# 1. Description

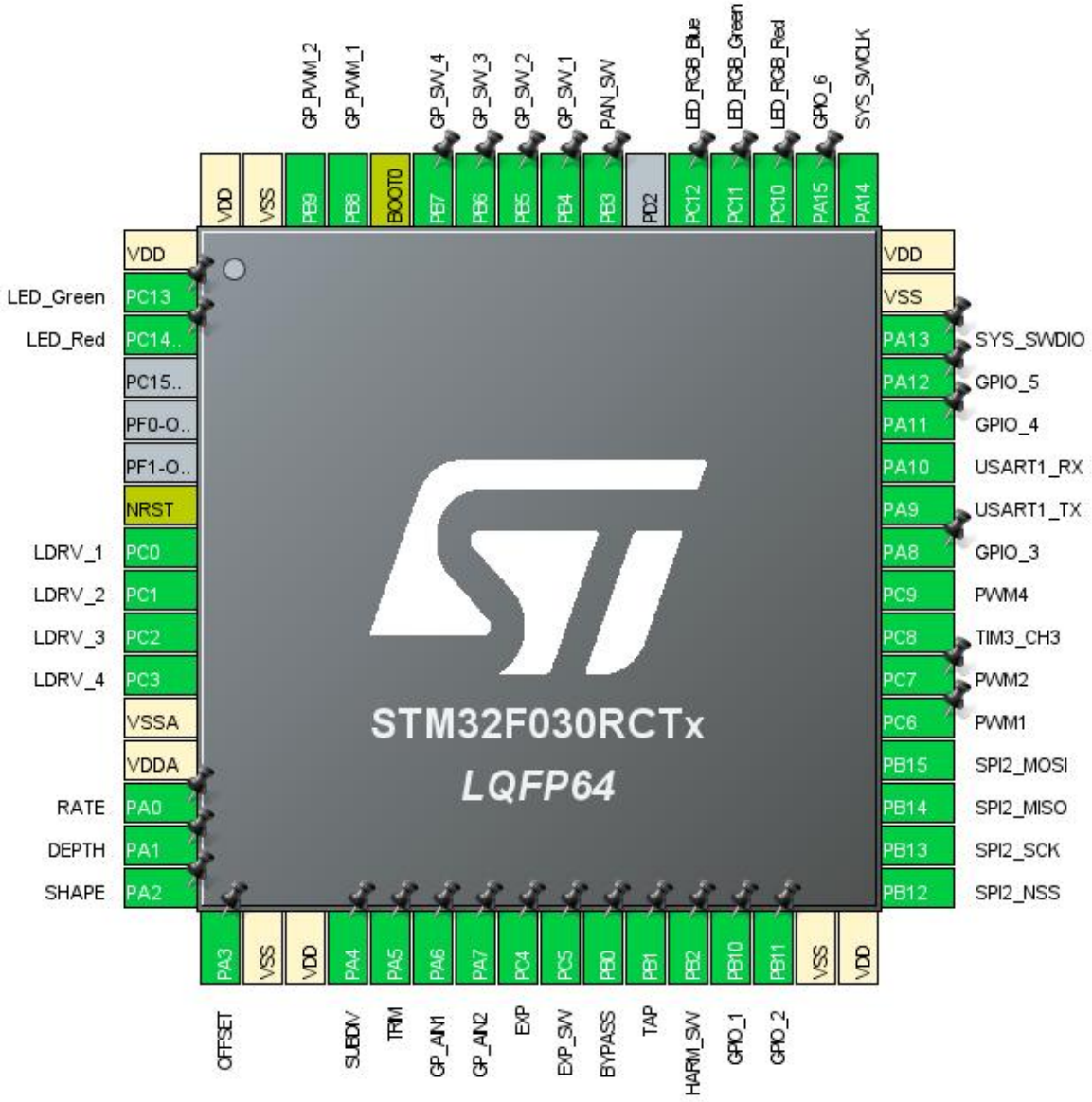
## 1.1. Project

| | |
|---|---|
| Project Name | Tremolo |
| Board Name | custom |
| Generated with: | STM32CubeMX 5.6.1 |
| Date | 05/18/2020 |

## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32F0 |
| MCU Line | STM32F0x0 Value Line |
| MCU name | STM32F030RCTx |
| MCU Package | LQFP64 |
| MCU Pin number | 64 |

## 2. Pinout Configuration



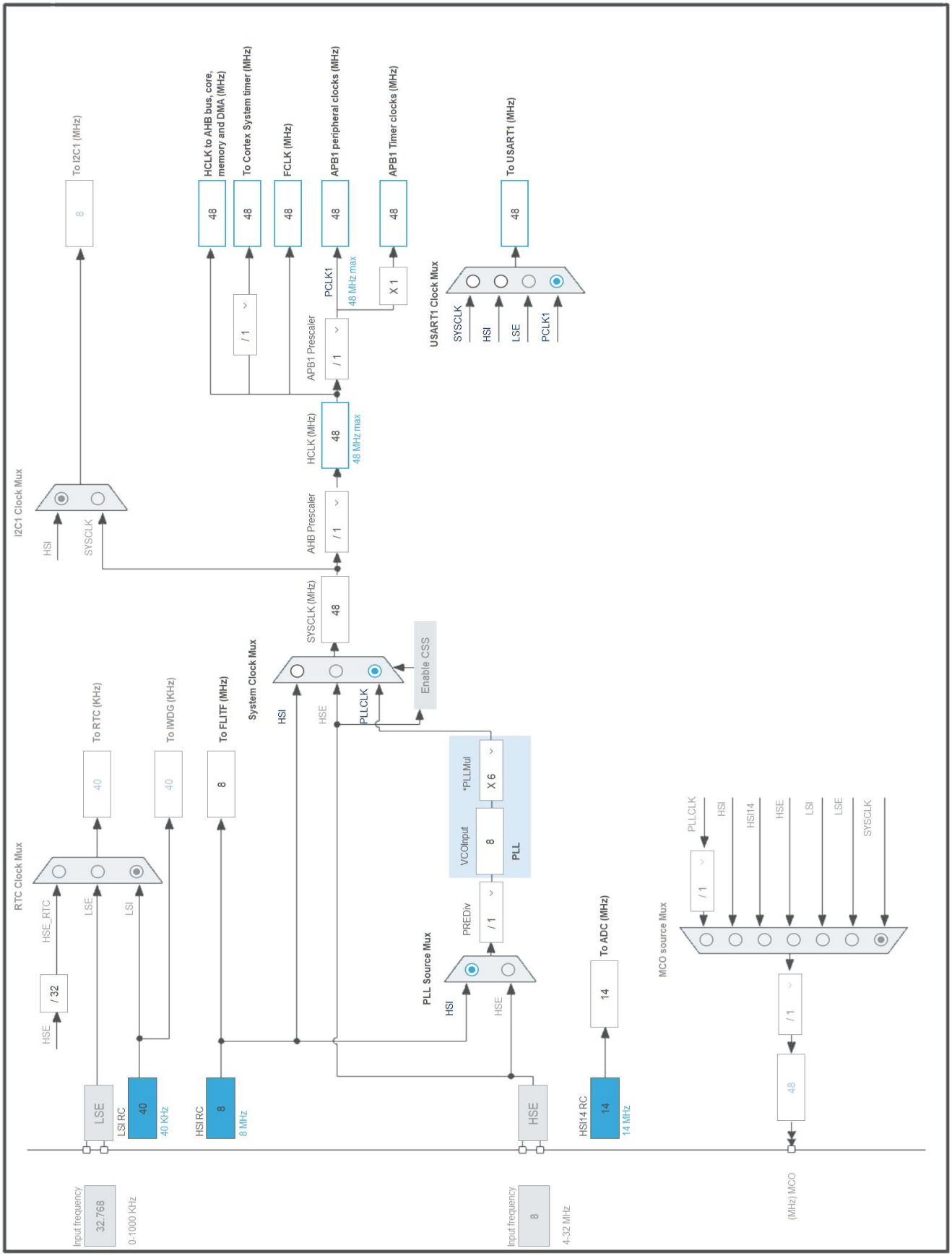
# 3. Pins Configuration

| Pin Number LQFP64 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | VDD | Power | | |
| 2 | PC13 * | I/O | GPIO_Output | LED_Green |
| 3 | PC14OSC32_IN * | I/O | GPIO_Output | LED_Red |
| 7 | NRST | Reset | | |
| 8 | PC0 | I/O | ADC_IN10 | LDRV_1 |
| 9 | PC1 | I/O | ADC_IN11 | LDRV_2 |
| 10 | PC2 | I/O | ADC_IN12 | LDRV_3 |
| 11 | PC3 | I/O | ADC_IN13 | LDRV_4 |
| 12 | VSSA | Power | | |
| 13 | VDDA | Power | | |
| 14 | PA0 | I/O | ADC_IN0 | RATE |
| 15 | PA1 | I/O | ADC_IN1 | DEPTH |
| 16 | PA2 | I/O | ADC_IN2 | SHAPE |
| 17 | PA3 | I/O | ADC_IN3 | OFFSET |
| 18 | VSS | Power | | |
| 19 | VDD | Power | | |
| 20 | PA4 | I/O | ADC_IN4 | SUBDIV |
| 21 | PA5 | I/O | ADC_IN5 | TRIM |
| 22 | PA6 | I/O | ADC_IN6 | GP_AIN1 |
| 23 | PA7 | I/O | ADC_IN7 | GP_AIN2 |
| 24 | PC4 | I/O | ADC_IN14 | EXP |
| 25 | PC5 * | I/O | GPIO_Input | EXP_SW |
| 26 | PB0 * | I/O | GPIO_Input | BYPASS |
| 27 | PB1 * | I/O | GPIO_Input | TAP |
| 28 | PB2 * | I/O | GPIO_Input | HARM_SW |
| 29 | PB10 * | I/O | GPIO_Input | GPIO_1 |
| 30 | PB11 * | I/O | GPIO_Input | GPIO_2 |
| 31 | VSS | Power | | |
| 32 | VDD | Power | | |
| 33 | PB12 | I/O | SPI2_NSS | |
| 34 | PB13 | I/O | SPI2_SCK | |
| 35 | PB14 | I/O | SPI2_MISO | |
| 36 | PB15 | I/O | SPI2_MOSI | |
| 37 | PC6 | I/O | TIM3_CH1 | PWM1 |
| 38 | PC7 | I/O | TIM3_CH2 | PWM2 |
| 39 | PC8 | I/O | TIM3_CH3 | |

| Pin Number LQFP64 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 40 | PC9 | I/O | TIM3_CH4 | PWM4 |
| 41 | PA8 * | I/O | GPIO_Input | GPIO_3 |
| 42 | PA9 | I/O | USART1_TX | |
| 43 | PA10 | I/O | USART1_RX | |
| 44 | PA11 * | I/O | GPIO_Input | GPIO_4 |
| 45 | PA12 * | I/O | GPIO_Input | GPIO_5 |
| 46 | PA13 | I/O | SYS_SWDIO | |
| 47 | VSS | Power | | |
| 48 | VDD | Power | | |
| 49 | PA14 | I/O | SYS_SWCLK | |
| 50 | PA15 * | I/O | GPIO_Input | GPIO_6 |
| 51 | PC10 * | I/O | GPIO_Output | LED_RGB_Red |
| 52 | PC11 * | I/O | GPIO_Output | LED_RGB_Green |
| 53 | PC12 * | I/O | GPIO_Output | LED_RGB_Blue |
| 55 | PB3 * | I/O | GPIO_Input | PAN_SW |
| 56 | PB4 * | I/O | GPIO_Input | GP_SW_1 |
| 57 | PB5 * | I/O | GPIO_Input | GP_SW_2 |
| 58 | PB6 * | I/O | GPIO_Input | GP_SW_3 |
| 59 | PB7 * | I/O | GPIO_Input | GP_SW_4 |
| 60 | BOOT0 | Boot | | |
| 61 | PB8 | I/O | TIM16_CH1 | GP_PWM_1 |
| 62 | PB9 | I/O | TIM17_CH1 | GP_PWM_2 |
| 63 | VSS | Power | | |
| 64 | 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 | Tremolo |
| Project Folder | E:\Pinebox\Firmware\Tremolo |
| Toolchain / IDE | STM32CubeIDE |
| Firmware Package Name and Version | STM32Cube FW_F0 V1.11.0 |

## 5.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube MCU packages and embedded software | Add necessary library files as reference in the toolchain project configuration file |
| Generate peripheral initialization as a pair of '.c/.h' files | No |
| Backup previously generated files when re-generating | No |
| Delete previously generated files when not re-generated | Yes |
| Set all free pins as analog (to optimize the power consumption) | No |

# 6. Power Consumption Calculator report

6.1. Microcontroller Selection

| | |
|---|---|
| Series | STM32F0 |
| Line | STM32F0x0 Value Line |
| MCU | STM32F030RCTx |
| Datasheet | 024849_Rev2 |

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 |

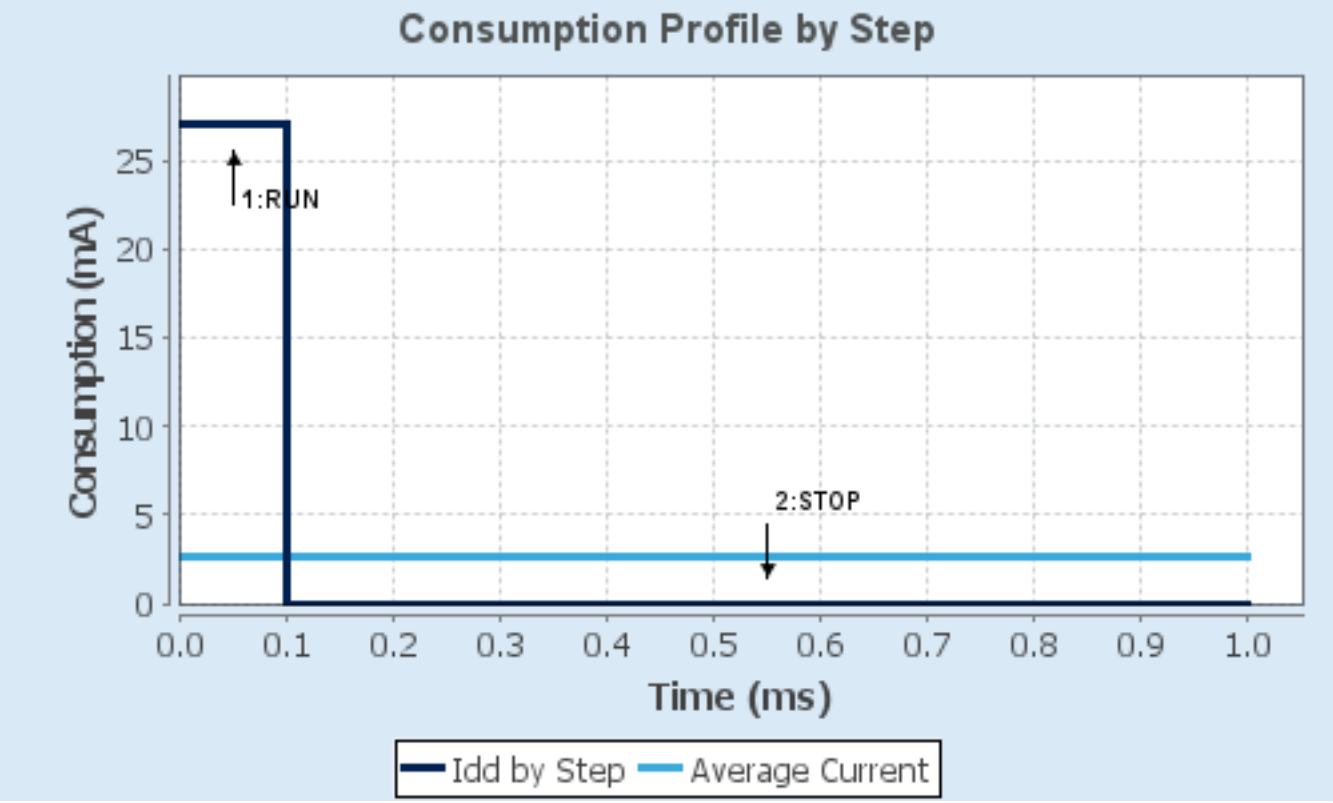
6.4. Sequence

| ***Step*** | Step1 | Step2 |
|---|---|---|
| ***Mode*** | RUN | STOP |
| ***Vdd*** | 3.6 | 3.6 |
| ***Voltage Source*** | Battery | Battery |
| ***Range*** | No Scale | No Scale |
| ***Fetch Type*** | FLASH | n/a |
| ***CPU Frequency*** | 48 MHz | 0 Hz |
| ***Clock Configuration*** | HSI PLL All IPs ON | Regulator_LP |
| ***Clock Source Frequency*** | 8 MHz | 0 Hz |
| ***Peripherals*** | | |
| ***Additional Cons.*** | 0 mA | 0 mA |
| ***Average Current*** | 27.03 mA | 7.9 µA |
| ***Duration*** | 0.1 ms | 0.9 ms |
| ***DMIPS*** | 0.0 | 0.0 |
| ***Ta Max*** | 100.72 | 105 |
| ***Category*** | In DS Table | In DS Table |

## 6.5. RESULTS

| Sequence Time | 1 ms | Average Current | 2.71 mA |
|---|---|---|---|
| Battery Life | 1 month, 21 days, 18 hours | Average DMIPS | 0.0 DMIPS |

## 6.6. Chart


Consumption Profile by Step
Consumption (mA)
25
20
15
10
5
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

# 7. IPs and Middleware Configuration

## 7.1. ADC

**mode: IN0**

**mode: IN1**

**mode: IN2**

**mode: IN3**

**mode: IN4**

**mode: IN5**

**mode: IN6**

**mode: IN7**

**mode: IN10**

**mode: IN11**

**mode: IN12**

**mode: IN13**

**mode: IN14**

### 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 |

## 7.2. GPIO

## 7.3. RCC

### 7.3.1. Parameter Settings:

**System Parameters:**

| | |
|---|---|
| VDD voltage (V) | 3.3 |
| Prefetch Buffer | Enabled |
| Flash Latency(WS) | 1 WS (2 CPU cycle) |

**RCC Parameters:**

| | |
|---|---|
| HSI Calibration Value | 16 |
| HSI14 Calibration Value | 16 |
| HSE Startup Timout Value (ms) | 100 |
| LSE Startup Timout Value (ms) | 5000 |

## 7.4. SPI2

**Mode: Full-Duplex Master**

**Hardware NSS Signal: Hardware NSS Output Signal**

### 7.4.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Frame Format | Motorola |
| Data Size | 4 Bits |
| First Bit | MSB First |

**Clock Parameters:**

| | |
|---|---|
| Prescaler (for Baud Rate) | **8 *** |
| Baud Rate | **6.0 MBits/s *** |
| Clock Polarity (CPOL) | Low |
| Clock Phase (CPHA) | 1 Edge |

**Advanced Parameters:**

| | |
|---|---|
| CRC Calculation | Disabled |
| NSSP Mode | Enabled |
| NSS Signal Type | Output Hardware |

## 7.5. SYS

**mode: Debug Serial Wire**

**Timebase Source: SysTick**

## 7.6. TIM1

**Clock Source : Internal Clock**

### 7.6.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | 0 |
| Internal Clock Division (CKD) | No Division |
| Repetition Counter (RCR - 8 bits value) | 0 |
| 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) |

## 7.7. TIM3

**Clock Source : Internal Clock**

**Channel1: PWM Generation CH1**

**Channel2: PWM Generation CH2**

**Channel3: PWM Generation CH3**

**Channel4: PWM Generation CH4**

### 7.7.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | 0 |
| 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 1:**

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

**PWM Generation Channel 2:**

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

**PWM Generation Channel 3:**

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

**PWM Generation Channel 4:**

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

## *7.8. TIM16*

**mode: Activated**

**Channel1: PWM Generation CH1**

### 7.8.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | 0 |
| Internal Clock Division (CKD) | No Division |
| Repetition Counter (RCR - 8 bits value) | 0 |
| auto-reload preload | Disable |

**Break And Dead Time management - BRK Configuration:**

| | |
|---|---|
| BRK State | Disable |
| BRK Polarity | High |

#### Break And Dead Time management - Output Configuration:

| | |
|---|---|
| Automatic Output State | Disable |
| Off State Selection for Run Mode (OSSR) | Disable |
| Off State Selection for Idle Mode (OSSI) | Disable |
| Lock Configuration | Off |

#### PWM Generation Channel 1:

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

## *7.9. TIM17*

### mode: Activated

### Channel1: PWM Generation CH1

### 7.9.1. Parameter Settings:

#### Counter Settings:

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | 0 |
| Internal Clock Division (CKD) | No Division |
| Repetition Counter (RCR - 8 bits value) | 0 |
| auto-reload preload | Disable |

#### Break And Dead Time management - BRK Configuration:

| | |
|---|---|
| BRK State | Disable |
| BRK Polarity | High |

#### Break And Dead Time management - Output Configuration:

| | |
|---|---|
| Automatic Output State | Disable |
| Off State Selection for Run Mode (OSSR) | Disable |
| Off State Selection for Idle Mode (OSSI) | Disable |
| Lock Configuration | Off |

#### PWM Generation Channel 1:

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

| | |
|---|---|
| CH Idle State | Reset |

## *7.10. USART1*

### Mode: Asynchronous

### 7.10.1. 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 |
|---|---|---|---|---|---|---|
| ADC | PC0 | ADC_IN10 | Analog mode | No pull-up and no pull-down | n/a | LDRV_1 |
| | PC1 | ADC_IN11 | Analog mode | No pull-up and no pull-down | n/a | LDRV_2 |
| | PC2 | ADC_IN12 | Analog mode | No pull-up and no pull-down | n/a | LDRV_3 |
| | PC3 | ADC_IN13 | Analog mode | No pull-up and no pull-down | n/a | LDRV_4 |
| | PA0 | ADC_IN0 | Analog mode | No pull-up and no pull-down | n/a | RATE |
| | PA1 | ADC_IN1 | Analog mode | No pull-up and no pull-down | n/a | DEPTH |
| | PA2 | ADC_IN2 | Analog mode | No pull-up and no pull-down | n/a | SHAPE |
| | PA3 | ADC_IN3 | Analog mode | No pull-up and no pull-down | n/a | OFFSET |
| | PA4 | ADC_IN4 | Analog mode | No pull-up and no pull-down | n/a | SUBDIV |
| | PA5 | ADC_IN5 | Analog mode | No pull-up and no pull-down | n/a | TRIM |
| | PA6 | ADC_IN6 | Analog mode | No pull-up and no pull-down | n/a | GP_AIN1 |
| | PA7 | ADC_IN7 | Analog mode | No pull-up and no pull-down | n/a | GP_AIN2 |
| | PC4 | ADC_IN14 | Analog mode | No pull-up and no pull-down | n/a | EXP |
| SPI2 | PB12 | SPI2_NSS | Alternate Function Push Pull | **Pull-up *** | **High *** | |
| | PB13 | SPI2_SCK | Alternate Function Push Pull | No pull-up and no pull-down | **High *** | |
| | PB14 | SPI2_MISO | Alternate Function Push Pull | No pull-up and no pull-down | **High *** | |
| | PB15 | SPI2_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | **High *** | |
| SYS | PA13 | SYS_SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_SWCLK | n/a | n/a | n/a | |
| TIM3 | PC6 | TIM3_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | PWM1 |
| | PC7 | TIM3_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | PWM2 |
| | PC8 | TIM3_CH3 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PC9 | TIM3_CH4 | Alternate Function Push Pull | No pull-up and no pull-down | Low | PWM4 |
| TIM16 | PB8 | TIM16_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | GP_PWM_1 |
| TIM17 | PB9 | TIM17_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | GP_PWM_2 |
| 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 *** | |
| GPIO | PC13 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_Green |
| | PC14OSC32_IN | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_Red |
| | PC5 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | EXP_SW |
| | PB0 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | BYPASS |
| | PB1 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | TAP |
| | PB2 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | HARM_SW |
| | PB10 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_1 |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
| | PB11 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_2 |
| | PA8 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_3 |
| | PA11 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_4 |
| | PA12 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_5 |
| | PA15 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GPIO_6 |
| | PC10 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_RGB_Red |
| | PC11 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_RGB_Green |
| | PC12 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_RGB_Blue |
| | PB3 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | PAN_SW |
| | PB4 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GP_SW_1 |
| | PB5 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GP_SW_2 |
| | PB6 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GP_SW_3 |
| | PB7 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | GP_SW_4 |

## *8.2. DMA configuration*

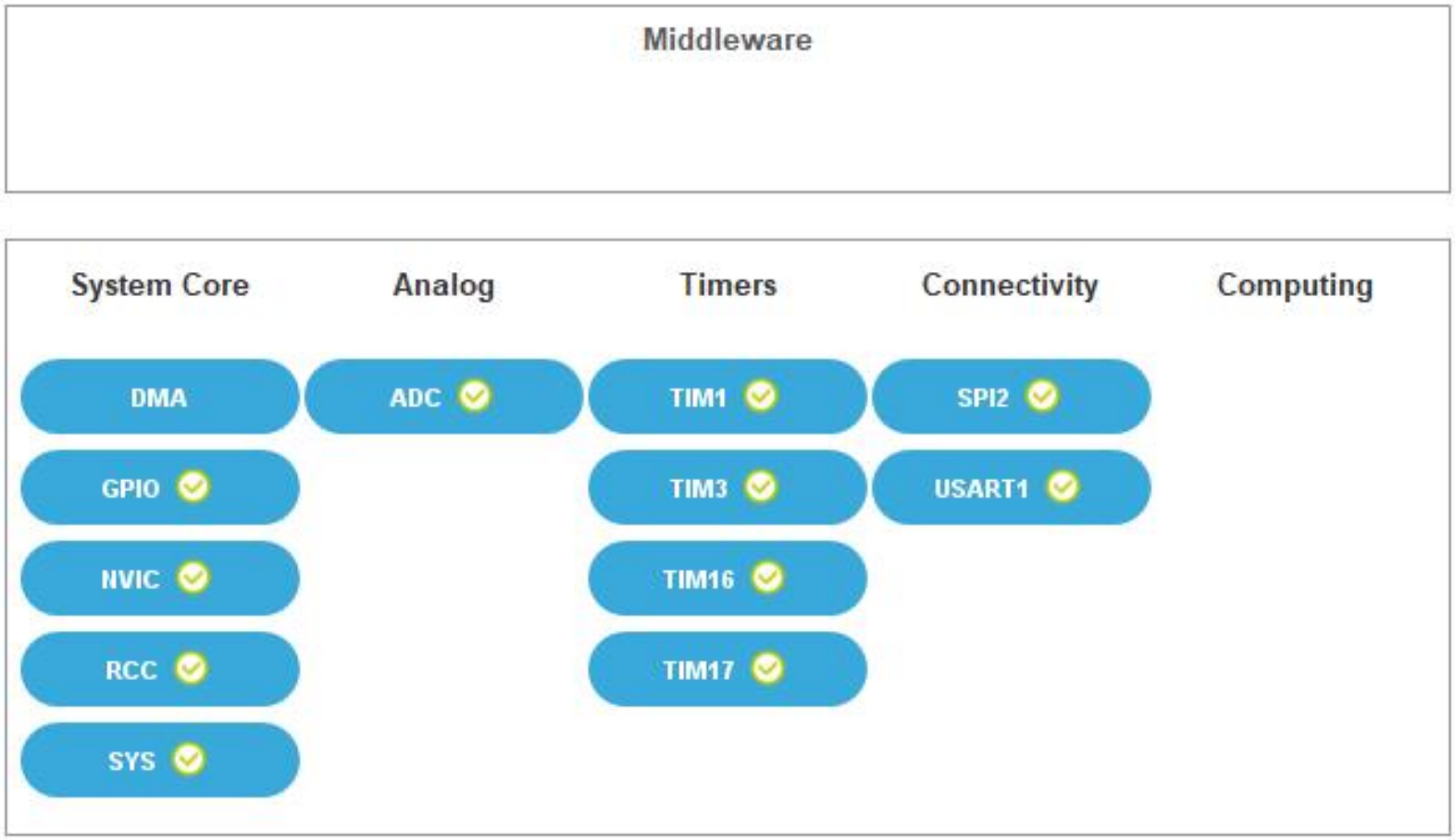
nothing configured in DMA service

## 8.3. NVIC configuration

| 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 |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| ADC interrupt | unused | | |
| TIM1 break, update, trigger and commutation interrupts | unused | | |
| TIM1 capture compare interrupt | unused | | |
| TIM3 global interrupt | unused | | |
| TIM16 global interrupt | unused | | |
| TIM17 global interrupt | unused | | |
| SPI2 global interrupt | unused | | |
| USART1 global interrupt | unused | | |

*** User modified value**

## 9. Predefined Views - Category view : Current



# 10. Software Pack Report