

## 1. Description

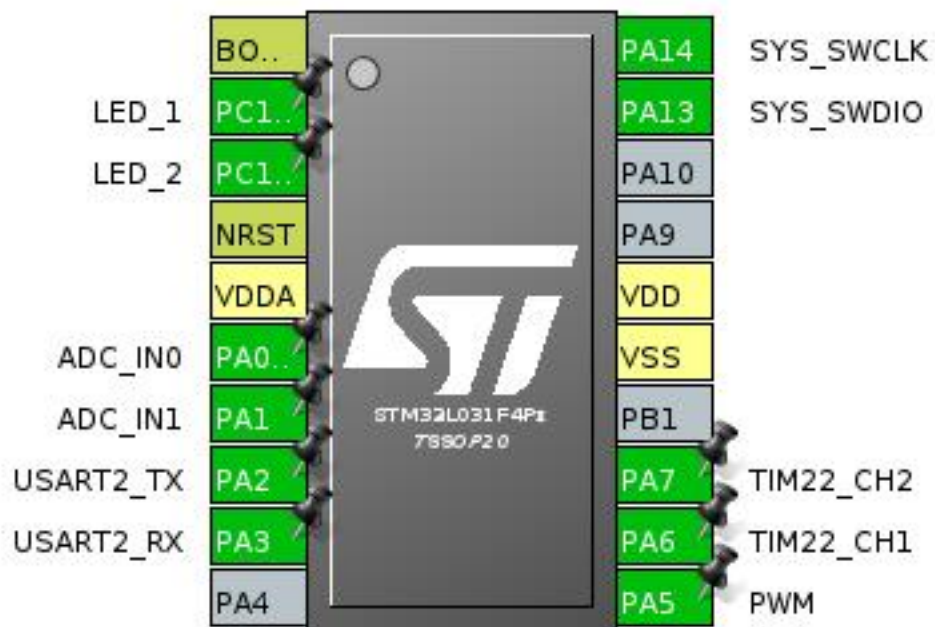
### 1.1. Project

Project Name	charge-controller
Board Name	custom
Generated with:	STM32CubeMX 5.1.0
Date	06/08/2019

### 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		
6	PA0-CK_IN	I/O	ADC_IN0	
7	PA1	I/O	ADC_IN1	
8	PA2	I/O	USART2_TX	
9	PA3	I/O	USART2_RX	
11	PA5	I/O	TIM2_CH1	PWM
12	PA6	I/O	TIM22_CH1	
13	PA7	I/O	TIM22_CH2	
15	VSS	Power		
16	VDD	Power		
19	PA13	I/O	SYS_SWDIO	
20	PA14	I/O	SYS_SWCLK	

\* The pin is affected with an I/O function



## 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)	Yes

## 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. ADC

mode: IN0

mode: IN1

#### 7.1.1. Parameter Settings:

##### ADC\_Settings:

Clock Prescaler

Resolution

Data Alignment

Scan Direction

Continuous Conversion Mode

Discontinuous Conversion Mode

DMA Continuous Requests

End Of Conversion Selection

Overrun behaviour

Low Power Auto Wait

Low Frequency Mode

Auto Off

Oversampling Mode

**Synchronous clock mode divided by 2 \***

ADC 12-bit resolution

Right alignment

Forward

**Enabled \***

Disabled

Disabled

End of single conversion

Overrun data preserved

Disabled

Disabled

Disabled

Disabled

##### ADC\_Regular\_ConversionMode:

Sampling Time

External Trigger Conversion Source

External Trigger Conversion Edge

**79.5 Cycles \***

Regular Conversion launched by software

None

##### WatchDog:

Enable Analog WatchDog Mode

false

### 7.2. RCC

#### 7.2.1. Parameter Settings:

##### System Parameters:

VDD voltage (V)

Buffer Cache

Prefetch

Preread

Flash Latency(WS)

3.3

Enabled

Disabled

Enabled

0 WS (1 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 3 \***

### 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)	<b>15 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>1000 *</b>
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)	<b>500 *</b>
Fast Mode	Disable
CH Polarity	High

### 7.5. TIM22

**Clock Source : Internal Clock**

**Channel1: PWM Generation CH1**



## Channel2: PWM Generation CH2

### 7.5.1. Parameter Settings:

#### Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	<b>Center Aligned mode1 *</b>
Counter Period (AutoReload Register - 16 bits value )	<b>128 *</b>
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	<b>PWM mode 2 *</b>
Pulse (16 bits value)	<b>58 *</b>
Fast Mode	Disable
CH Polarity	High

#### PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	<b>63 *</b>
Fast Mode	Disable
CH Polarity	High

## 7.6. USART2

### Mode: Asynchronous

### 7.6.1. Parameter Settings:

#### Basic Parameters:

Baud Rate	<b>9600 *</b>
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	PA0-CK_IN	ADC_IN0	Analog mode	No pull-up and no pull-down	n/a	
	PA1	ADC_IN1	Analog mode	No pull-up and no pull-down	n/a	
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
TIM22	PA6	TIM22_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA7	TIM22_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
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

### 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		
ADC, COMP1 and COMP2 interrupts (COMP interrupts through EXTI lines 21 and 22)	unused		
TIM2 global interrupt	unused		
TIM22 global interrupt	unused		
USART2 global interrupt / USART2 wake-up interrupt through EXTI line 26	unused		

\* User modified value

## ***9. Software Pack Report***