus-programming-manual-stmicroelectronics.pdf">https://www.st.com/resource/en/programming_manual/pm0264-stm32-cortexm33-mcus-programming-manual-stmicroelectronics.pdf</a>
Reference Manuals	<a href="https://www.st.com/resource/en/reference_manual/rm0456-stm32u5-series-armbased-32bit-mcus-stmicroelectronics.pdf">https://www.st.com/resource/en/reference_manual/rm0456-stm32u5-series-armbased-32bit-mcus-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1163-description-of-wlcsp-for-microcontrollers-and-recommendations-for-its-use-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1163-description-of-wlcsp-for-microcontrollers-and-recommendations-for-its-use-stmicroelectronics.pdf</a>
Technical Notes	<a href="https://www.st.com/resource/en/technical_note/tn1204-tape-and-reel-">https://www.st.com/resource/en/technical_note/tn1204-tape-and-reel-</a>

& Articles	<a href="#">shipping-media-for-stm32-microcontrollers-in-bga-packages-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1205-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-fpn-packages-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1205-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-fpn-packages-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1206-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-qfp-packages-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1206-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-qfp-packages-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1207-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-so-packages-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1207-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-so-packages-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1208-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-tssop-and-ssop-packages-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1208-tape-and-reel-shipping-media-for-stm8-and-stm32-microcontrollers-in-tssop-and-ssop-packages-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1433-reference-device-marking-schematics-for-stm32-microcontrollers-and-microprocessors-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1433-reference-device-marking-schematics-for-stm32-microcontrollers-and-microprocessors-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1474-security-bulletin-tn1474stpsirt-information-on-softwarebased--microarchitectural-timing-sidechannel-attacks-on-mcus-with-trustzone-for--armv8m-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1474-security-bulletin-tn1474stpsirt-information-on-softwarebased--microarchitectural-timing-sidechannel-attacks-on-mcus-with-trustzone-for--armv8m-stmicroelectronics.pdf</a>
Technical Notes & Articles	<a href="https://www.st.com/resource/en/technical_note/tn1489-security-bulletin-tn1489stpsirt-physical-attacks-on-stm32-and-stm32cube-firmware-stmicroelectronics.pdf">https://www.st.com/resource/en/technical_note/tn1489-security-bulletin-tn1489stpsirt-physical-attacks-on-stm32-and-stm32cube-firmware-stmicroelectronics.pdf</a>
User Manuals	<a href="https://www.st.com/resource/en/user_manual/um2875-stm32u5-series-safety-manual-stmicroelectronics.pdf">https://www.st.com/resource/en/user_manual/um2875-stm32u5-series-safety-manual-stmicroelectronics.pdf</a>