



## 1. Description

### 1.1. Project

Project Name	Weather_Station
Board Name	NUCLEO-L031K6
Generated with:	STM32CubeMX 6.8.1
Date	12/28/2023

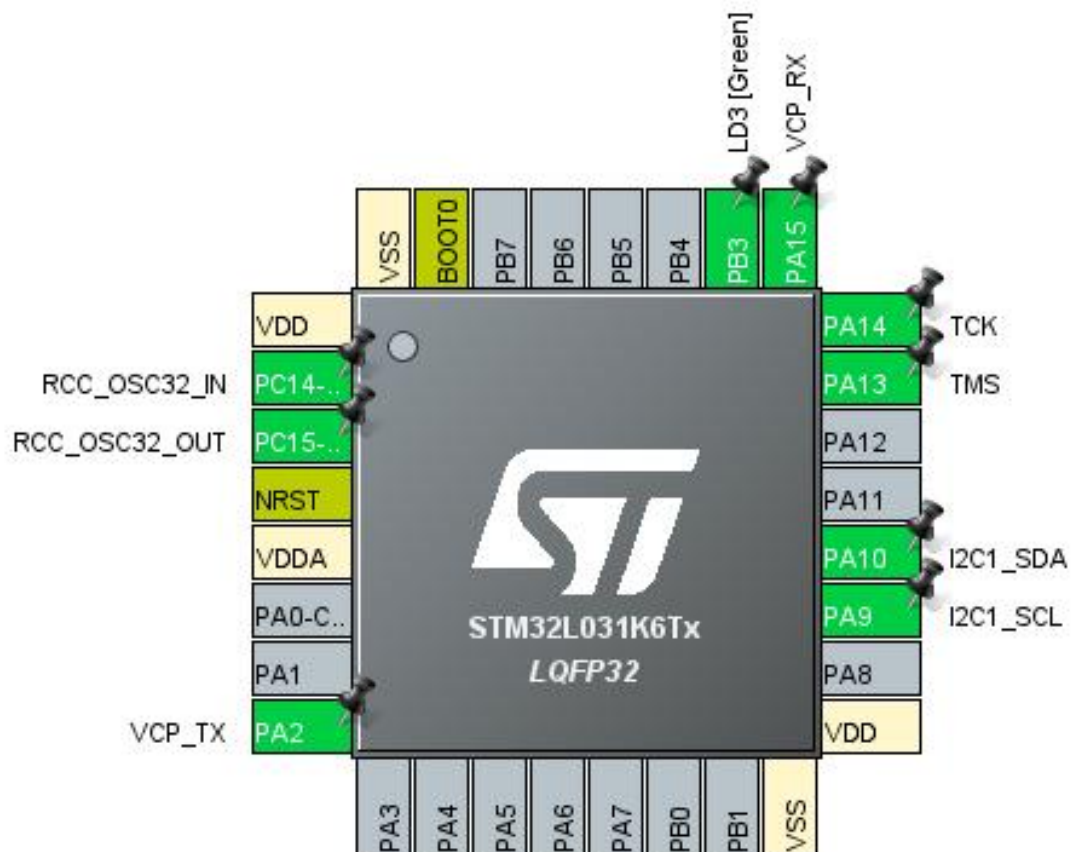
### 1.2. MCU

MCU Series	STM32L0
MCU Line	STM32L0x1
MCU name	STM32L031K6Tx
MCU Package	LQFP32
MCU Pin number	32

### 1.3. Core(s) information

Core(s)	Arm Cortex-M0+
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## 2. Pinout Configuration

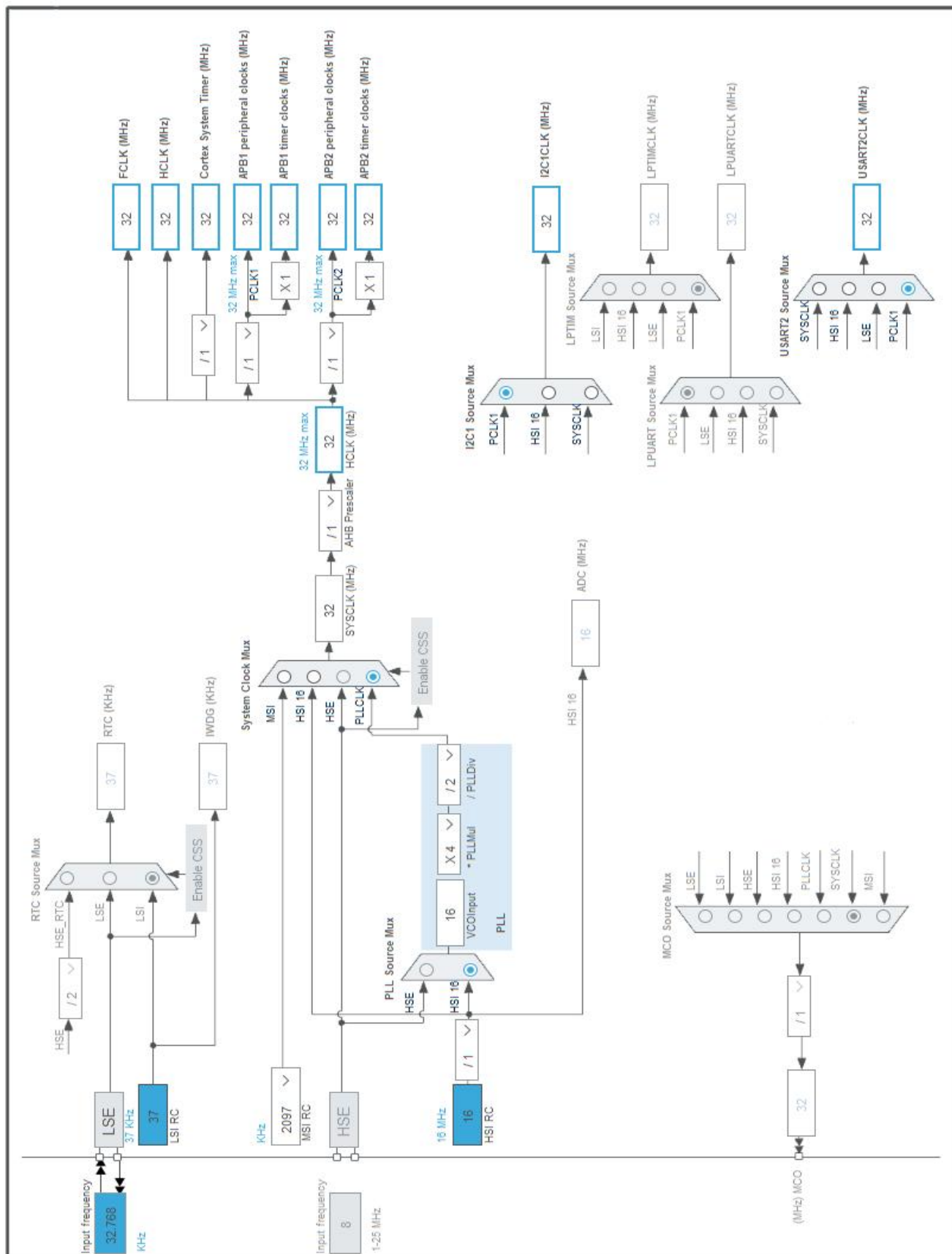


### 3. Pins Configuration

Pin Number LQFP32	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
2	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
3	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
4	NRST	Reset		
5	VDDA	Power		
8	PA2	I/O	USART2_TX	VCP_TX
16	VSS	Power		
17	VDD	Power		
19	PA9	I/O	I2C1_SCL	
20	PA10	I/O	I2C1_SDA	
23	PA13	I/O	SYS_SWDIO	TMS
24	PA14	I/O	SYS_SWCLK	TCK
25	PA15	I/O	USART2_RX	VCP_RX
26	PB3 *	I/O	GPIO_Output	LD3 [Green]
31	BOOT0	Boot		
32	VSS	Power		

\* The pin is affected with an I/O function

## 4. Clock Tree Configuration



## 5. Software Project

### 5.1. Project Settings

Name	Value
Project Name	Weather_Station
Project Folder	C:\Users\adria\Documents\weather-station
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L0 V1.12.2
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_USART2_UART_Init	USART2
4	MX_TIM21_Init	TIM21
5	MX_I2C1_Init	I2C1
6	MX_TIM22_Init	TIM22

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32L0
Line	STM32L0x1
MCU	STM32L031K6Tx
Datasheet	DS10668_Rev4

### 6.2. Parameter Selection

Temperature	25
Vdd	3.0

### 6.3. Battery Selection

Battery	Li-SOCL2(AAA700)
Capacity	700.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	10.0 mA
Max Pulse Current	30.0 mA
Cells in series	1
Cells in parallel	1

#### 6.4. Sequence

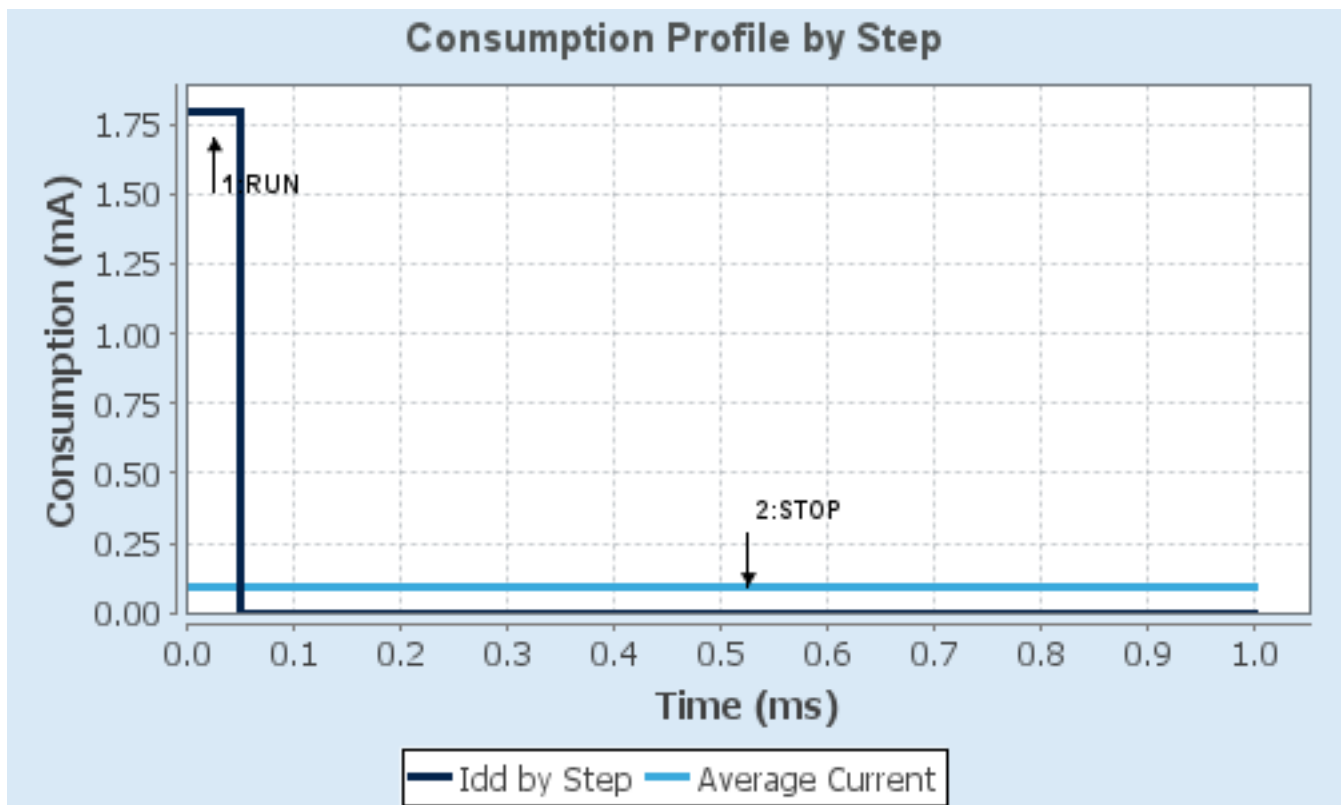
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP
<b>Vdd</b>	3.0	3.0
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	Range2-Medium	NoRange
<b>Fetch Type</b>	RAM	n/a
<b>CPU Frequency</b>	16 MHz	0 Hz
<b>Clock Configuration</b>	HSEBYP	ALL CLOCKS OFF
<b>Clock Source Frequency</b>	16 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	1.8 mA	380 nA
<b>Duration</b>	0.05 ms	0.95 ms
<b>DMIPS</b>	15.0	0.0
<b>Ta Max</b>	104.68	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	90.36 $\mu$ A
Battery Life	10 months, 15 days, 20 hours	Average DMIPS	15.2 DMIPS

#### 6.6. Chart





## 7. Peripherals and Middlewares Configuration

### 7.1. I2C1

#### I2C: I2C

##### 7.1.1. Parameter Settings:

###### Timing configuration:

I2C Speed Mode	<b>Fast Mode *</b>
I2C Speed Frequency (KHz)	400
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	<b>0x00300F38 *</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

### 7.2. RCC

#### Low Speed Clock (LSE) : Crystal/Ceramic Resonator

##### 7.2.1. Parameter Settings:

###### System Parameters:

VDD voltage (V)	3.3
Buffer Cache	Enabled
Prefetch	Disabled
Preread	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

###### RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

###### Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
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### 7.3. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

### 7.4. TIM21

Clock Source : Internal Clock

#### 7.4.1. Parameter Settings:

##### Counter Settings:

Prescaler (PSC - 16 bits value)	<b>32000-1 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>1000 *</b>
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

##### Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

### 7.5. TIM22

Clock Source : Internal Clock

#### 7.5.1. Parameter Settings:

##### Counter Settings:

Prescaler (PSC - 16 bits value)	<b>32-1 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	65535
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

##### Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

### 7.6. USART2

## Mode: Asynchronous

### 7.6.1. Parameter Settings:

#### Basic Parameters:

Baud Rate	115200
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

#### Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples
Single Sample	Disable

#### Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

\* User modified value

## 8. System Configuration

### 8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PA9	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	<b>Very High</b> *	
	PA10	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	<b>Very High</b> *	
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	TMS
	PA14	SYS_SWCLK	n/a	n/a	n/a	TCK
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	VCP_TX
	PA15	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	<b>Very High</b> *	VCP_RX
GPIO	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Green]

### 8.2. DMA configuration

nothing configured in DMA service

### 8.3. NVIC configuration

#### 8.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable Interrupt	true	0	0
Hard fault interrupt	true	0	0
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
TIM21 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash and EEPROM global interrupt	unused		
RCC global interrupt	unused		
TIM22 global interrupt	unused		
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	unused		
USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26	unused		

#### 8.3.2. 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
System service call via SWI instruction	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
TIM21 global interrupt	false	true	true

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

Middleware				
System Core	Analog	Timers	Connectivity	Computing
DMA		TIM21 ✓	I2C1 ✓	
GPIO ✓		TIM22 ✓	USART2 ✓	
IVIC ✓				
RCC ✓				
SYS ✓				

## 10. Docs & Resources

Type	Link
IBIS models	<a href="https://www.st.com/resource/en/ibis_model/stm32l0_ibis.zip">https://www.st.com/resource/en/ibis_model/stm32l0_ibis.zip</a>
System View Description	<a href="https://www.st.com/resource/en/svd/stm32l0_svd.zip">https://www.st.com/resource/en/svd/stm32l0_svd.zip</a>
Presentations	<a href="https://www.st.com/resource/en/product_presentation/gt_stm32f0-l0.pdf">https://www.st.com/resource/en/product_presentation/gt_stm32f0-l0.pdf</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>
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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>
Brochures	<a href="https://www.st.com/resource/en/brochure/brstm32l0.pdf">https://www.st.com/resource/en/brochure/brstm32l0.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/flstm32trust.pdf">https://www.st.com/resource/en/flyer/flstm32trust.pdf</a>
Magazine Articles	<a href="https://www.st.com/resource/en/magazine/design-elektronik_october2016.pdf">https://www.st.com/resource/en/magazine/design-elektronik_october2016.pdf</a>
Application Notes	<a href="https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.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>



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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)

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

errors-in-stm32-applications-stmicroelectronics.pdf

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