
STM32
CubeMX

# 1. Description

## 1.1. Project

| | |
|---|---|
| Project Name | ElbALTM1 |
| Board Name | custom |
| Generated with: | STM32CubeMX 6.14.1 |
| Date | 07/30/2025 |

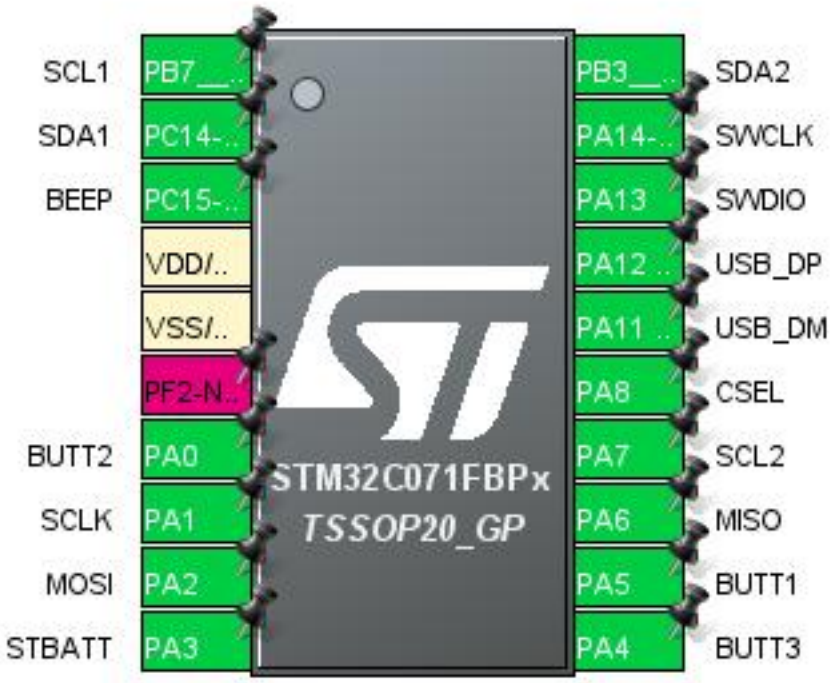
## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32C0 |
| MCU Line | STM32C0x1 |
| MCU name | STM32C071FBPx |
| MCU Package | TSSOP20_GP |
| MCU Pin number | 25 |

## 1.3. Core(s) information

| | |
|---|---|
| Core(s) | ARM Cortex-M0+ |

## 2. Pinout Configuration

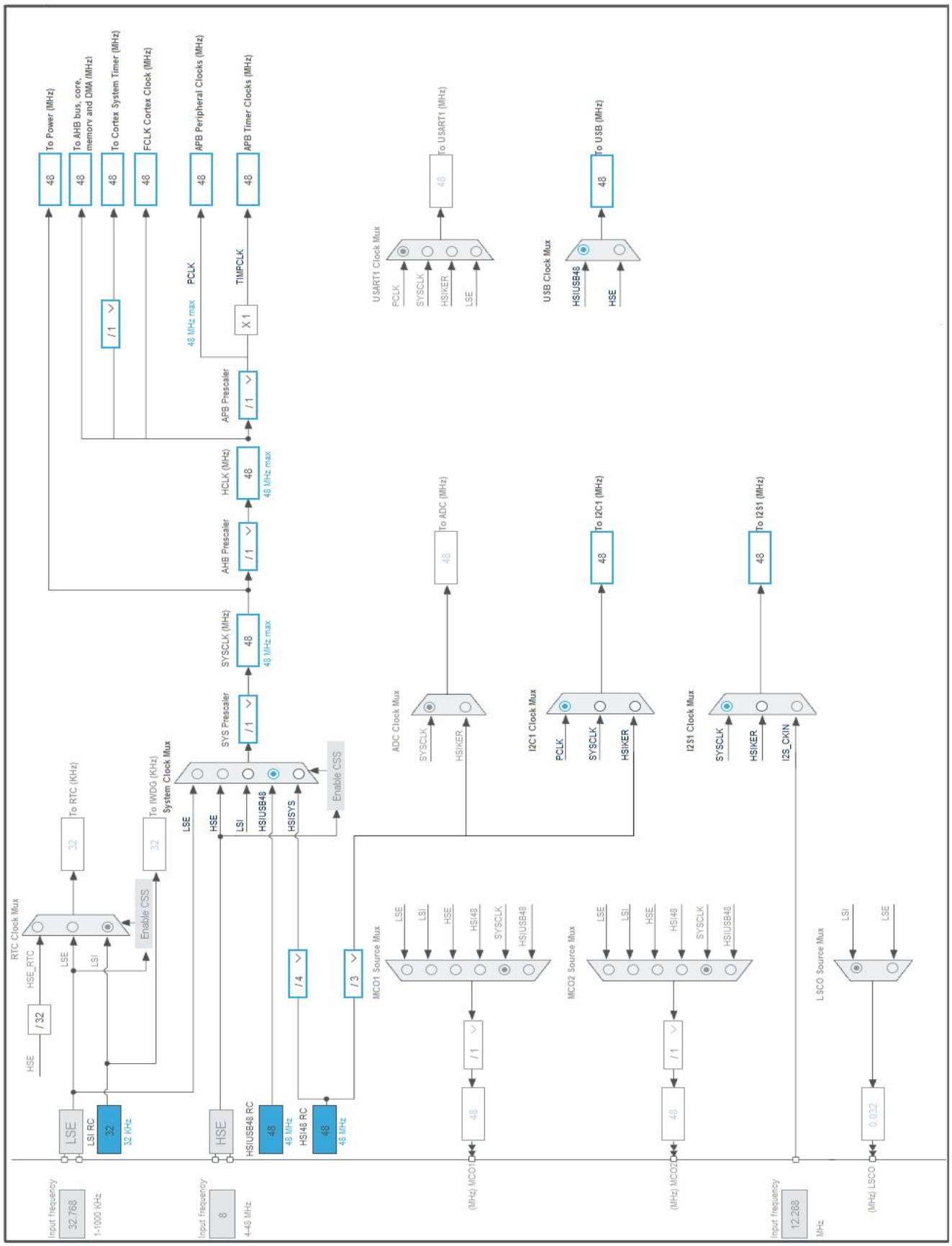


# 3. Pins Configuration

| Pin Number TSSOP20_GP | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | PB7 | I/O | I2C1_SCL | SCL1 |
| 2 | PC14-OSCX_IN(PC14) | I/O | I2C1_SDA | SDA1 |
| 3 | PC15-OSCX_OUT(PC15) | I/O | TIM3_CH3 | BEEP |
| 4 | VDD/VDDA | Power | | |
| 5 | VSS/VSSA | Power | | |
| 6 | PF2-NRST | I/O | | |
| 7 | PA0 * | I/O | GPIO_Input | BUTT2 |
| 8 | PA1 | I/O | SPI1_SCK | SCLK |
| 9 | PA2 | I/O | SPI1_MOSI | MOSI |
| 10 | PA3 * | I/O | GPIO_Input | STBATT |
| 11 | PA4 * | I/O | GPIO_Input | BUTT3 |
| 12 | PA5 * | I/O | GPIO_Input | BUTT1 |
| 13 | PA6 | I/O | SPI1_MISO | MISO |
| 14 | PA7 | I/O | I2C2_SCL | SCL2 |
| 15 | PA8 * | I/O | GPIO_Output | CSEL |
| 16 | PA11 [PA9] | I/O | USB_DM | |
| 17 | PA12 [PA10] | I/O | USB_DP | |
| 18 | PA13 | I/O | DEBUG_SWDIO | SWDIO |
| 19 | PA14-BOOT0 | I/O | DEBUG_SWCLK | SWCLK |
| 20 | PB4 | I/O | I2C2_SDA | SDA2 |

* The pin is affected with an I/O function

# 4. Clock Tree Configuration



# 1. Power Consumption Calculator report

## 1.1. Microcontroller Selection

| | |
|---|---|
| Series | STM32C0 |
| Line | STM32C0x1 |
| MCU | STM32C071FBPx |
| Datasheet | DS00000_Rev0 |

## 1.2. Parameter Selection

| | |
|---|---|
| Temperature | 25 |
| Vdd | 3.0 |

## 1.3. 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 |

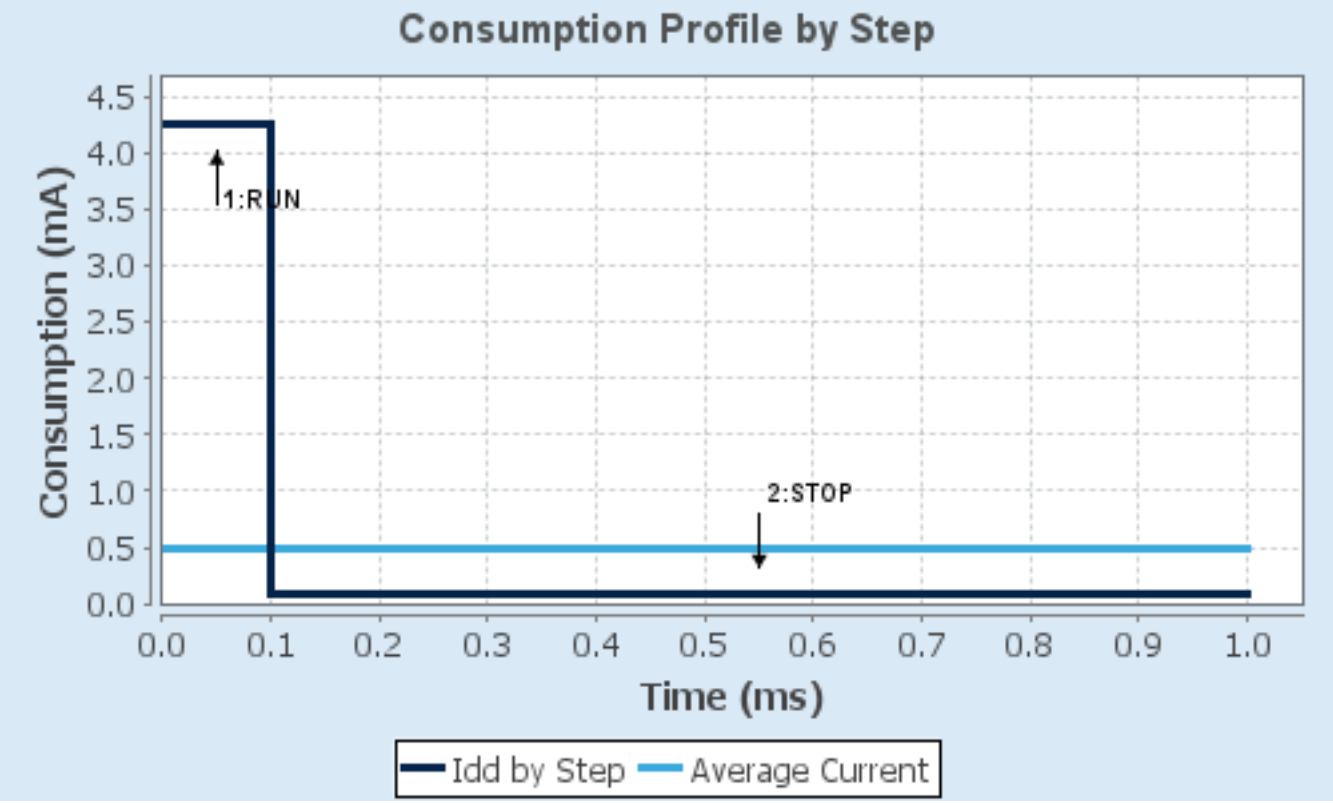
## 1.4. Sequence

| ***Step*** | Step1 | Step2 |
|---|---|---|
| ***Mode*** | RUN | STOP |
| ***Vdd*** | 3.0 | 3.0 |
| ***Voltage Source*** | Battery | Battery |
| ***Range*** | NaN/SMPS | NaN/SMPS |
| ***Fetch Type*** | FLASH/Cache/PREFETCH | Flash-PowerDownStop |
| ***CPU Frequency*** | 48 MHz | 0 Hz |
| ***Clock Configuration*** | HSI48 | LSE |
| ***Clock Source Frequency*** | 48 MHz | 32.768 kHz |
| ***Peripherals*** | | |
| ***Additional Cons.*** | 0 mA | 0 mA |
| ***Average Current*** | 4.25 mA | 79.5 µA |
| ***Duration*** | 0.1 ms | 0.9 ms |
| ***DMIPS*** | 60.0 | 0.0 |
| ***Ta Max*** | 104.41 | 104.99 |
| ***Category*** | In DS Table | In DS Table |

## 1.5. Results

| Sequence Time | 1 ms | Average Current | 496.55 µA |
|---|---|---|---|
| Battery Life | 1 month, 28 days, 5 hours | Average DMIPS | 60.0 DMIPS |

## 1.6. Chart


Consumption Profile by Step
Consumption (mA)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1:RUN
2:STOP
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

# 2. Software Project

## 2.1. Project Settings

| Name | Value |
|---|---|
| Project Name | ElbALTM1 |
| Project Folder | C:\dirpers\Progetti x MCU\ElbALTM\fw\ElbALTM1 |
| Toolchain / IDE | CMake |
| Firmware Package Name and Version | STM32Cube FW_C0 V1.4.0 |
| Application Structure | Advanced |
| Generate Under Root | No |
| Do not generate the main() | No |
| Minimum Heap Size | 0x200 |
| Minimum Stack Size | 0x400 |

## 2.2. 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 | Yes |

## 2.3. 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_TIM3_Init | TIM3 |
| 5 | MX_USB_PCD_Init | USB |
| 6 | MX_I2C2_Init | I2C2 |
| 7 | MX_SPI1_Init | SPI1 |

# 3. Peripherals and Middlewares Configuration

## 3.1. DEBUG

**mode: Debug**

## 3.2. I2C1

**I2C: I2C**

### 3.2.1. Parameter Settings:

**Timing configuration:**

| | |
|---|---|
| Custom Timing | Disabled |
| I2C Speed Mode | **Fast Mode *** |
| I2C Speed Frequency (KHz) | 400 |
| Rise Time (ns) | 100 |
| Fall Time (ns) | 100 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | **0x0090194B *** |

**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 |

## 3.3. I2C2

**mode: I2C**

### 3.3.1. Parameter Settings:

**Timing configuration:**

| | |
|---|---|
| Custom Timing | Disabled |
| I2C Speed Mode | **Fast Mode *** |
| I2C Speed Frequency (KHz) | 400 |
| Rise Time (ns) | 100 |
| Fall Time (ns) | 100 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | **0x0090194B *** |

**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 |

## 3.4. RCC

### 3.4.1. Parameter Settings:

**System Parameters:**

| | |
|---|---|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Enabled |
| Prefetch Buffer | Disabled |
| Data Cache | Enabled |
| Flash Latency(WS) | 1 WS (2 HCLK cycle) |

**RCC Parameters:**

| | |
|---|---|
| HSI Calibration Value | 64 |
| HSE Startup Timout Value (ms) | 100 |
| LSE Startup Timout Value (ms) | 5000 |

## 3.5. SPI1

## Mode: Full-Duplex Master

### 3.5.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Frame Format | Motorola |
| Data Size | 8 Bits |
| First Bit | MSB First |

**Clock Parameters:**

| | |
|---|---|
| Prescaler (for Baud Rate) | 2 |
| Baud Rate | **24.0 MBits/s *** |
| Clock Polarity (CPOL) | Low |
| Clock Phase (CPHA) | 1 Edge |

**Advanced Parameters:**

| | |
|---|---|
| CRC Calculation | Disabled |
| NSSP Mode | Enabled |

| | |
|---|---|
| NSS Signal Type | Software |

## 3.6. SYS

## Timebase Source: SysTick

## 3.7. TIM3

## Clock Source : Internal Clock

## Channel3: PWM Generation CH3

### 3.7.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | **48-1 *** |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | **4000 *** |
| Internal Clock Division (CKD) | No Division |
| auto-reload preload | **Enable *** |

**Trigger Output (TRGO) Parameters:**

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

**Clear Input:**

| | |
|---|---|
| Clear Input Source | Disable |

**PWM Generation Channel 3:**

| | |
|---|---|
| Mode | PWM mode 1 |
| Pulse (16 bits value) | **2000 *** |
| Output compare preload | Enable |
| Fast Mode | Disable |
| CH Polarity | High |

## 3.8. USB

## Mode: Device_Only

### 3.8.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Speed | Full Speed 12MBit/s |
| Physical interface | Internal Phy |
| Signal start of frame | Disabled |

**Power Parameters:**

| | |
|---|---|
| Low Power | Disabled |
| Link Power Management | Disabled |
| Battery Charging | Disabled |

**EndPoint Parameters:**

| | |
|---|---|
| Bulk double buffer | Disabled |
| Iso single buffer | Disabled |

*** User modified value**

# 4. System Configuration

## 4.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
| DEBUG | PA13 | DEBUG_SWDIO | n/a | n/a | n/a | SWDIO |
| | PA14-BOOT0 | DEBUG_SWCLK | n/a | n/a | n/a | SWCLK |
| I2C1 | PB7 | I2C1_SCL | Alternate Function Open Drain | No pull-up and no pull-down | Low | SCL1 |
| | PC14-OSCX_IN(PC14) | I2C1_SDA | Alternate Function Open Drain | No pull-up and no pull-down | Low | SDA1 |
| I2C2 | PA7 | I2C2_SCL | Alternate Function Open Drain | No pull-up and no pull-down | Low | SCL2 |
| | PB4 | I2C2_SDA | Alternate Function Open Drain | No pull-up and no pull-down | Low | SDA2 |
| SPI1 | PA1 | SPI1_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Low | SCLK |
| | PA2 | SPI1_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Low | MOSI |
| | PA6 | SPI1_MISO | Alternate Function Push Pull | No pull-up and no pull-down | Low | MISO |
| TIM3 | PC15-OSCX_OUT(PC15) | TIM3_CH3 | Alternate Function Push Pull | No pull-up and no pull-down | Low | BEEP |
| USB | PA11 [PA9] | USB_DM | n/a | n/a | n/a | |
| | PA12 [PA10] | USB_DP | n/a | n/a | n/a | |
| GPIO | PA0 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | BUTT2 |
| | PA3 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | STBATT |
| | PA4 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | BUTT3 |
| | PA5 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | BUTT1 |
| | PA8 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | CSEL |

## 4.2. DMA configuration

nothing configured in DMA service

## 4.3. NVIC configuration

### 4.3.1. 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 | 3 | 0 |
| Flash global interrupt | unused | | |
| RCC global Interrupt + CRS global interrupt | unused | | |
| USB global interrupt (combined with EXTI 33) | unused | | |
| TIM3 global interrupt | unused | | |
| I2C1 interrupt (combined with EXTI 23) | unused | | |
| I2C2 interrupt | unused | | |
| SPI1 interrupt | unused | | |

### 4.3.2. NVIC Code generation

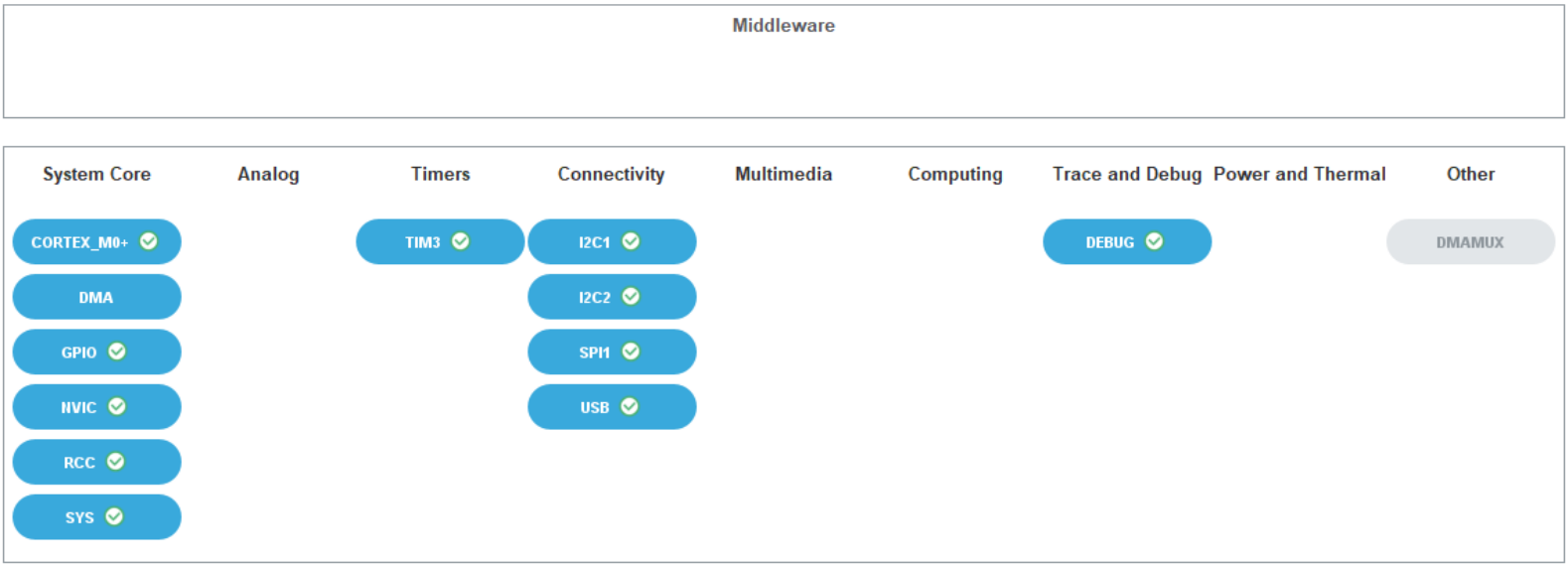
| Enabled interrupt Table | Select for init sequence ordering | Generate IRQ handler | Call HAL handler |
|---|---|---|---|
| Non maskable interrupt | false | true | false |
| Hard fault interrupt | false | true | false |
| System service call via SWI instruction | false | true | false |
| Pendable request for system service | false | true | false |
| System tick timer | false | true | true |

*** User modified value**

# 5. System Views

## 5.1. Category view

### *5.1.1. Current*



# 6. Docs & Resources

| Type | Link |
|---|---|
| IBIS models | https://www.st.com/resource/en/ibis_model/stm32c0-ibis.zip |
| System View Description | https://www.st.com/resource/en/svd/stm32c0-svd.zip |
| Presentations | https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf |
| Presentations | https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf |
| Presentations | https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf |
| Presentations | https://www.st.com/resource/en/product_presentation/microcontrollers-stm32c0-series-overview.pdf |
| Presentations | https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf |
| Presentations | https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-entry-level-graphics.pdf |
| Brochures | https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf |
| Flyers | https://www.st.com/resource/en/flyer/flstm32nucleo.pdf |
| Flyers | https://www.st.com/resource/en/flyer/fldpstpfc11120.pdf |
| Flyers | https://www.st.com/resource/en/flyer/flstm32c0.pdf |
| Security Bulletin | https://www.st.com/resource/en/technical_note/tn1489-security-bulletin-tn1489stpsirt-physical-attacks-on-stm32-and-stm32cube-firmware-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf |
| Application Notes | 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/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 |
| Application Notes | 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/an4221-i2c-protocol-used-in-the-stm32-bootloader-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 |
| Application Notes | 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/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 |
| Application Notes | 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/an5027-interfacing-pdm-digital-microphones-using-stm32-mcus-and-mpus-stmicroelectronics.pdf |
| Application Notes | 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 |
| Application Notes | 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/an5780-migration-of-applications-from-atmega328-family-to-stm32c0-series-microcontrollers-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5857-using- |

| | |
|---|---|
| | xcuberccalib-software-to-calibrate-stm32c0-series-internal-rc-oscillator-stmicroelectronics.pdf |
| Application Notes | 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/an5225-introduction-to-usb-typec-power-delivery-for-stm32-mcus-and-mpus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an4894-how-to-use-eeprom-emulation-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 |
| Application Notes | https://www.st.com/resource/en/application_note/an2548-introduction-to-dma-controller-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an4013-introduction-to-timers-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an4277-how-to-use-pwm-shutdown-for-motor-control-and-digital-power-conversion-on-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an4759-introduction-to-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an4908-getting-started-with-usart-automatic-baud-rater-detection-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5156-introduction-to-security-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5224-introduction-to-dmamux-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5543-guidelines-for-enhanced-spi-communication-on-stm32-mcus-and-mpus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5775-migrating-from- |

| | |
|---|---|
| | stm8l-and-stm8s-to-stm32c0-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5348-introduction-to-fdcan-peripherals-for-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5673-getting-started-with-stm32c0-mcu-hardware-development-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an5969-migrating-between-stm32g0-and-stm32c0-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/cd00211314-how-to-optimize-the-adc-accuracy-in-the-stm32-mcus-stmicroelectronics.pdf |
| Application Notes | https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack2-mcus-and-mpus-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an4631-how-to-calibrate-an-stm32l0xx-internal-rc-oscillator-stmicroelectronics.pdf |
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| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an4736-how-to-calibrate-stm32l4-series-microcontrollers-internal-rc-oscillator-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an4841-digital-signal-processing-for-stm32-microcontrollers-using-cmsis-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5282-using-xcuberccalib-software-to-calibrate-stm32wb-series-internal-rc-oscillators-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5360-getting-started-with-projects-based-on-the-stm32mp1-series-in-stm32cubeide-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5361-getting-started-with-projects-based-on-dualcore-stm32h7-microcontrollers-in-stm32cubeide-stmicroelectronics.pdf |

| | |
|---|---|
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5394-getting-started-with-projects-based-on-the-stm32l5-series-in-stm32cubeide-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5418-how-to-build-a-simple-usbpd-sink-application-with-stm32cubemx-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5426-migrating-graphics-middleware-projects-from-stm32cubemx-540-to-stm32cubemx-550-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5564-getting-started-with-projects-based-on-dualcore-stm32wl-microcontrollers-in-stm32cubeide-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5731-stm32cubemx-and-stm32cubeide-threadsafe-solution-stmicroelectronics.pdf |
| Application Notes for related Tools & Software | https://www.st.com/resource/en/application_note/an5802-stm32cube-mcu-package-examples-for-stm32c0-series-stmicroelectronics.pdf |
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| Datasheet | https://www.st.com/resource/en/datasheet/dm01085881.pdf |
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