

## 1. Description

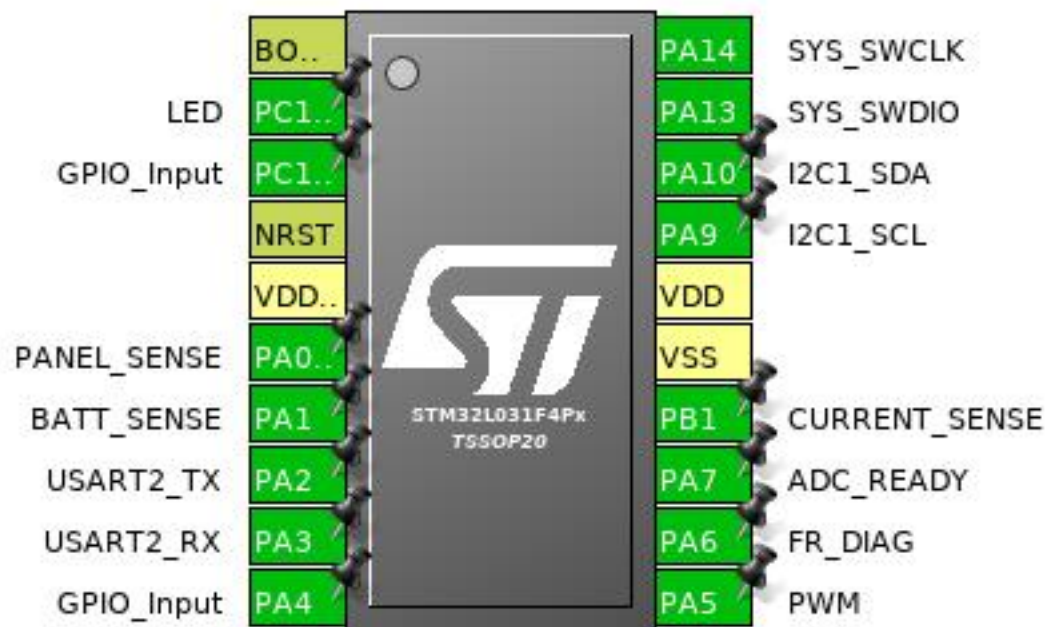
### 1.1. Project

Project Name	charge-controller
Board Name	custom
Generated with:	STM32CubeMX 5.1.0
Date	03/03/2019

### 1.2. MCU

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

## 2. Pinout Configuration

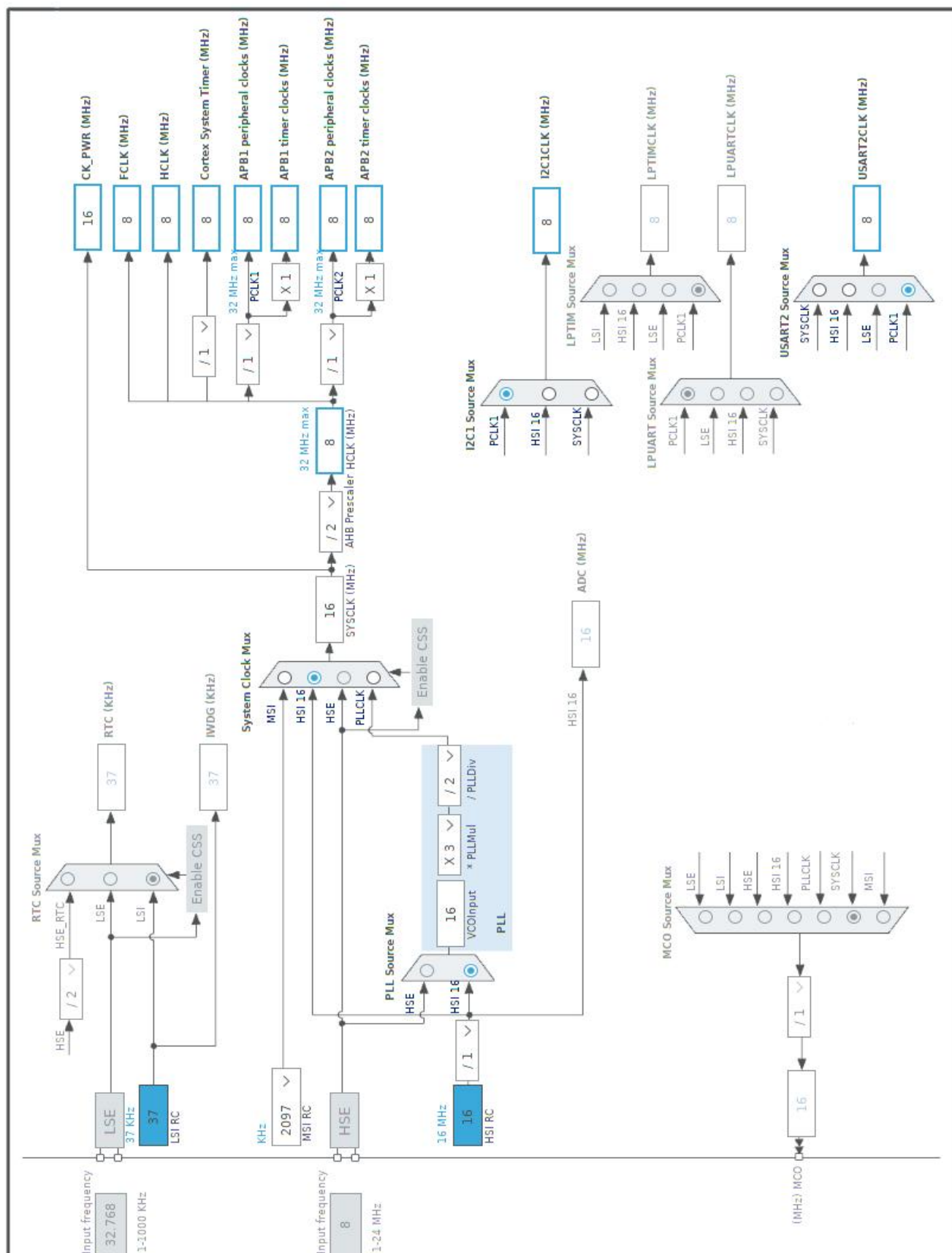


### 3. Pins Configuration

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
3	PC15-OSC32_OUT *	I/O	GPIO_Input	
4	NRST	Reset		
5	VDDA	Power		
6	PA0-CK_IN	I/O	ADC_IN0	PANEL_SENSE
7	PA1	I/O	ADC_IN1	BATT_SENSE
8	PA2	I/O	USART2_TX	
9	PA3	I/O	USART2_RX	
10	PA4 *	I/O	GPIO_Input	
11	PA5	I/O	TIM2_CH1	PWM
12	PA6 *	I/O	GPIO_Input	FR_DIAG
13	PA7 *	I/O	GPIO_Input	ADC_READY
14	PB1	I/O	ADC_IN9	CURRENT_SENSE
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)	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

mode: IN9

#### 7.1.1. Parameter Settings:

##### ADC\_Settings:

Clock Prescaler	Synchronous clock mode divided by 2
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Direction	Forward
Continuous Conversion Mode	<b>Enabled *</b>
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 Frequency Mode	Disabled
Auto Off	Disabled
Oversampling Mode	Disabled

##### ADC\_Regular\_ConversionMode:

Sampling Time	<b>39.5 Cycles *</b>
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None

##### WatchDog:

Enable Analog WatchDog Mode	<b>true *</b>
Watchdog Mode	Single regular channel
Analog WatchDog Channel	<b>Channel 1 *</b>
High Threshold	<b>4095 *</b>
Low Threshold	<b>2042 *</b>
Interrupt Mode	<b>Enabled *</b>

### 7.2. I2C1

I2C: I2C

### 7.2.1. 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	<b>0x2000090E *</b>

#### 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

## 7.3. RCC

### 7.3.1. 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 Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

#### Power Parameters:

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

## 7.4. SYS

mode: Debug Serial Wire



**Timebase Source: SysTick**

## 7.5. TIM2

**Clock Source : Internal Clock**

**Channel1: PWM Generation CH1**

### 7.5.1. Parameter Settings:

#### Counter Settings:

Prescaler (PSC - 16 bits value)	<b>32 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>255 *</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>32 *</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	PANEL_SENSE
	PA1	ADC_IN1	Analog mode	No pull-up and no pull-down	n/a	BATT_SENSE
	PB1	ADC_IN9	Analog mode	No pull-up and no pull-down	n/a	CURRENT_SENSE
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
	PC15-OSC32_OUT	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PA4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	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
ADC, COMP1 and COMP2 interrupts (COMP interrupts through EXTI lines 21 and 22)	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***