



## 1. Description

### 1.1. Project

|                 |                   |
|-----------------|-------------------|
| Project Name    | WIFI_MODULE       |
| Board Name      | custom            |
| Generated with: | STM32CubeMX 6.9.2 |
| Date            | 06/22/2024        |

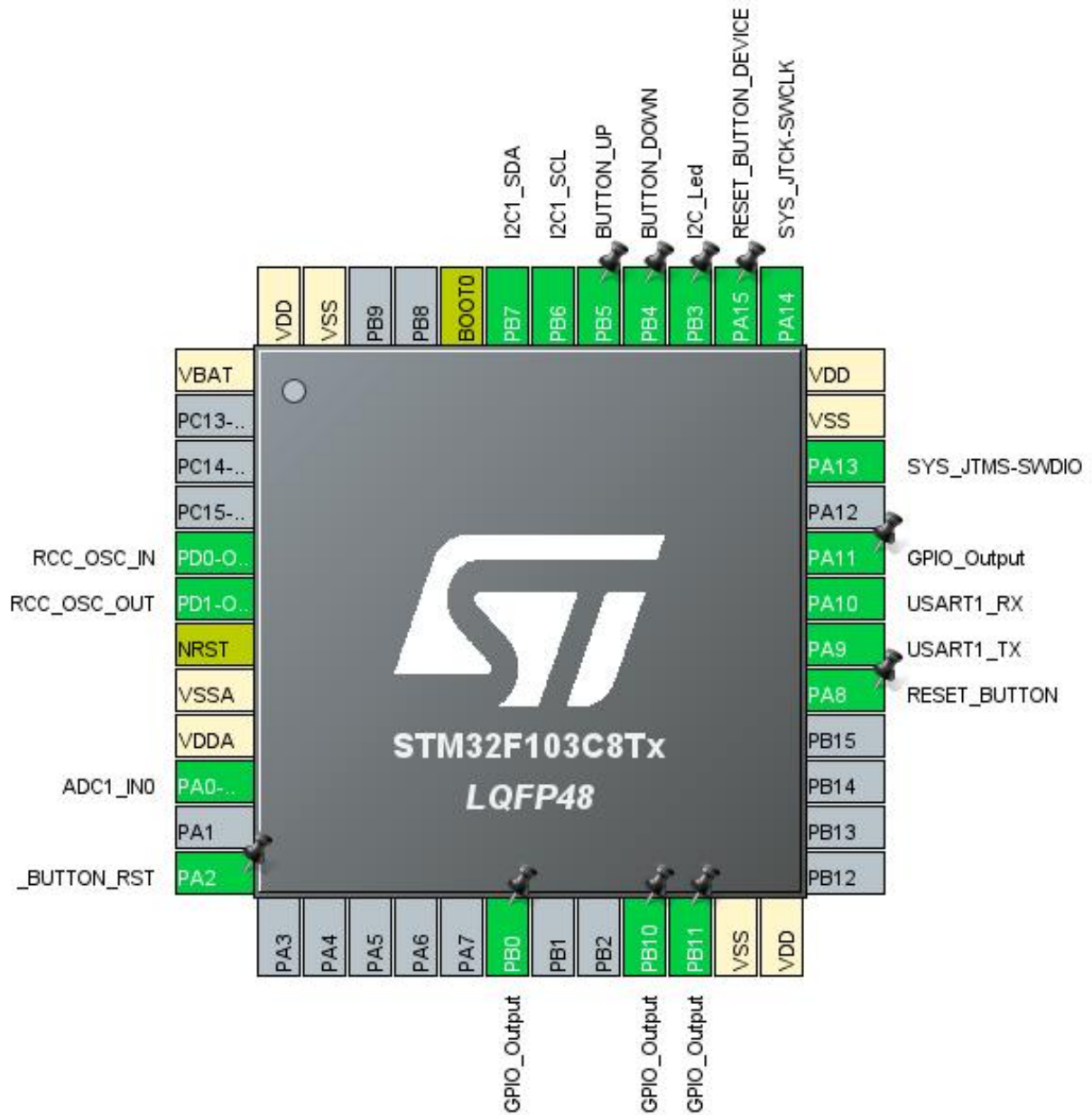
### 1.2. MCU

|                |               |
|----------------|---------------|
| MCU Series     | STM32F1       |
| MCU Line       | STM32F103     |
| MCU name       | STM32F103C8Tx |
| MCU Package    | LQFP48        |
| MCU Pin number | 48            |

### 1.3. Core(s) information

|         |               |
|---------|---------------|
| Core(s) | Arm Cortex-M3 |
|---------|---------------|

## 2. Pinout Configuration



### 3. Pins Configuration

| Pin Number<br>LQFP48 | Pin Name<br>(function after<br>reset) | Pin Type | Alternate<br>Function(s) | Label               |
|----------------------|---------------------------------------|----------|--------------------------|---------------------|
| 1                    | VBAT                                  | Power    |                          |                     |
| 5                    | PD0-OSC_IN                            | I/O      | RCC_OSC_IN               |                     |
| 6                    | PD1-OSC_OUT                           | I/O      | RCC_OSC_OUT              |                     |
| 7                    | NRST                                  | Reset    |                          |                     |
| 8                    | VSSA                                  | Power    |                          |                     |
| 9                    | VDDA                                  | Power    |                          |                     |
| 10                   | PA0-WKUP                              | I/O      | ADC1_IN0                 |                     |
| 12                   | PA2 *                                 | I/O      | GPIO_Output              | _BUTTON_RST         |
| 18                   | PB0 *                                 | I/O      | GPIO_Output              |                     |
| 21                   | PB10 *                                | I/O      | GPIO_Output              |                     |
| 22                   | PB11 *                                | I/O      | GPIO_Output              |                     |
| 23                   | VSS                                   | Power    |                          |                     |
| 24                   | VDD                                   | Power    |                          |                     |
| 29                   | PA8                                   | I/O      | GPIO_EXTI8               | RESET_BUTTON        |
| 30                   | PA9                                   | I/O      | USART1_TX                |                     |
| 31                   | PA10                                  | I/O      | USART1_RX                |                     |
| 32                   | PA11 *                                | I/O      | GPIO_Output              |                     |
| 34                   | PA13                                  | I/O      | SYS_JTMS-SWDIO           |                     |
| 35                   | VSS                                   | Power    |                          |                     |
| 36                   | VDD                                   | Power    |                          |                     |
| 37                   | PA14                                  | I/O      | SYS_JTCK-SWCLK           |                     |
| 38                   | PA15                                  | I/O      | GPIO_EXTI15              | RESET_BUTTON_DEVICE |
| 39                   | PB3 *                                 | I/O      | GPIO_Output              | I2C_Led             |
| 40                   | PB4                                   | I/O      | GPIO_EXTI4               | BUTTON_DOWN         |
| 41                   | PB5                                   | I/O      | GPIO_EXTI5               | BUTTON_UP           |
| 42                   | PB6                                   | I/O      | I2C1_SCL                 |                     |
| 43                   | PB7                                   | I/O      | I2C1_SDA                 |                     |
| 44                   | BOOT0                                 | Boot     |                          |                     |
| 47                   | VSS                                   | Power    |                          |                     |
| 48                   | VDD                                   | Power    |                          |                     |

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



## 5. Software Project

### 5.1. Project Settings

| Name                              | Value                         |
|-----------------------------------|-------------------------------|
| Project Name                      | WIFI_MODULE                   |
| Project Folder                    | D:\STM32Workspace\WIFI_MODULE |
| Toolchain / IDE                   | STM32CubeIDE                  |
| Firmware Package Name and Version | STM32Cube FW_F1 V1.8.5        |
| 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   | No                                    |
| 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_USART1_UART_Init | USART1                   |
| 4    | MX_I2C1_Init        | I2C1                     |
| 5    | MX_TIM2_Init        | TIM2                     |
| 6    | MX_ADC1_Init        | ADC1                     |
| 7    | MX_TIM3_Init        | TIM3                     |

## 1. Power Consumption Calculator report

### 1.1. Microcontroller Selection

|           |               |
|-----------|---------------|
| Series    | STM32F1       |
| Line      | STM32F103     |
| MCU       | STM32F103C8Tx |
| Datasheet | DS5319_Rev17  |

### 1.2. Parameter Selection

|             |     |
|-------------|-----|
| Temperature | 25  |
| Vdd         | 3.3 |

### 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

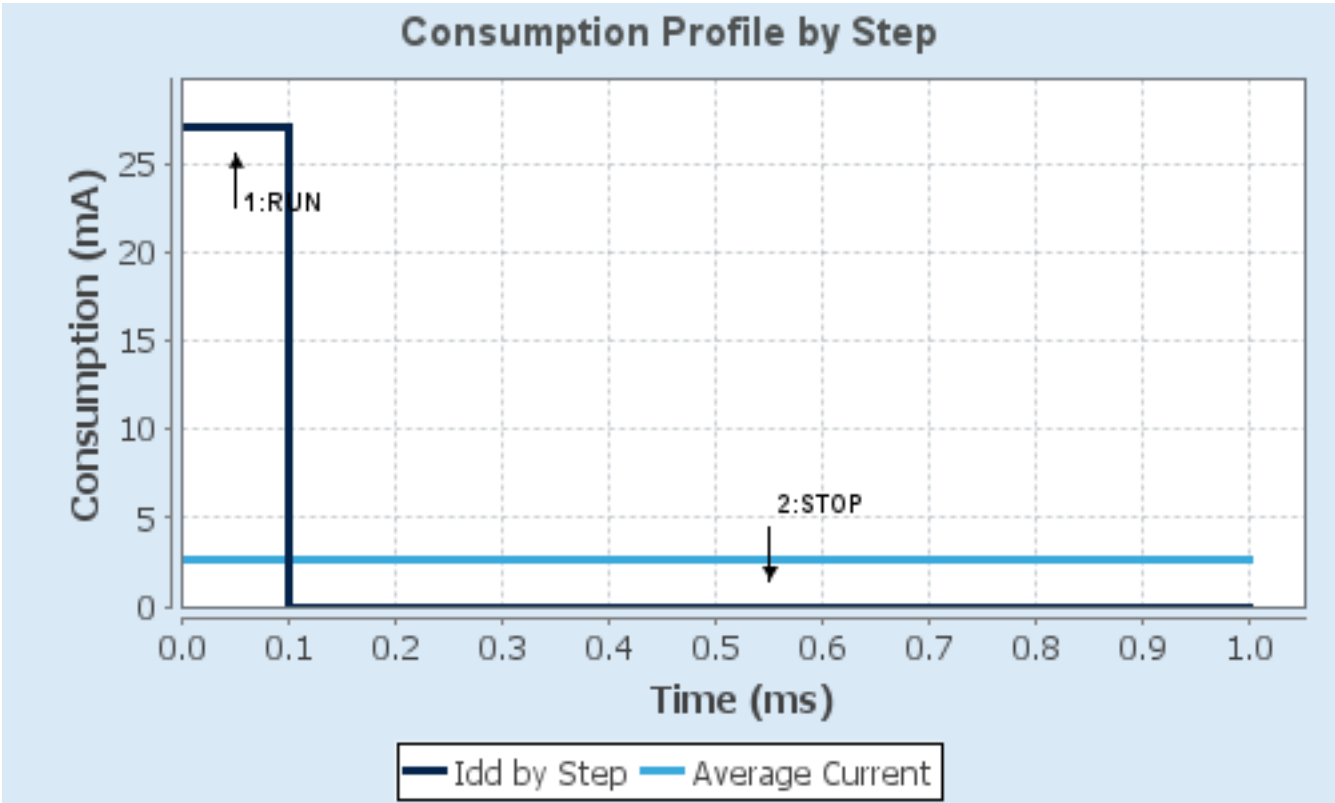
|                               |             |              |
|-------------------------------|-------------|--------------|
| <b>Step</b>                   | Step1       | Step2        |
| <b>Mode</b>                   | RUN         | STOP         |
| <b>Vdd</b>                    | 3.3         | 3.3          |
| <b>Voltage Source</b>         | Battery     | Battery      |
| <b>Range</b>                  | No Scale    | No Scale     |
| <b>Fetch Type</b>             | FLASH       | n/a          |
| <b>CPU Frequency</b>          | 72 MHz      | 0 Hz         |
| <b>Clock Configuration</b>    | HSE 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>        | 27 mA       | 14 $\mu$ A   |
| <b>Duration</b>               | 0.1 ms      | 0.9 ms       |
| <b>DMIPS</b>                  | 90.0        | 0.0          |
| <b>Ta Max</b>                 | 100.1       | 105          |
| <b>Category</b>               | In DS Table | In DS Table  |

#### 1.5. Results

|               |                               |                 |            |
|---------------|-------------------------------|-----------------|------------|
| Sequence Time | 1 ms                          | Average Current | 2.71 mA    |
| Battery Life  | 1 month, 21 days,<br>17 hours | Average DMIPS   | 61.0 DMIPS |

#### 1.6. Chart





## 2. Peripherals and Middlewares Configuration

### 2.1. ADC1

mode: IN0

#### 2.1.1. Parameter Settings:

##### ADCs\_Common\_Settings:

Mode Independent mode

##### ADC\_Settings:

Data Alignment Right alignment

Scan Conversion Mode Disabled

Continuous Conversion Mode **Enabled \***

Discontinuous Conversion Mode Disabled

##### ADC\_Regular\_ConversionMode:

Enable Regular Conversions Enable

Number Of Conversion 1

External Trigger Conversion Source Regular Conversion launched by software

Rank 1

Channel Channel 0

Sampling Time **239.5 Cycles \***

##### ADC\_Injected\_ConversionMode:

Enable Injected Conversions Disable

##### WatchDog:

Enable Analog WatchDog Mode false

### 2.2. I2C1

I2C: I2C

#### 2.2.1. Parameter Settings:

##### Master Features:

I2C Speed Mode **Fast Mode \***

I2C Clock Speed (Hz) 400000

Fast Mode Duty Cycle **Duty cycle Tlow/Thigh = 16/9 \***

##### Slave Features:

Clock No Stretch Mode Disabled

Primary Address Length selection 7-bit

Dual Address Acknowledged Disabled

Primary slave address 0

General Call address detection Disabled

## 2.3. RCC

### High Speed Clock (HSE): Crystal/Ceramic Resonator

#### 2.3.1. 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   |
| HSE Startup Timeout Value (ms) | 100  |
| LSE Startup Timeout Value (ms) | 5000 |

## 2.4. SYS

### Debug: Serial Wire

## 2.5. TIM2

### Clock Source : Internal Clock

#### 2.5.1. Parameter Settings:

##### Counter Settings:

|   |             |
|---|-------------|
| Prescaler (PSC - 16 bits value)                       | 249 *       |
| Counter Mode  | Up          |
| Counter Period (AutoReload Register - 16 bits value ) | 63999 *     |
| 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)               |

## 2.6. TIM3

### mode: Clock Source

### 2.6.1. Parameter Settings:

#### **Counter Settings:**

|   |                |
|---|----------------|
| Prescaler (PSC - 16 bits value)                       | <b>15 *</b>    |
| Counter Mode  | Up             |
| Counter Period (AutoReload Register - 16 bits value ) | <b>49999 *</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)               |

## **2.7. USART1**

### **Mode: Asynchronous**

### 2.7.1. 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           |

**\* User modified value**

### 3. System Configuration

#### 3.1. GPIO configuration

| IP     | Pin         | Signal         | GPIO mode  | GPIO pull/up pull down      | Max Speed | User Label          |
|--------|-------------|----------------|--|-----------------------------|-----------|---------------------|
| ADC1   | PA0-WKUP    | ADC1_IN0       | Analog mode                                      | n/a                         | n/a       |                     |
| I2C1   | PB6         | I2C1_SCL       | Alternate Function Open Drain                    | n/a                         | High *    |                     |
|        | PB7         | I2C1_SDA       | Alternate Function Open Drain                    | n/a                         | High *    |                     |
| RCC    | PD0-OSC_IN  | RCC_OSC_IN     | n/a  | n/a                         | n/a       |                     |
|        | PD1-OSC_OUT | RCC_OSC_OUT    | n/a  | n/a                         | n/a       |                     |
| SYS    | PA13        | SYS_JTMS-SWDIO | n/a  | n/a                         | n/a       |                     |
|        | PA14        | SYS_JTCK-SWCLK | n/a  | n/a                         | n/a       |                     |
| USART1 | PA9         | USART1_TX      | Alternate Function Push Pull                     | n/a                         | High *    |                     |
|        | PA10        | USART1_RX      | Input mode                                       | No pull-up and no pull-down | n/a       |                     |
| GPIO   | PA2         | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       | _BUTTON_RST         |
|        | PB0         | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       |                     |
|        | PB10        | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       |                     |
|        | PB11        | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       |                     |
|        | PA8         | GPIO_EXTI8     | External Interrupt Mode with Rising/Falling edge | Pull-up *                   | n/a       | RESET_BUTTON        |
|        | PA11        | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       |                     |
|        | PA15        | GPIO_EXTI15    | External Interrupt Mode with Rising/Falling edge | Pull-up *                   | n/a       | RESET_BUTTON_DEVICE |
|        | PB3         | GPIO_Output    | Output Push Pull                                 | No pull-up and no pull-down | Low       | I2C_Led             |
|        | PB4         | GPIO_EXTI4     | External Interrupt Mode with Rising/Falling edge | Pull-up *                   | n/a       | BUTTON_DOWN         |
|        | PB5         | GPIO_EXTI5     | External Interrupt Mode with Rising/Falling edge | Pull-up *                   | n/a       | BUTTON_UP           |

#### 3.2. DMA configuration

nothing configured in DMA service

### 3.3. NVIC configuration

#### 3.3.1. 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           |
| EXTI line4 interrupt                    | true   | 1                    | 0           |
| ADC1 and ADC2 global interrupts         | true   | 3                    | 0           |
| EXTI line[9:5] interrupts               | true   | 1                    | 0           |
| TIM2 global interrupt                   | true   | 1                    | 0           |
| TIM3 global interrupt                   | true   | 2                    | 0           |
| USART1 global interrupt                 | true   | 0                    | 0           |
| PVD interrupt through EXTI line 16      | unused |                      |             |
| Flash global interrupt                  | unused |                      |             |
| RCC global interrupt                    | unused |                      |             |
| I2C1 event interrupt                    | unused |                      |             |
| I2C1 error interrupt                    | unused |                      |             |
| EXTI line[15:10] interrupts             | unused |                      |             |

#### 3.3.2. 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            |
| 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             |
| EXTI line4 interrupt                    | false                             | true                 | true             |
| ADC1 and ADC2 global interrupts         | false                             | true                 | true             |
| EXTI line[9:5] interrupts               | false                             | true                 | true             |

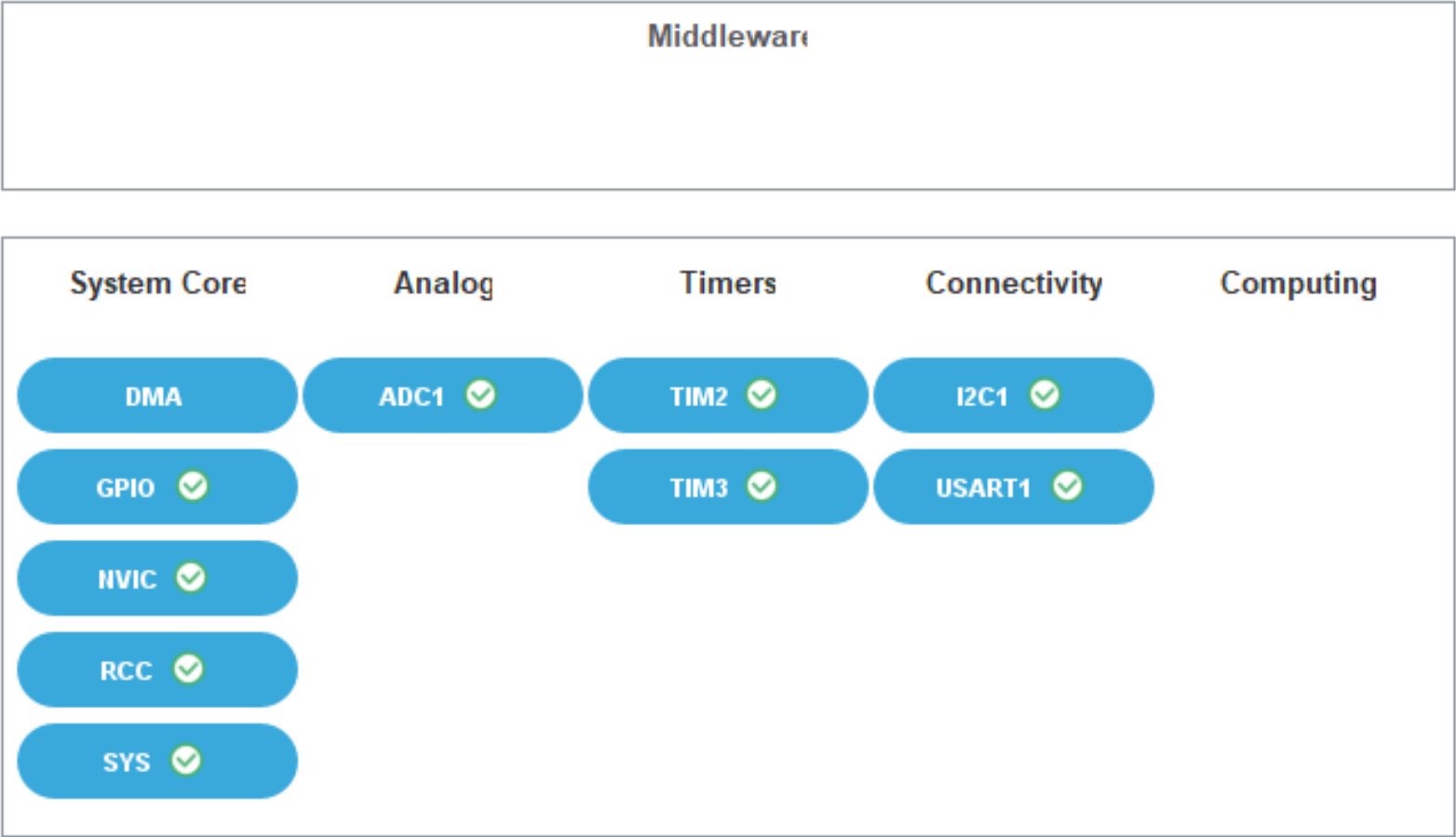
| Enabled interrupt Table | Select for init<br>sequence ordering | Generate IRQ<br>handler | Call HAL handler |
|-------------------------|--------------------------------------|-------------------------|------------------|
| TIM2 global interrupt   | false                                | true                    | true             |
| TIM3 global interrupt   | false                                | true                    | true             |
| USART1 global interrupt | false                                | true                    | true             |

\* User modified value



## 4. System Views

- 4.1. Category view
- 4.1.1. Current



## 5. Docs & Resources

| Type                    | Link  |
|-------------------------|---|
| BSDL files              | <a href="https://www.st.com/resource/en/bsdl_model/stm32f1_bsd1.zip">https://www.st.com/resource/en/bsdl_model/stm32f1_bsd1.zip</a>   |
| IBIS models             | <a href="https://www.st.com/resource/en/ibis_model/stm32ibis.zip">https://www.st.com/resource/en/ibis_model/stm32ibis.zip</a>   |
| System View Description | <a href="https://www.st.com/resource/en/svd/stm32f1_svd.zip">https://www.st.com/resource/en/svd/stm32f1_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-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/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>   |
| Flyers                  | <a href="https://www.st.com/resource/en/flyer/flstmcsuite.pdf">https://www.st.com/resource/en/flyer/flstmcsuite.pdf</a>   |
| Flyers                  | <a href="https://www.st.com/resource/en/flyer/fldpstpfc11120.pdf">https://www.st.com/resource/en/flyer/fldpstpfc11120.pdf</a>   |
| Product Certifications  | <a href="https://www.st.com/resource/en/certification_document/1239988349.pdf">https://www.st.com/resource/en/certification_document/1239988349.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/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/an2586-getting-started-with-stm32f10xxx-hardware-development-stmicroelectronics.pdf">https://www.st.com/resource/en/application_note/an2586-getting-started-with-stm32f10xxx-hardware-development-stmicroelectronics.pdf</a> |

Application Notes [https://www.st.com/resource/en/application\\_note/an2604-stm32f101xx-and-stm32f103xx-rtc-calibration-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an2604-stm32f101xx-and-stm32f103xx-rtc-calibration-stmicroelectronics.pdf)

Application Notes [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)

Application Notes [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)

Application Notes [https://www.st.com/resource/en/application\\_note/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an2945-stm8s-and-stm32-mcus-a-consistent-832bit-product-line-for-painless-migration-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3070-managing-the-driver-enable-signal-for-rs485-and-iolink-communications-with-the-stm32s-usart-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an3095-stevalisv002v1-stevalisv002v2-3-kw-gridconnected-pv-system-based-on-the-stm32f103xx-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3095-stevalisv002v1-stevalisv002v2-3-kw-gridconnected-pv-system-based-on-the-stm32f103xx-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an3108-stlm75-firmware-library-for-the-stm32f10x-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3108-stlm75-firmware-library-for-the-stm32f10x-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/an3128-stm32-embedded-graphic-objectstouchscreen-library-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3128-stm32-embedded-graphic-objectstouchscreen-library-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-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)

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Application Notes [https://www.st.com/resource/en/application\\_note/an3364-migration-and-compatibility-guidelines-for-stm32-microcontroller-applications-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an3364-migration-and-compatibility-guidelines-for-stm32-microcontroller-applications-stmicroelectronics.pdf)

Application Notes [https://www.st.com/resource/en/application\\_note/an3422-migration-of-](https://www.st.com/resource/en/application_note/an3422-migration-of-)

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