# 1. Description

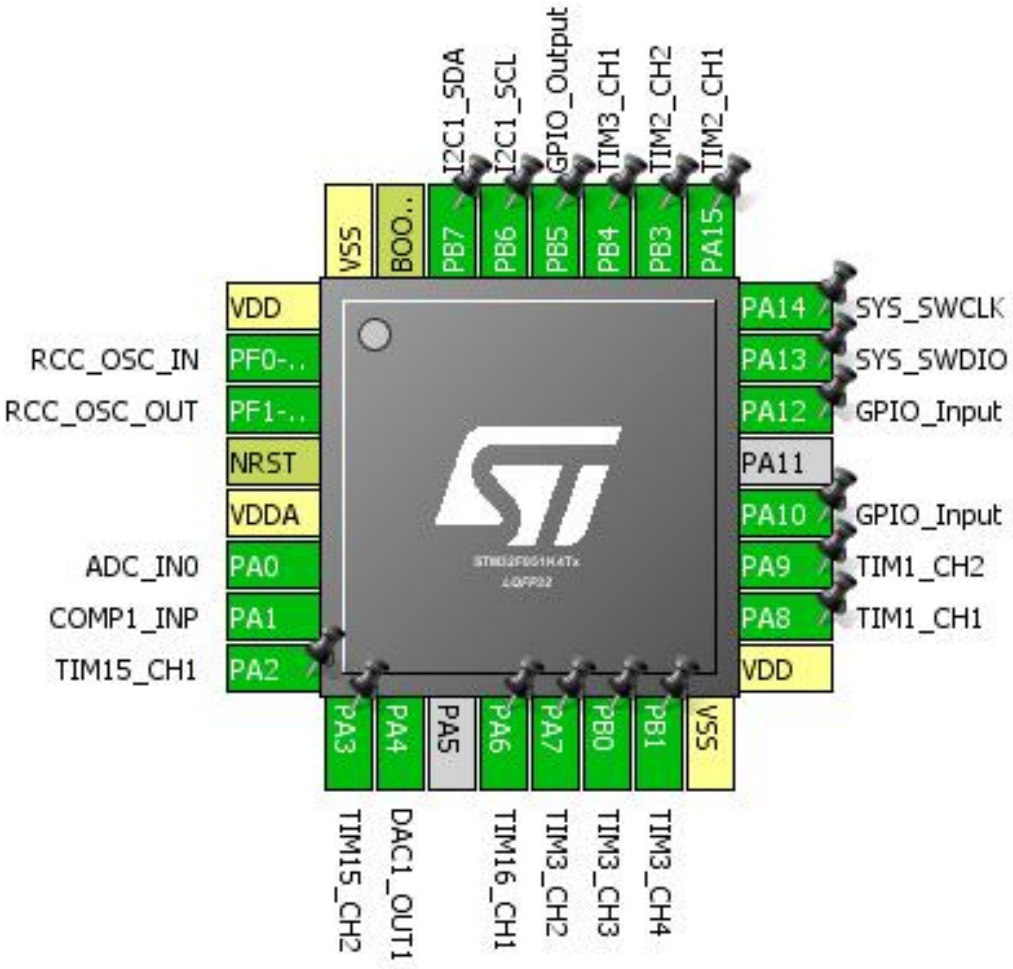
## 1.1. Project

| | |
|---|---|
| Project Name | LED Rotary Dimmer |
| Board Name | LED Rotary Dimmer |
| Generated with: | STM32CubeMX 4.14.0 |
| Date | 06/05/2016 |

## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32F0 |
| MCU Line | STM32F0x1 |
| MCU name | STM32F051K4Tx |
| MCU Package | LQFP32 |
| MCU Pin number | 32 |

# 2. Pinout Configuration

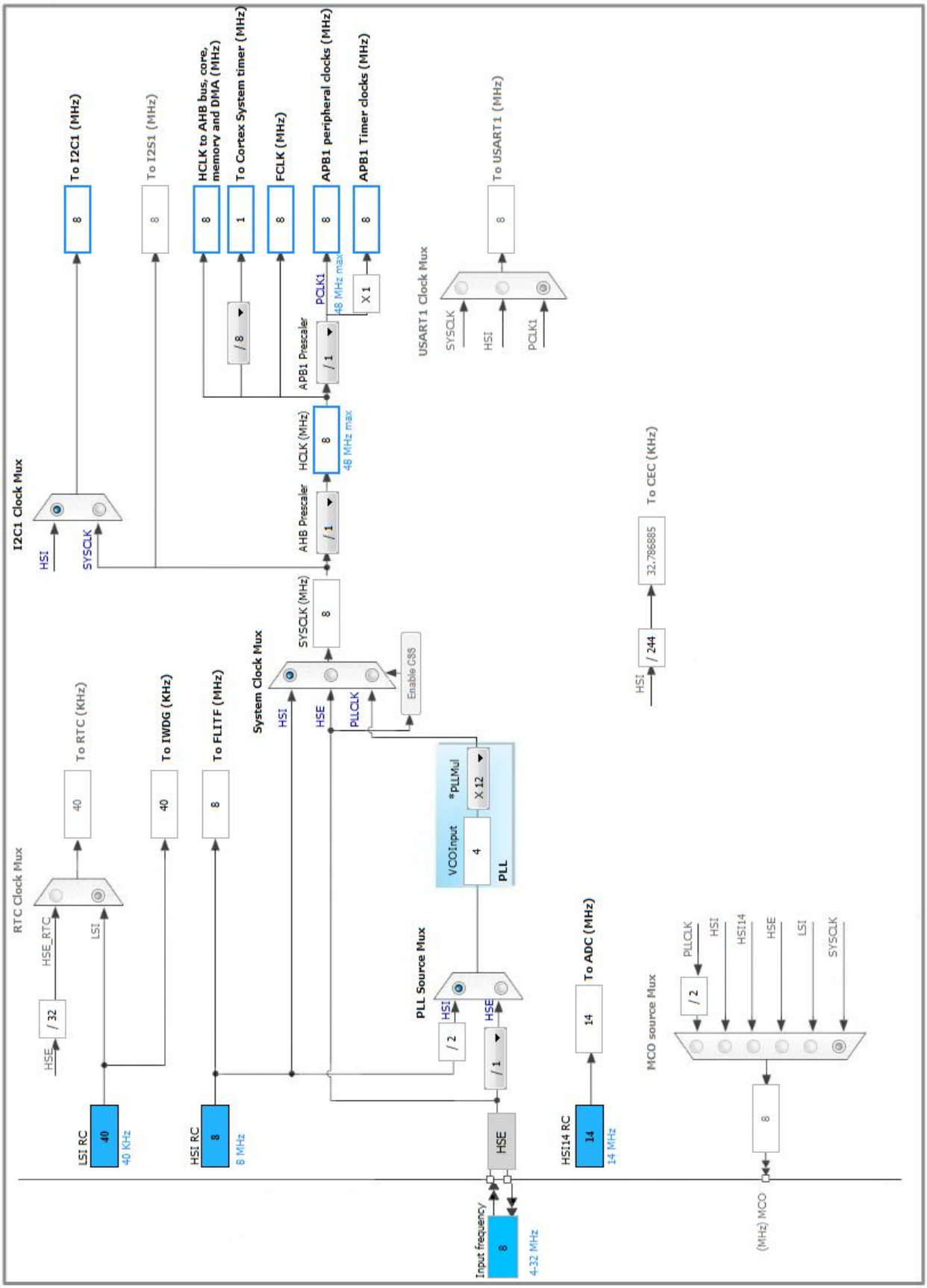


# 3. Pins Configuration

| 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 | |
| 3 | PF1-OSC_OUT | I/O | RCC_OSC_OUT | |
| 4 | NRST | Reset | | |
| 5 | VDDA | Power | | |
| 6 | PA0 | I/O | ADC_IN0 | |
| 7 | PA1 | I/O | COMP1_INP | |
| 8 | PA2 | I/O | TIM15_CH1 | |
| 9 | PA3 | I/O | TIM15_CH2 | |
| 10 | PA4 | I/O | DAC1_OUT1 | |
| 12 | PA6 | I/O | TIM16_CH1 | |
| 13 | PA7 | I/O | TIM3_CH2 | |
| 14 | PB0 | I/O | TIM3_CH3 | |
| 15 | PB1 | I/O | TIM3_CH4 | |
| 16 | VSS | Power | | |
| 17 | VDD | Power | | |
| 18 | PA8 | I/O | TIM1_CH1 | |
| 19 | PA9 | I/O | TIM1_CH2 | |
| 20 | PA10 * | I/O | GPIO_Input | |
| 22 | PA12 * | I/O | GPIO_Input | |
| 23 | PA13 | I/O | SYS_SWDIO | |
| 24 | PA14 | I/O | SYS_SWCLK | |
| 25 | PA15 | I/O | TIM2_CH1 | |
| 26 | PB3 | I/O | TIM2_CH2 | |
| 27 | PB4 | I/O | TIM3_CH1 | |
| 28 | PB5 * | I/O | GPIO_Output | |
| 29 | PB6 | I/O | I2C1_SCL | |
| 30 | PB7 | I/O | I2C1_SDA | |
| 31 | BOOT0 | Boot | | |
| 32 | VSS | Power | | |

* The pin is affected with an I/O function

# 4. Clock Tree Configuration



# 5. IPs and Middleware Configuration

## 5.1. ADC

**mode: IN0**

**mode: Temperature Sensor Channel**

**mode: Vrefint Channel**

**mode: Vbat Channel**

### 5.1.1. 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 Edge | None |

**WatchDog:**

| | |
|---|---|
| Enable Analog WatchDog Mode | false |

## 5.2. COMP1

**Input [+]: INP**

### 5.2.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Speed / Power Mode | High Speed / Full Power |
| Interrupt Trigger Mode | None |

| | |
|---|---|
| Hysteresis Level | None |

**Output Parameters:**

| | |
|---|---|
| Output Polarity | Not Inverted |
| Output Internal Selection | None |

## *5.3. DAC1*

**mode: OUT1 Configuration**

### 5.3.1. Parameter Settings:

**DAC Out1 Settings:**

| | |
|---|---|
| Output Buffer | Enable |
| Trigger | None |

## *5.4. I2C1*

**I2C: I2C**

### 5.4.1. Parameter Settings:

**Timing configuration:**

| | |
|---|---|
| I2C Speed Mode | Standard Mode |
| I2C Speed Frequency (KHz) | 100 |
| Rise Time (ns) | 0 |
| Fall Time (ns) | 0 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | 0x2000090E |

**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 |

## 5.5. IWDG

**mode: Activated**

### 5.5.1. Parameter Settings:

**Clocking:**

| | |
|---|---|
| IWDG counter clock prescaler | 4 |
| IWDG window value | 4095 |
| IWDG down-counter reload value | 4095 |

## 5.6. RCC

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

### 5.6.1. Parameter Settings:

**System Parameters:**

| | |
|---|---|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Disabled |
| Prefetch Buffer | Enabled |
| Data Cache | Disabled |
| Flash Latency(WS) | 0 WS (1 CPU cycle) |

**RCC Parameters:**

| | |
|---|---|
| HSI Calibration Value | 16 |
| HSI14 Calibration Value | 16 |

## 5.7. SYS

**mode: Serial-WireDebug**

**Timebase Source: SysTick**

## 5.8. TIM1

**Channel1: Input Capture direct mode**

**Channel2: Input Capture direct mode**

### 5.8.1. 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 |

#### Trigger Output (TRGO) Parameters:

| | |
|---|---|
| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR) |

#### Input Capture Channel 1:

| | |
|---|---|
| Polarity Selection | Rising Edge |
| IC Selection | Direct |
| Prescaler Division Ratio | No division |
| Input Filter (4 bits value) | 0 |

#### Input Capture Channel 2:

| | |
|---|---|
| Polarity Selection | Rising Edge |
| IC Selection | Direct |
| Prescaler Division Ratio | No division |
| Input Filter (4 bits value) | 0 |

## *5.9. TIM2*

**Channel1: Input Capture direct mode**

**Channel2: Input Capture direct mode**

### 5.9.1. Parameter Settings:

#### Counter Settings:

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 32 bits value ) | 0 |
| Internal Clock Division (CKD) | No Division |

#### Trigger Output (TRGO) Parameters:

| | |
|---|---|
| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR) |

#### Input Capture Channel 1:

| | |
|---|---|
| Polarity Selection | Rising Edge |
| IC Selection | Direct |
| Prescaler Division Ratio | No division |

| | |
|---|---|
| Input Filter (4 bits value) | 0 |

**Input Capture Channel 2:**

| | |
|---|---|
| Polarity Selection | Rising Edge |
| IC Selection | Direct |
| Prescaler Division Ratio | No division |
| Input Filter (4 bits value) | 0 |

## *5.10. TIM3*

**Channel1: PWM Generation CH1**
**Channel2: PWM Generation CH2**
**Channel3: PWM Generation CH3**
**Channel4: PWM Generation CH4**

### 5.10.1. 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 |

**Trigger Output (TRGO) Parameters:**

| | |
|---|---|
| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR) |

**PWM Generation Channel 1:**

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

**PWM Generation Channel 2:**

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

**PWM Generation Channel 3:**

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

**PWM Generation Channel 4:**

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

## *5.11. TIM15*

**Channel1: PWM Generation CH1**

**Channel2: PWM Generation CH2**

### 5.11.1. 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 |

**Trigger Output (TRGO) Parameters:**

| | |
|---|---|
| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR) |

**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 |
| Fast Mode | Disable |
| CH Polarity | High |
| CH Idle State | Reset |

**PWM Generation Channel 2:**

| | |
|---|---|
| Mode | PWM mode 1 |
| Pulse (16 bits value) | 0 |
| Fast Mode | Disable |

| | |
|---|---|
| CH Polarity | High |
| CH Idle State | Reset |

## *5.12. TIM16*

**mode: Activated**

**Channel1: PWM Generation CH1**

### 5.12.1. 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 |

**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 |
| Fast Mode | Disable |
| CH Polarity | High |
| CH Idle State | Reset |

*** User modified value**

# 6. System Configuration

## 6.1. 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 | |
| COMP1 | PA1 | COMP1_INP | Analog mode | No pull-up and no pull-down | n/a | |
| DAC1 | PA4 | DAC1_OUT1 | Analog mode | No pull-up and no pull-down | n/a | |
| I2C1 | PB6 | I2C1_SCL | Alternate Function Open Drain | Pull-up | **High *** | |
| | PB7 | I2C1_SDA | Alternate Function Open Drain | Pull-up | **High *** | |
| RCC | PF0-OSC_IN | RCC_OSC_IN | n/a | n/a | n/a | |
| | PF1-OSC_OUT | RCC_OSC_OUT | n/a | n/a | n/a | |
| SYS | PA13 | SYS_SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_SWCLK | n/a | n/a | n/a | |
| TIM1 | PA8 | TIM1_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA9 | TIM1_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| TIM2 | PA15 | TIM2_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB3 | TIM2_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| TIM3 | PA7 | TIM3_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB0 | TIM3_CH3 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB1 | TIM3_CH4 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB4 | TIM3_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| TIM15 | PA2 | TIM15_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA3 | TIM15_CH2 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| TIM16 | PA6 | TIM16_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| GPIO | PA10 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PA12 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PB5 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |

## 6.2. DMA configuration

nothing configured in DMA service

## 6.3. NVIC configuration

| Interrupt Table | Enable | Preenmption Priority | SubPriority |
|---|---|---|---|
| Non maskable interrupt | true | 0 | 0 |
| Hard fault interrupt | true | 0 | 0 |
| System tick timer | true | 0 | 0 |
| PVD interrupt through EXTI Line16 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| ADC and COMP interrupts (COMP interrupts through EXTI lines 21 and 22) | unused | | |
| TIM1 break, update, trigger and commutation interrupts | unused | | |
| TIM1 capture compare interrupt | unused | | |
| TIM2 global interrupt | unused | | |
| TIM3 global interrupt | unused | | |
| TIM6 global and DAC underrun error interrupts | unused | | |
| TIM15 global interrupt | unused | | |
| TIM16 global interrupt | unused | | |
| I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23 | unused | | |

*** User modified value**

# 7. Power Plugin report

## 7.1. Microcontroller Selection

| | |
|---|---|
| Series | STM32F0 |
| Line | STM32F0x1 |
| MCU | STM32F051K4Tx |
| Datasheet | 022265_Rev4 |

## 7.2. Parameter Selection

| | |
|---|---|
| Temperature | 25 |
| Vdd | 3.6 |

# 8. Software Project

## 8.1. Project Settings

| Name | Value |
|---|---|
| Project Name | LED Rotary Dimmer |
| Project Folder | C:\Users\Jeroen\ownCloud\Projects\0 Multi\LED Rotary |
| Toolchain / IDE | MDK-ARM V4 |
| Firmware Package Name and Version | STM32Cube FW_F0 V1.5.0 |

## 8.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube Firmware Library Package | Copy all used libraries into the project folder |
| 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 |