



## 1. Description

### 1.1. Project

Project Name	csModbus
Board Name	NUCLEO-F042K6
Generated with:	STM32CubeMX 6.8.0
Date	08/10/2024

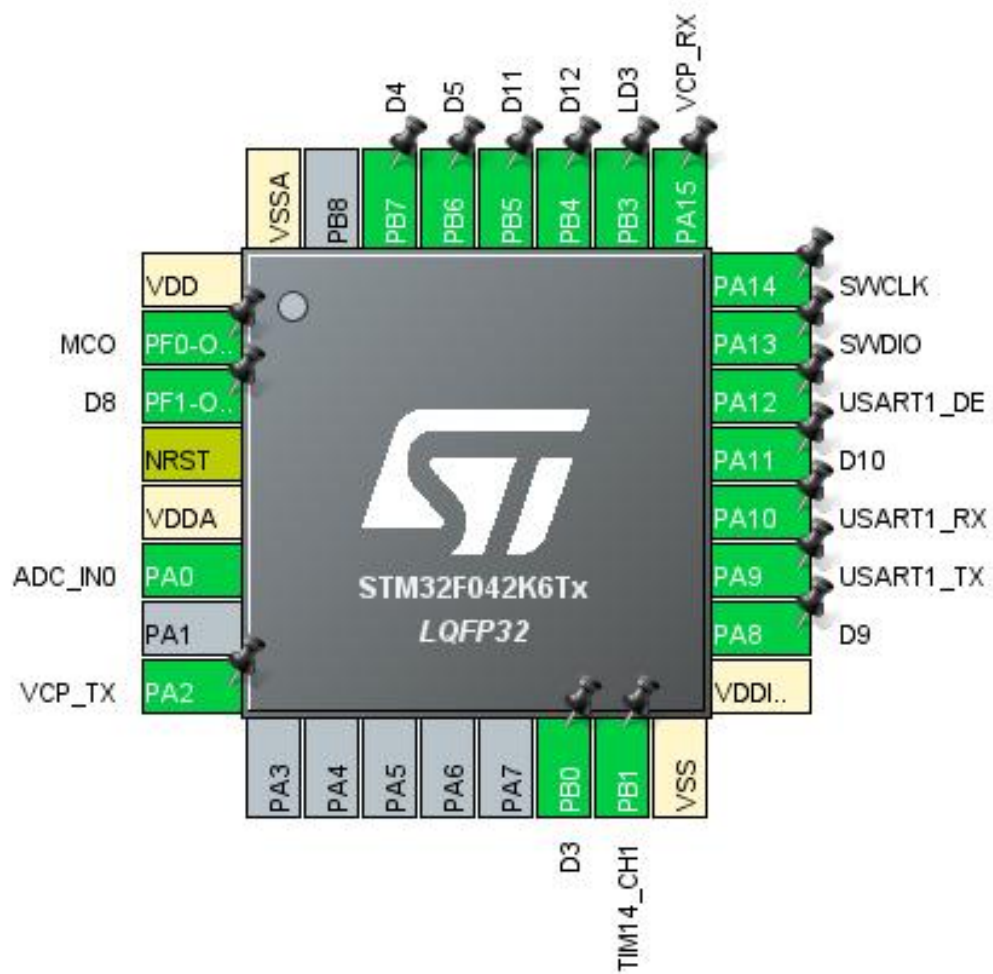
### 1.2. MCU

MCU Series	STM32F0
MCU Line	STM32F0x2
MCU name	STM32F042K6Tx
MCU Package	LQFP32
MCU Pin number	32

### 1.3. Core(s) information

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

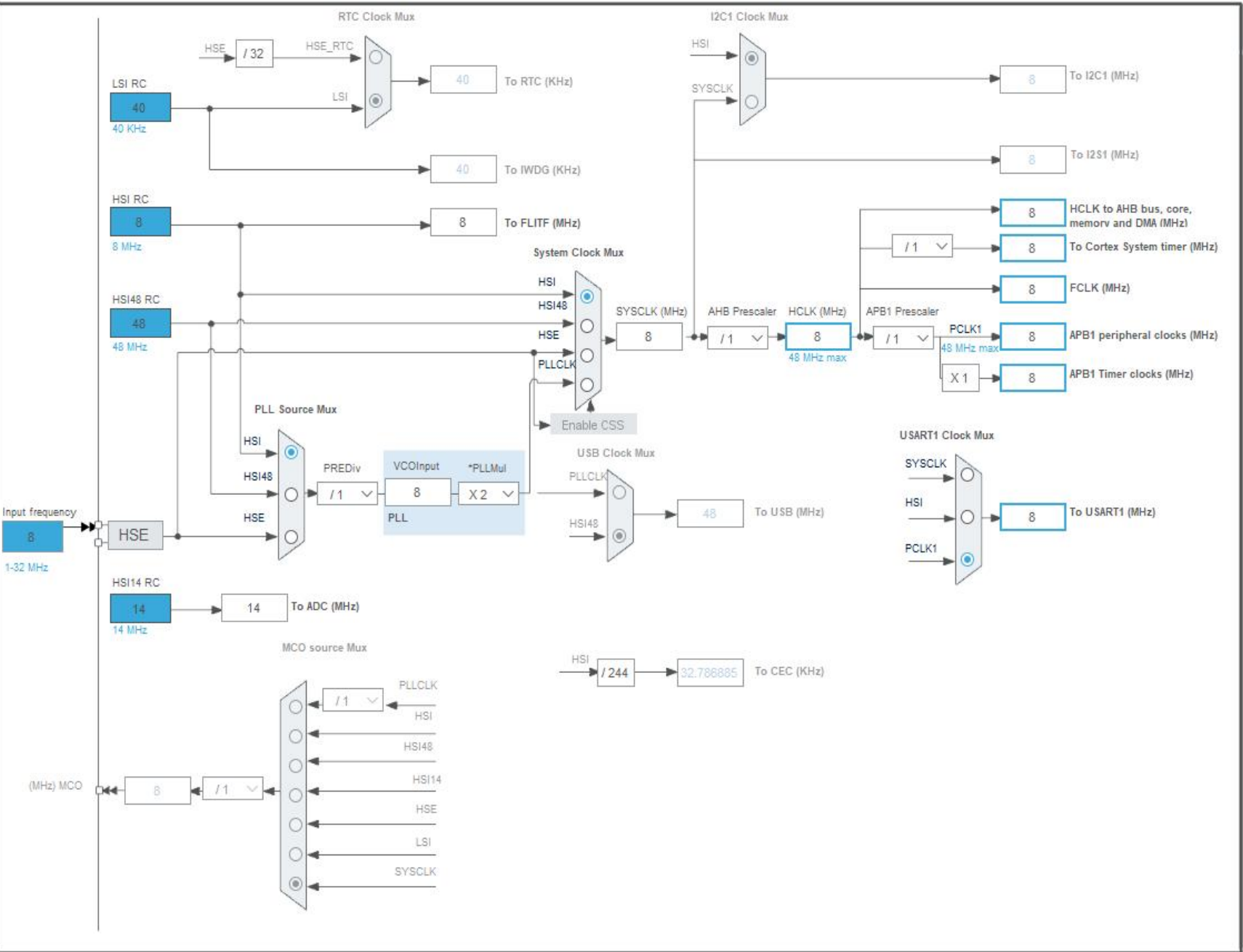


### 3. Pins Configuration

Pin Number LQFP32	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
2	PF0-OSC_IN	I/O	RCC_OSC_IN	MCO
3	PF1-OSC_OUT *	I/O	GPIO_Output	D8
4	NRST	Reset		
5	VDDA	Power		
6	PA0	I/O	ADC_IN0	
8	PA2	I/O	USART2_TX	VCP_TX
14	PB0 *	I/O	GPIO_Output	D3
15	PB1	I/O	TIM14_CH1	
16	VSS	Power		
17	VDDIO2	Power		
18	PA8 *	I/O	GPIO_Input	D9
19	PA9	I/O	USART1_TX	
20	PA10	I/O	USART1_RX	
21	PA11 *	I/O	GPIO_Input	D10
22	PA12	I/O	USART1_DE	
23	PA13	I/O	SYS_SWDIO	SWDIO
24	PA14	I/O	SYS_SWCLK	SWCLK
25	PA15	I/O	USART2_RX	VCP_RX
26	PB3 *	I/O	GPIO_Output	LD3
27	PB4 *	I/O	GPIO_Input	D12
28	PB5 *	I/O	GPIO_Input	D11
29	PB6 *	I/O	GPIO_Output	D5
30	PB7 *	I/O	GPIO_Output	D4
32	VSSA	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	csModbus
Project Folder	D:\CraneSoft\Develop\GitHub\csModbus.cpp\Nucleo-F04K6\CubeMX\csModbus
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F0 V1.11.5
Application Structure	Advanced
Generate Under Root	No
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_ADC_Init	ADC
4	MX_TIM14_Init	TIM14
5	MX_USART1_UART_Init	USART1
6	MX_USART2_UART_Init	USART2

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32F0
Line	STM32F0x2
MCU	STM32F042K6Tx
Datasheet	DS10147_Rev5

### 6.2. Parameter Selection

Temperature	25
Vdd	3.6

### 6.3. 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

#### 6.4. Sequence

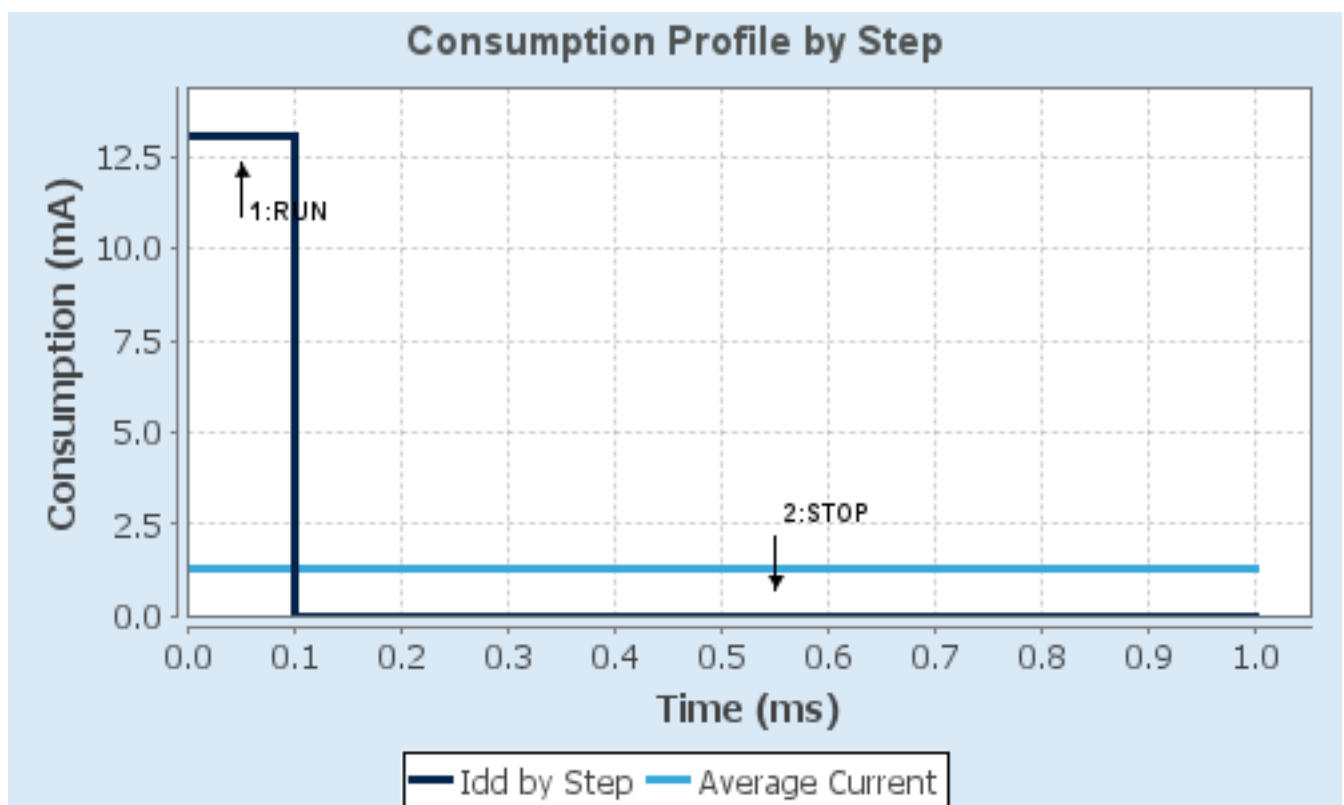
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP
<b>Vdd</b>	3.6	3.6
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	No Scale	No Scale
<b>Fetch Type</b>	FLASH	n/a
<b>CPU Frequency</b>	48 MHz	0 Hz
<b>Clock Configuration</b>	HSI PLL	Regulator LP
<b>Clock Source Frequency</b>	8 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	13.04 mA	6.2 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	0.0	0.0
<b>Ta Max</b>	102.32	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	1.31 mA
Battery Life	3 months, 16 days, 14 hours	Average DMIPS	0.0 DMIPS

#### 6.6. Chart





## 7. Peripherals and Middlewares Configuration

### 7.1. ADC

**mode: IN0**

#### 7.1.1. Parameter Settings:

##### **ADC\_Settings:**

Clock Prescaler	Asynchronous clock mode
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Conversion Mode	Forward
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	End of single conversion
Overrun behaviour	Overrun data preserved
Low Power Auto Wait	Disabled
Low Power Auto Power Off	Disabled

##### **ADC\_Regular\_ConversionMode:**

Sampling Time	1.5 Cycles
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

##### **WatchDog:**

Enable Analog WatchDog Mode	false
Low Threshold	0

### 7.2. RCC

**High Speed Clock (HSE): BYPASS Clock Source**

#### 7.2.1. Parameter Settings:

##### **System Parameters:**

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

##### **RCC Parameters:**

HSI Calibration Value	16
HSI14 Calibration Value	16
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

### 7.3. SYS

**mode: Debug Serial Wire**

### 7.4. TIM14

**mode: Activated**

**Channel1: PWM Generation CH1**

#### 7.4.1. Parameter Settings:

##### **Counter Settings:**

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	65535
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

##### **PWM Generation Channel 1:**

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

### 7.5. USART1

**Mode: Asynchronous**

**mode: Hardware Flow Control (RS485)**

#### 7.5.1. Parameter Settings:

##### **Basic Parameters:**

Baud Rate	<b>19200 *</b>
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
Polarity	High

Assertion Time	0
Deassertion Time	0

**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

## 7.6. USART2

### Mode: Asynchronous

#### 7.6.1. Parameter Settings:

**Basic Parameters:**

Baud Rate	38400
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:**

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
ADC	PA0	ADC_IN0	Analog mode	No pull-up and no pull-down	n/a	
RCC	PF0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	MCO
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	SWDIO
	PA14	SYS_SWCLK	n/a	n/a	n/a	SWCLK
TIM14	PB1	TIM14_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	High *	
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	High *	
	PA12	USART1_DE	Alternate Function Push Pull	No pull-up and no pull-down	High *	
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	High *	VCP_TX
	PA15	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	High *	VCP_RX
GPIO	PF1-OSC_OUT	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D8
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D3
	PA8	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	D9
	PA11	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	D10
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3
	PB4	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	D12
	PB5	GPIO_Input	Input mode	<b>Pull-down *</b>	n/a	D11
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D5
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D4

### 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
PVD and VDDIO2 supply comparator interrupts through EXTI lines 16 and 31	unused		
Flash global interrupt	unused		
RCC and CRS global interrupts	unused		
ADC interrupt	unused		
TIM14 global interrupt	unused		
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	unused		
USART2 global interrupt	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

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

Middleware					
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System Core	Analog	Timers	Connectivity	Multimedia	Computing
DMA	ADC ✓	TIM14 ✓	USART1 ✓		
GPIO ✓			USART2 ✓		
IIVIC ✓					
RCC ✓					
SYS ✓					

## 10. Docs & Resources

Type	Link
IBIS models	<a href="https://www.st.com/resource/en/ibis_model/stm32f0_ibis.zip">https://www.st.com/resource/en/ibis_model/stm32f0_ibis.zip</a>
System View Description	<a href="https://www.st.com/resource/en/svd/stm32f0_svd.zip">https://www.st.com/resource/en/svd/stm32f0_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>
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Brochures	<a href="https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf">https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf</a>
Flyers	<a href="https://www.st.com/resource/en/flyer/flstm32nucleo.pdf">https://www.st.com/resource/en/flyer/flstm32nucleo.pdf</a>
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Flyers	<a href="https://www.st.com/resource/en/flyer/fldpstpf11120.pdf">https://www.st.com/resource/en/flyer/fldpstpf11120.pdf</a>
Product Certifications	<a href="https://www.st.com/resource/en/certification_document/stm32_authentication_can.pdf">https://www.st.com/resource/en/certification_document/stm32_authentication_can.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-">https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-</a>



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