



1. Description

1.1. Project

| | |
|-----------------|-------------------|
| Project Name | densitometer |
| Board Name | custom |
| Generated with: | STM32CubeMX 6.3.0 |
| Date | 08/27/2021 |

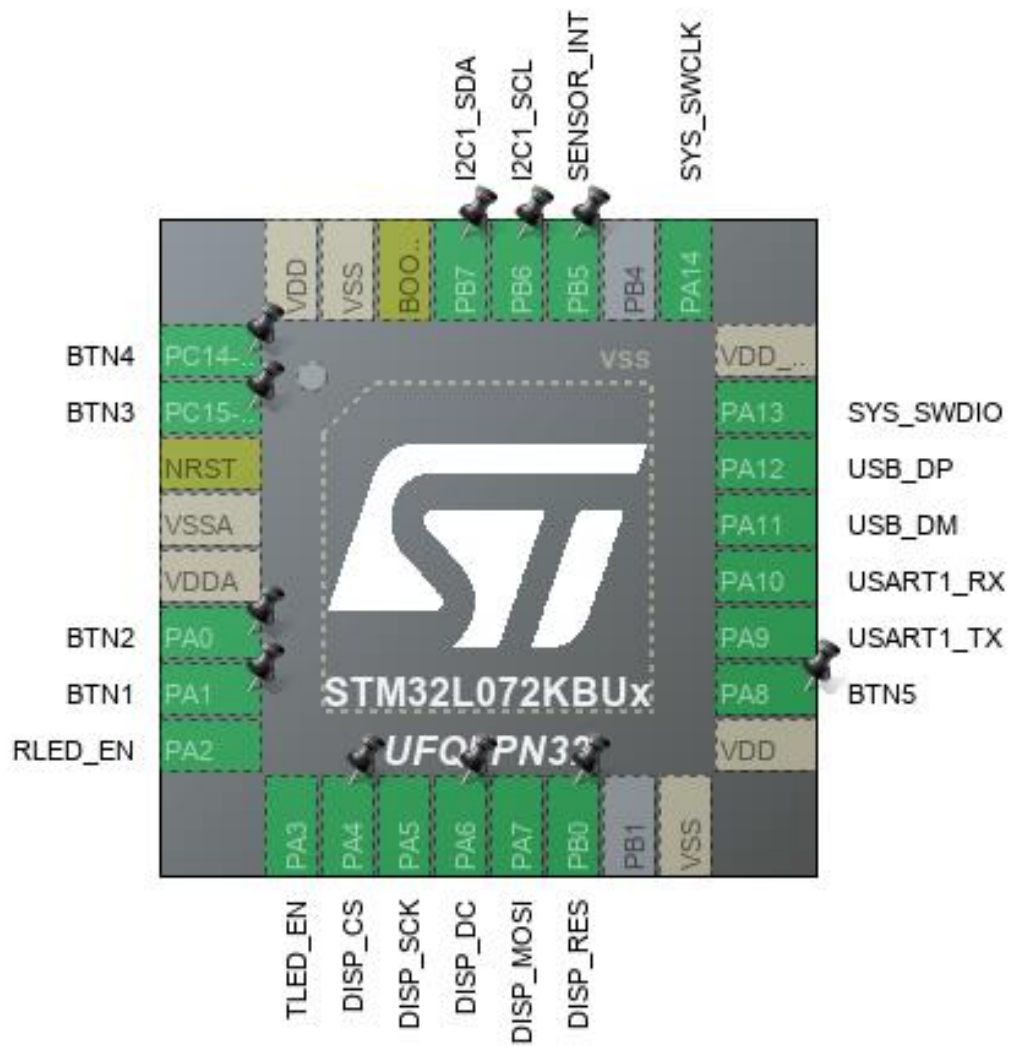
1.2. MCU

| | |
|----------------|---------------|
| MCU Series | STM32L0 |
| MCU Line | STM32L0x2 |
| MCU name | STM32L072KBUx |
| MCU Package | UFQFPN32 |
| MCU Pin number | 32 |

1.3. Core(s) information

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

2. Pinout Configuration

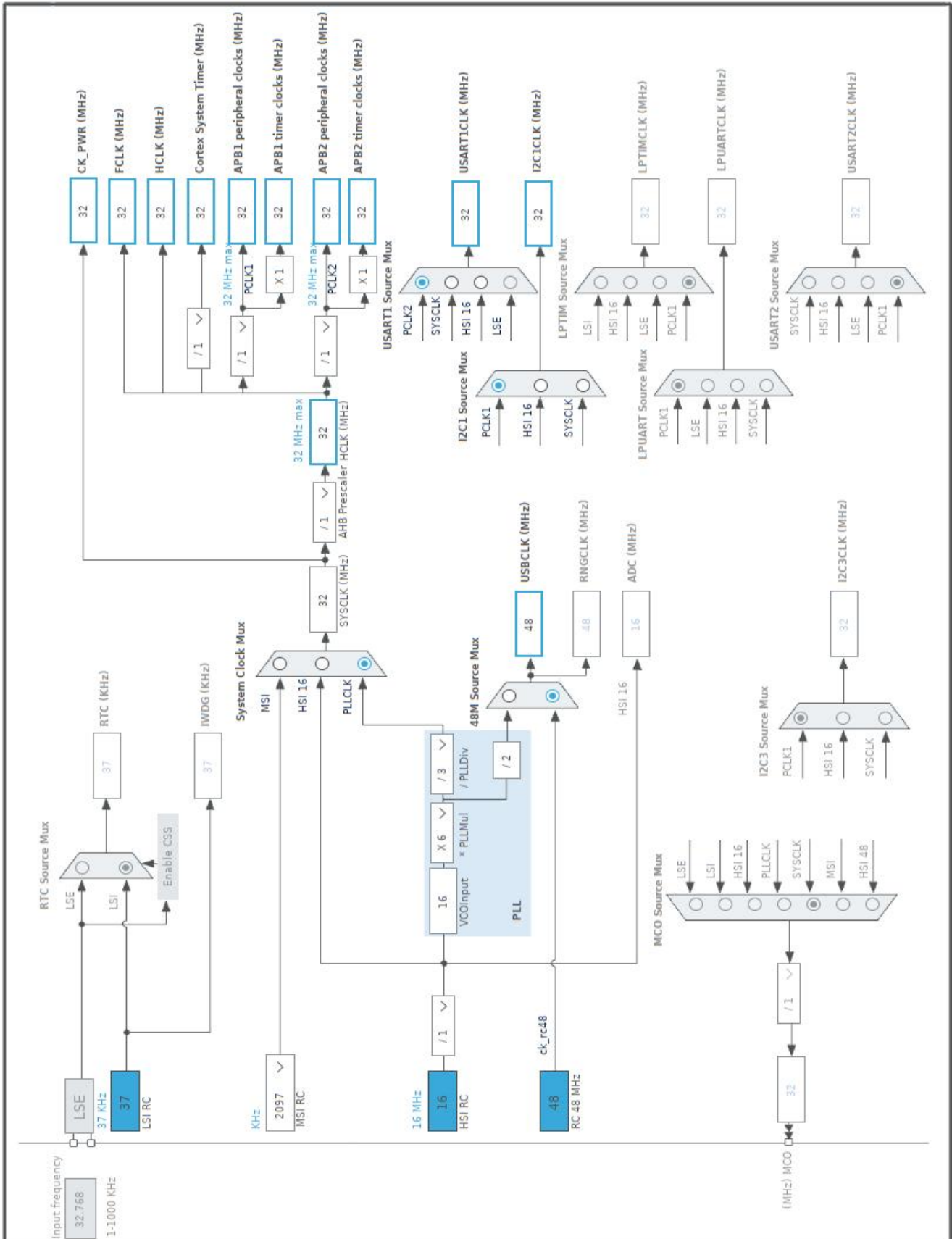


3. Pins Configuration

| Pin Number UFQFPN32 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|------------------------|---------------------------------------|----------|--------------------------|------------|
| 1 | PC14-OSC32_IN | I/O | GPIO_EXTI14 | BTN4 |
| 2 | PC15-OSC32_OUT | I/O | GPIO_EXTI15 | BTN3 |
| 3 | NRST | Reset | | |
| 4 | VSSA | Power | | |
| 5 | VDDA | Power | | |
| 6 | PA0 | I/O | GPIO_EXTI0 | BTN2 |
| 7 | PA1 | I/O | GPIO_EXTI1 | BTN1 |
| 8 | PA2 | I/O | TIM2_CH3 | RLED_EN |
| 9 | PA3 | I/O | TIM2_CH4 | TLED_EN |
| 10 | PA4 * | I/O | GPIO_Output | DISP_CS |
| 11 | PA5 | I/O | SPI1_SCK | DISP_SCK |
| 12 | PA6 * | I/O | GPIO_Output | DISP_DC |
| 13 | PA7 | I/O | SPI1_MOSI | DISP_MOSI |
| 14 | PB0 * | I/O | GPIO_Output | DISP_RES |
| 16 | VSS | Power | | |
| 17 | VDD | Power | | |
| 18 | PA8 | I/O | GPIO_EXTI8 | BTN5 |
| 19 | PA9 | I/O | USART1_TX | |
| 20 | PA10 | I/O | USART1_RX | |
| 21 | PA11 | I/O | USB_DM | |
| 22 | PA12 | I/O | USB_DP | |
| 23 | PA13 | I/O | SYS_SWDIO | |
| 24 | VDD_USB | Power | | |
| 25 | PA14 | I/O | SYS_SWCLK | |
| 27 | PB5 | I/O | GPIO_EXTI5 | SENSOR_INT |
| 28 | PB6 | I/O | I2C1_SCL | |
| 29 | PB7 | I/O | I2C1_SDA | |
| 30 | BOOT0 | Boot | | |
| 31 | VSS | Power | | |
| 32 | VDD | 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 | densitometer |
| Project Folder | /home/octo/devel/densitometer/docs/cube |
| Toolchain / IDE | STM32CubeIDE |
| Firmware Package Name and Version | STM32Cube FW_L0 V1.12.1 |
| 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) | Yes |
| 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_SPI1_Init | SPI1 |
| 5 | MX_TIM2_Init | TIM2 |
| 6 | MX_USART1_UART_Init | USART1 |
| 7 | MX_USB_DEVICE_Init | USB_DEVICE |

6. Power Consumption Calculator report

6.1. Microcontroller Selection

| | |
|-----------|---------------|
| Series | STM32L0 |
| Line | STM32L0x2 |
| MCU | STM32L072KBUx |
| Datasheet | DS10689_Rev5 |

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 |

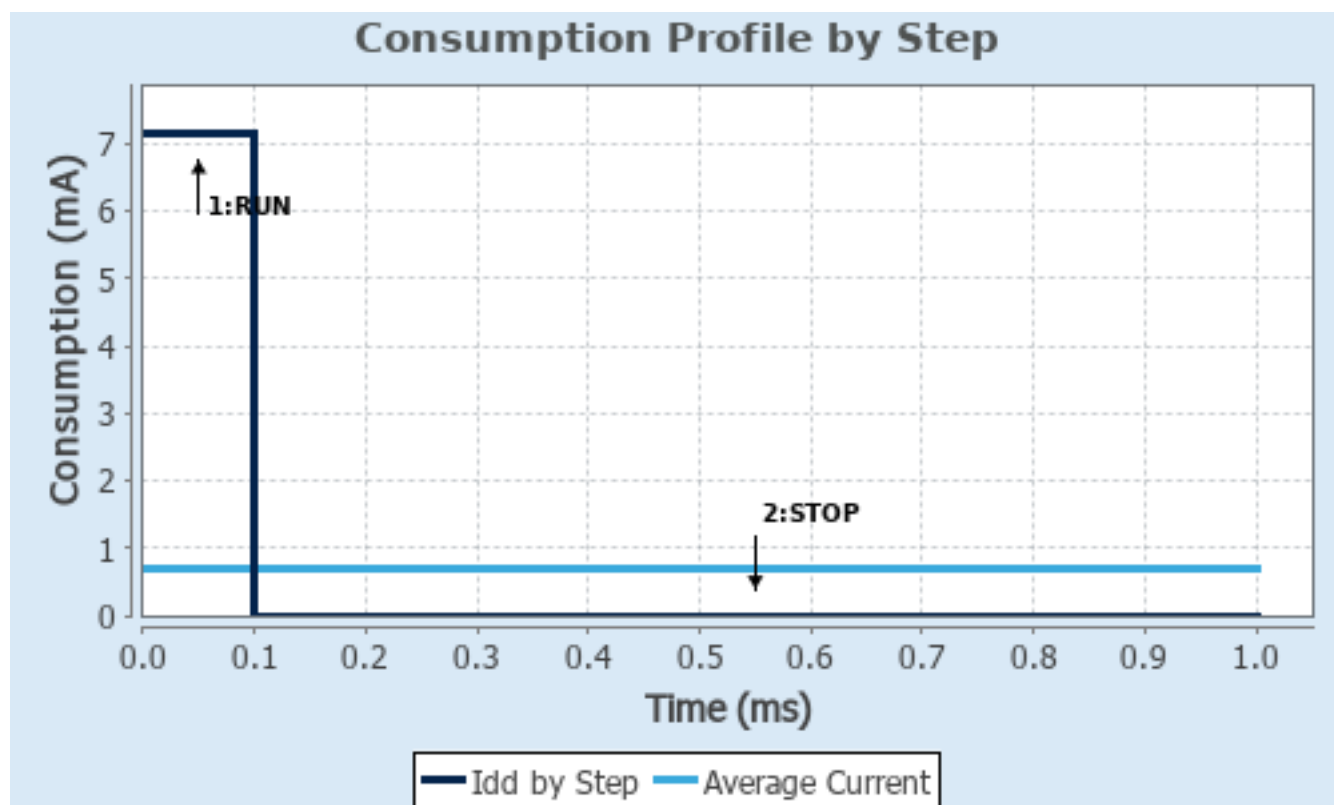
6.4. Sequence

| | | |
|-------------------------------|-------------|----------------|
| Step | Step1 | Step2 |
| Mode | RUN | STOP |
| Vdd | 3.0 | 3.0 |
| Voltage Source | Battery | Battery |
| Range | Range1-High | NoRange |
| Fetch Type | FLASH | n/a |
| CPU Frequency | 32 MHz | 0 Hz |
| Clock Configuration | HSI PLL | ALL CLOCKS OFF |
| Clock Source Frequency | 16 MHz | 0 Hz |
| Peripherals | | |
| Additional Cons. | 0 mA | 0 mA |
| Average Current | 7.15 mA | 430 nA |
| Duration | 0.1 ms | 0.9 ms |
| DMIPS | 30.0 | 0.0 |
| Ta Max | 104.23 | 105 |
| Category | In DS Table | In DS Table |

6.5. Results

| | | | |
|---------------|------------------------------|-----------------|----------------|
| Sequence Time | 1 ms | Average Current | 715.39 μ A |
| Battery Life | 1 month, 10 days, 7 hours | Average DMIPS | 30.4 DMIPS |

6.6. Chart



7. Peripherals and Middlewares Configuration

7.1. I2C1

I2C: I2C

7.1.1. Parameter Settings:

Timing configuration:

| | |
|-------------------------------|---------------------|
| I2C Speed Mode | Fast Mode * |
| I2C Speed Frequency (KHz) | 400 |
| Rise Time (ns) | 0 |
| Fall Time (ns) | 0 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | 0x00300F38 * |

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

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 |
|-------------------------------|---------------------------------|

7.3. SPI1

Mode: Transmit Only Master

7.3.1. Parameter Settings:

Basic Parameters:

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

Clock Parameters:

| | |
|---------------------------|-----------------------|
| Prescaler (for Baud Rate) | 2 |
| Baud Rate | 16.0 MBits/s * |
| Clock Polarity (CPOL) | Low |
| Clock Phase (CPHA) | 1 Edge |

Advanced Parameters:

| | |
|-----------------|----------|
| CRC Calculation | Disabled |
| NSS Signal Type | Software |

7.4. SYS

mode: Debug Serial Wire

Timebase Source: TIM6

7.5. TIM2

Clock Source : Internal Clock

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.5.1. Parameter Settings:

Counter Settings:

| | |
|---|--------------|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value) | 127 * |
| 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) |

PWM Generation Channel 3:

| | |
|------------------------|-------------|
| Mode | PWM mode 1 |
| Pulse (16 bits value) | 64 * |
| Output compare preload | Enable |
| Fast Mode | Disable |
| CH Polarity | High |

PWM Generation Channel 4:

| | |
|------------------------|-------------|
| Mode | PWM mode 1 |
| Pulse (16 bits value) | 64 * |
| Output compare preload | Enable |
| Fast Mode | Disable |
| CH Polarity | High |

7.6. USART1

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 |

7.7. USB

mode: Device (FS)

7.7.1. Parameter Settings:

Basic Parameters:

| | |
|--------------------|---------------------|
| Speed | Full Speed 12MBit/s |
| Physical interface | Internal Phy |

Power Parameters:

| | |
|-----------------------|----------|
| Low Power | Disabled |
| Link Power Management | Disabled |

7.8. FREERTOS

Interface: CMSIS_V2

7.8.1. Config parameters:

API:

| | |
|--------------|----------|
| FreeRTOS API | CMSIS v2 |
|--------------|----------|

Versions:

| | |
|--------------------|--------|
| FreeRTOS version | 10.2.1 |
| CMSIS-RTOS version | 2.00 |

MPU/FPU:

| | |
|------------|----------|
| ENABLE_MPU | Disabled |
| ENABLE_FPU | Disabled |

Kernel settings:

| | |
|-----------------------------------|-----------------|
| USE_PREEMPTION | Enabled |
| CPU_CLOCK_HZ | SystemCoreClock |
| TICK_RATE_HZ | 1000 |
| MAX_PRIORITIES | 56 |
| MINIMAL_STACK_SIZE | 128 |
| MAX_TASK_NAME_LEN | 16 |
| USE_16_BIT_TICKS | Disabled |
| IDLE_SHOULD_YIELD | Enabled |
| USE_MUTEXES | Enabled |
| USE_RECURSIVE_MUTEXES | Enabled |
| USE_COUNTING_SEMAPHORES | Enabled |
| QUEUE_REGISTRY_SIZE | 8 |
| USE_APPLICATION_TASK_TAG | Disabled |
| ENABLE_BACKWARD_COMPATIBILITY | Enabled |
| USE_PORT_OPTIMISED_TASK_SELECTION | Disabled |
| USE_TICKLESS_IDLE | Disabled |

| | |
|---------------------------|----------|
| USE_TASK_NOTIFICATIONS | Enabled |
| RECORD_STACK_HIGH_ADDRESS | Disabled |

Memory management settings:

| | |
|--------------------------|------------------|
| Memory Allocation | Dynamic / Static |
| TOTAL_HEAP_SIZE | 3072 |
| Memory Management scheme | heap_4 |

Hook function related definitions:

| | |
|------------------------------|----------|
| USE_IDLE_HOOK | Disabled |
| USE_TICK_HOOK | Disabled |
| USE_MALLOC_FAILED_HOOK | Disabled |
| USE_DAEMON_TASK_STARTUP_HOOK | Disabled |
| CHECK_FOR_STACK_OVERFLOW | Disabled |

Run time and task stats gathering related definitions:

| | |
|--------------------------------|----------|
| GENERATE_RUN_TIME_STATS | Disabled |
| USE_TRACE_FACILITY | Enabled |
| USE_STATS_FORMATTING_FUNCTIONS | Disabled |

Co-routine related definitions:

| | |
|---------------------------|----------|
| USE_CO_ROUTINES | Disabled |
| MAX_CO_ROUTINE_PRIORITIES | 2 |

Software timer definitions:

| | |
|------------------------|---------|
| USE_TIMERS | Enabled |
| TIMER_TASK_PRIORITY | 2 |
| TIMER_QUEUE_LENGTH | 10 |
| TIMER_TASK_STACK_DEPTH | 256 |

Added with 10.2.1 support:

| | |
|----------------------------|----------|
| MESSAGE_BUFFER_LENGTH_TYPE | size_t |
| USE_POSIX_ERRNO | Disabled |

7.8.2. Include parameters:

Include definitions:

| | |
|------------------------|----------|
| vTaskPrioritySet | Enabled |
| uxTaskPriorityGet | Enabled |
| vTaskDelete | Enabled |
| vTaskCleanUpResources | Disabled |
| vTaskSuspend | Enabled |
| vTaskDelayUntil | Enabled |
| vTaskDelay | Enabled |
| xTaskGetSchedulerState | Enabled |
| xTaskResumeFromISR | Enabled |
| xQueueGetMutexHolder | Enabled |

| | |
|------------------------------|----------|
| xSemaphoreGetMutexHolder | Disabled |
| pcTaskGetTaskName | Disabled |
| uxTaskGetStackHighWaterMark | Enabled |
| xTaskGetCurrentTaskHandle | Disabled |
| eTaskGetState | Enabled |
| xEventGroupSetBitFromISR | Disabled |
| xTimerPendFunctionCall | Enabled |
| xTaskAbortDelay | Disabled |
| xTaskGetHandle | Disabled |
| uxTaskGetStackHighWaterMark2 | Disabled |

7.8.3. Advanced settings:

Newlib settings (see parameter description first):

USE_NEWLIB_REENTRANT **Enabled ***

Project settings (see parameter description first):

Use FW pack heap file Enabled

7.9. USB_DEVICE

Class For FS IP: Communication Device Class (Virtual Port Com)

7.9.1. Parameter Settings:

Basic Parameters:

| | |
|--|---------------------|
| USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces) | 1 |
| USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration) | 1 |
| USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors) | 512 |
| USBD_SELF_POWERED (Enabled self power) | Enabled |
| USBD_DEBUG_LEVEL (USBD Debug Level) | 0: No debug message |

Class Parameters:

| | |
|------------------------|------|
| USB CDC Rx Buffer Size | 1000 |
| USB CDC Tx Buffer Size | 1000 |

7.9.2. Device Descriptor:

Device Descriptor:

| | |
|---|------------------------|
| VID (Vendor Identifier) | 1155 |
| LANGID_STRING (Language Identifier) | English(United States) |
| MANUFACTURER_STRING (Manufacturer Identifier) | STMicroelectronics |

Device Descriptor FS:

| | |
|---|-----------------------|
| PID (Product Identifier) | 22336 |
| PRODUCT_STRING (Product Identifier) | STM32 Virtual ComPort |
| CONFIGURATION_STRING (Configuration Identifier) | CDC Config |
| INTERFACE_STRING (Interface Identifier) | CDC Interface |

* 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 | PB6 | I2C1_SCL | Alternate Function Open Drain | No pull-up and no pull-down | Very High * | |
| | PB7 | I2C1_SDA | Alternate Function Open Drain | No pull-up and no pull-down | Very High * | |
| SPI1 | PA5 | SPI1_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | DISP_SCK |
| | PA7 | SPI1_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | DISP_MOSI |
| SYS | PA13 | SYS_SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_SWCLK | n/a | n/a | n/a | |
| TIM2 | PA2 | TIM2_CH3 | Alternate Function Push Pull | No pull-up and no pull-down | Low | RLED_EN |
| | PA3 | TIM2_CH4 | Alternate Function Push Pull | No pull-up and no pull-down | Low | TLED_EN |
| USART1 | PA9 | USART1_TX | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | |
| | PA10 | USART1_RX | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | |
| USB | PA11 | USB_DM | n/a | n/a | n/a | |
| | PA12 | USB_DP | n/a | n/a | n/a | |
| GPIO | PC14-OSC32_IN | GPIO_EXTI14 | External Interrupt Mode with Rising/Falling edge | No pull-up and no pull-down | n/a | BTN4 |
| | PC15-OSC32_OUT | GPIO_EXTI15 | External Interrupt Mode with Rising/Falling edge | No pull-up and no pull-down | n/a | BTN3 |
| | PA0 | GPIO_EXTI0 | External Interrupt Mode with Rising/Falling edge | No pull-up and no pull-down | n/a | BTN2 |
| | PA1 | GPIO_EXTI1 | External Interrupt Mode with Rising/Falling edge | No pull-up and no pull-down | n/a | BTN1 |
| | PA4 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | DISP_CS |
| | PA6 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | DISP_DC |
| | PB0 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | DISP_RES |
| | PA8 | GPIO_EXTI8 | External Interrupt | No pull-up and no pull-down | n/a | BTN5 |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|----|-----|------------|--|-----------------------------|-----------|------------|
| | | | Mode with Rising/Falling edge | | | |
| | PB5 | GPIO_EXTI5 | External Interrupt Mode with Falling edge trigger detection | No pull-up and no pull-down | n/a | SENSOR_INT |

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 | 3 | 0 |
| System tick timer | true | 3 | 0 |
| EXTI line 0 and line 1 interrupts | true | 3 | 0 |
| EXTI line 4 to 15 interrupts | true | 3 | 0 |
| TIM6 global interrupt and DAC1/DAC2 underrun error interrupts | true | 3 | 0 |
| USB event interrupt / USB wake-up interrupt through EXTI line 18 | true | 3 | 0 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash and EEPROM global interrupt | unused | | |
| RCC and CRS global interrupt | unused | | |
| TIM2 global interrupt | unused | | |
| I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23 | unused | | |
| SPI1 global interrupt | unused | | |
| USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25 | 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 | false | false |
| Pendable request for system service | false | false | false |
| System tick timer | false | false | true |
| EXTI line 0 and line 1 interrupts | false | true | true |
| EXTI line 4 to 15 interrupts | false | true | true |
| TIM6 global interrupt and DAC1/DAC2 underrun error interrupts | false | true | true |
| USB event interrupt / USB wake-up interrupt through EXTI line 18 | false | true | true |

* User modified value

9. System Views

9.1. Category view

9.1.1. Current

| Middleware | | | | | |
|-------------|--------|--------|--------------|----------|-----------|
| FREERTOS | | | | | |
| USB_DEVICE | | | | | |
| System Core | Analog | Timers | Connectivity | Security | Computing |
| DMA | | TIM2 | I2C1 | | |
| GPIO | | | SPI1 | | |
| NVIC | | | USART1 | | |
| RCC | | | USB | | |
| SYS | | | | | |

10. Docs & Resources

| Type | Link |
|--------------------|---|
| Datasheet | http://www.st.com/resource/en/datasheet/DM00141133.pdf |
| Reference manual | http://www.st.com/resource/en/reference_manual/DM00108281.pdf |
| Programming manual | http://www.st.com/resource/en/programming_manual/DM00104451.pdf |
| Errata sheet | http://www.st.com/resource/en/errata_sheet/DM00148855.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00160362.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00167594.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00211314.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00259245.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00264342.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00264379.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00042534.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00072315.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00073742.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00073853.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00081379.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00085385.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00087593.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00108286.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00112257.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00129215.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00145318.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00150423.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00151811.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00158601.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00160482.pdf |

Application note http://www.st.com/resource/en/application_note/DM00206898.pdf

Application note http://www.st.com/resource/en/application_note/DM00209725.pdf

Application note http://www.st.com/resource/en/application_note/DM00209768.pdf

Application note http://www.st.com/resource/en/application_note/DM00209772.pdf

Application note http://www.st.com/resource/en/application_note/DM00220769.pdf

Application note http://www.st.com/resource/en/application_note/DM00226326.pdf

Application note http://www.st.com/resource/en/application_note/DM00236305.pdf

Application note http://www.st.com/resource/en/application_note/DM00257177.pdf

Application note http://www.st.com/resource/en/application_note/DM00260952.pdf

Application note http://www.st.com/resource/en/application_note/DM00272912.pdf

Application note http://www.st.com/resource/en/application_note/DM00296349.pdf

Application note http://www.st.com/resource/en/application_note/DM00315319.pdf

Application note http://www.st.com/resource/en/application_note/DM00327191.pdf

Application note http://www.st.com/resource/en/application_note/DM00354244.pdf

Application note http://www.st.com/resource/en/application_note/DM00355687.pdf

Application note http://www.st.com/resource/en/application_note/DM00380469.pdf

Application note http://www.st.com/resource/en/application_note/DM00395696.pdf

Application note http://www.st.com/resource/en/application_note/DM00436604.pdf

Application note http://www.st.com/resource/en/application_note/DM00445657.pdf

Application note http://www.st.com/resource/en/application_note/DM00493651.pdf

Application note http://www.st.com/resource/en/application_note/DM00536349.pdf

Application note http://www.st.com/resource/en/application_note/DM00660597.pdf

Application note http://www.st.com/resource/en/application_note/DM00725181.pdf