# 1. Description

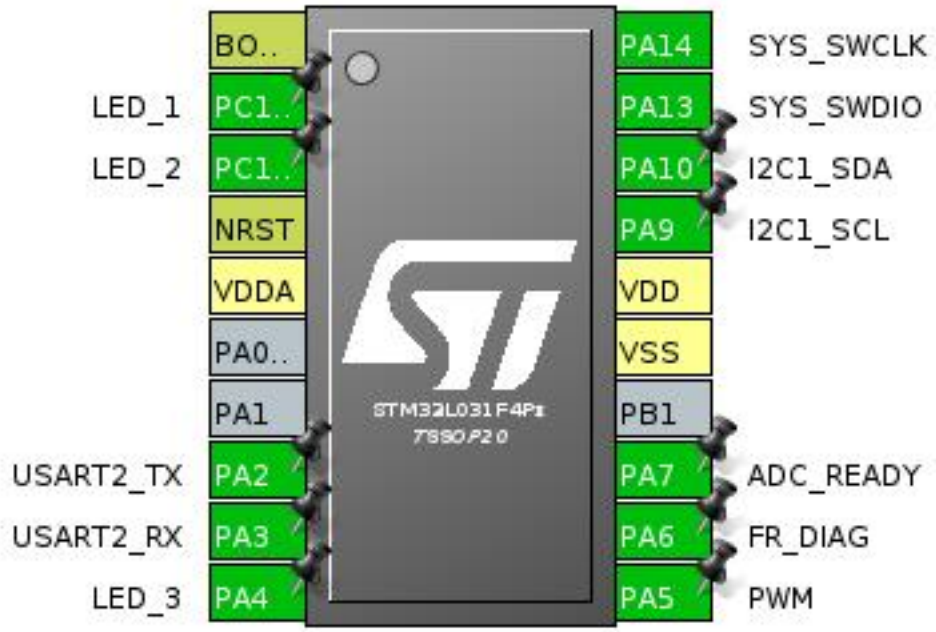
## 1.1. Project

| | |
|---|---|
| Project Name | charge-controller |
| Board Name | custom |
| Generated with: | STM32CubeMX 5.1.0 |
| Date | 04/07/2019 |

## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32L0 |
| MCU Line | STM32L0x1 |
| MCU name | STM32L031F4Px |
| MCU Package | TSSOP20 |
| MCU Pin number | 20 |

## 2. Pinout Configuration

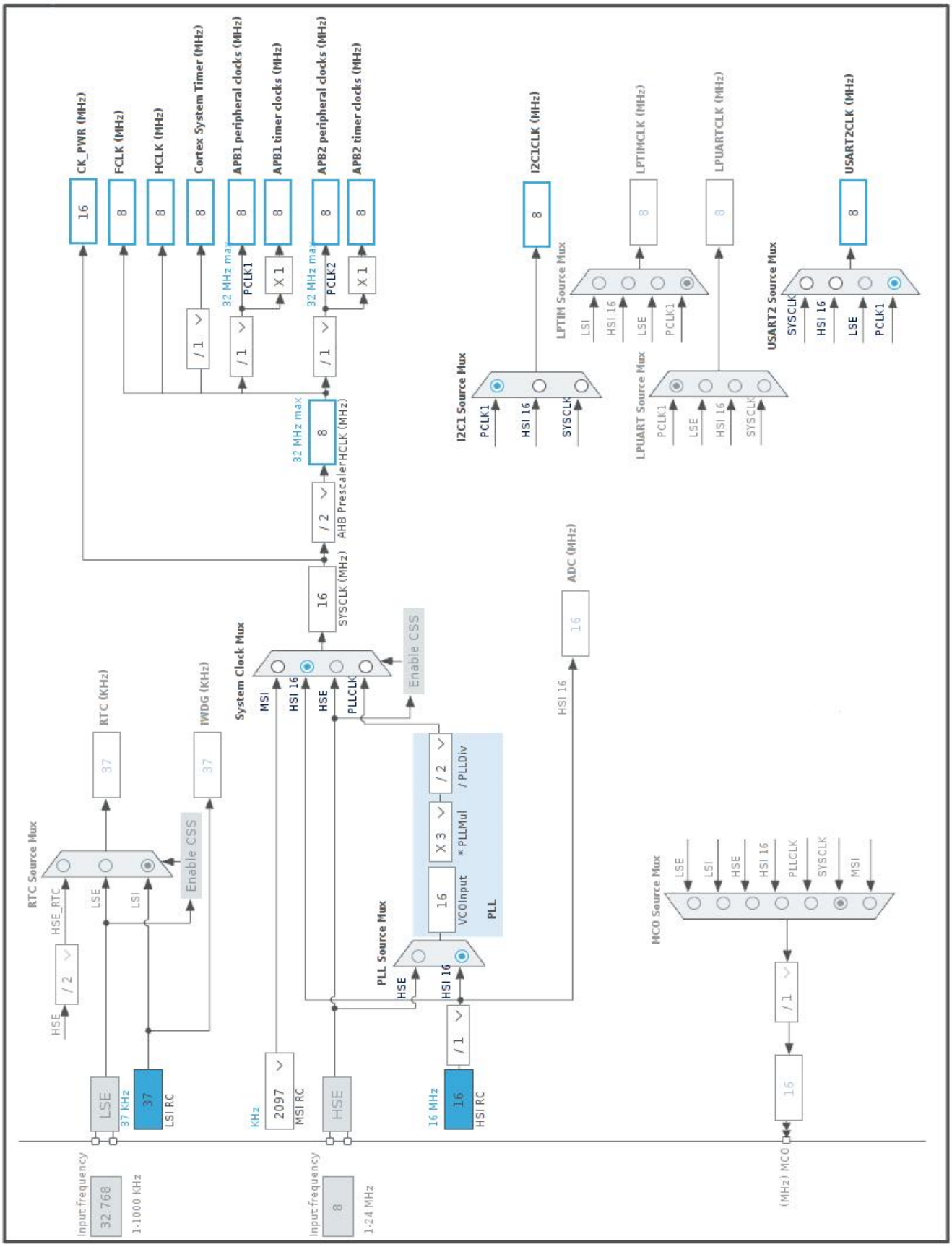


# 3. Pins Configuration

| Pin Number TSSOP20 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | BOOT0 | Boot | | |
| 2 | PC14-OSC32_IN * | I/O | GPIO_Output | LED_1 |
| 3 | PC15-OSC32_OUT * | I/O | GPIO_Output | LED_2 |
| 4 | NRST | Reset | | |
| 5 | VDDA | Power | | |
| 8 | PA2 | I/O | USART2_TX | |
| 9 | PA3 | I/O | USART2_RX | |
| 10 | PA4 * | I/O | GPIO_Output | LED_3 |
| 11 | PA5 | I/O | TIM2_CH1 | PWM |
| 12 | PA6 * | I/O | GPIO_Input | FR_DIAG |
| 13 | PA7 * | I/O | GPIO_Input | ADC_READY |
| 15 | VSS | Power | | |
| 16 | VDD | Power | | |
| 17 | PA9 | I/O | I2C1_SCL | |
| 18 | PA10 | I/O | I2C1_SDA | |
| 19 | PA13 | I/O | SYS_SWDIO | |
| 20 | PA14 | I/O | SYS_SWCLK | |

* The pin is affected with an I/O function

# 4. Clock Tree Configuration



# 5. Software Project

## 5.1. Project Settings

| Name | Value |
|---|---|
| Project Name | charge-controller |
| Project Folder | /home/peter/repos/pwm-charge-controller/stm32/charge-controller |
| Toolchain / IDE | SW4STM32 |
| Firmware Package Name and Version | STM32Cube FW_L0 V1.11.2 |

## 5.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube Firmware Library Package | 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 |
| 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 | STM32L0 |
| Line | STM32L0x1 |
| MCU | STM32L031F4Px |
| Datasheet | 027063_Rev4 |

6.2. Parameter Selection

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

# 7. IPs and Middleware Configuration

## 7.1. I2C1

**I2C: I2C**

### 7.1.1. 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 |

## 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) | 0 WS (1 CPU cycle) |

**RCC Parameters:**

| | |
|---|---|
| HSI Calibration Value | 16 |
| MSI Calibration Value | 0 |
| HSE Startup Timout Value (ms) | 100 |
| LSE Startup Timout Value (ms) | 5000 |

**Power Parameters:**

| | |
|---|---|
| Power Regulator Voltage Scale | Power Regulator Voltage Scale 1 |

## 7.3. SYS

**mode: Debug Serial Wire**

**Timebase Source: SysTick**

## 7.4. TIM2

**Clock Source : Internal Clock**

**Channel1: PWM Generation CH1**

### 7.4.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | **32 *** |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value ) | **255 *** |
| 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) | **32 *** |
| Fast Mode | Disable |
| CH Polarity | High |

## 7.5. USART2

**Mode: Asynchronous**

### 7.5.1. Parameter Settings:

**Basic Parameters:**

| | |
|---|---|
| Baud Rate | **9600 *** |
| 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 |
|---|---|---|---|---|---|---|
| I2C1 | PA9 | I2C1_SCL | Alternate Function Open Drain | Pull-up | **Very High** * | |
| | PA10 | I2C1_SDA | Alternate Function Open Drain | Pull-up | **Very High** * | |
| SYS | PA13 | SYS_SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_SWCLK | n/a | n/a | n/a | |
| TIM2 | PA5 | TIM2_CH1 | Alternate Function Push Pull | No pull-up and no pull-down | Low | PWM |
| USART2 | PA2 | USART2_TX | Alternate Function Push Pull | No pull-up and no pull-down | **Very High** * | |
| | PA3 | USART2_RX | Alternate Function Push Pull | No pull-up and no pull-down | **Very High** * | |
| GPIO | PC14-OSC32_IN | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_1 |
| | PC15-OSC32_OUT | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_2 |
| | PA4 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED_3 |
| | PA6 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | FR_DIAG |
| | PA7 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | ADC_READY |

## 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 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash and EEPROM global interrupt | unused | | |
| RCC global interrupt | unused | | |
| TIM2 global interrupt | unused | | |
| I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23 | unused | | |
| USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26 | unused | | |

*** User modified value**

# 9. Software Pack Report