

# STM32 CubeMX

## 1. Description

### 1.1. Project

Project Name	cube
Board Name	custom
Generated with:	STM32CubeMX 6.0.0
Date	02/02/2021

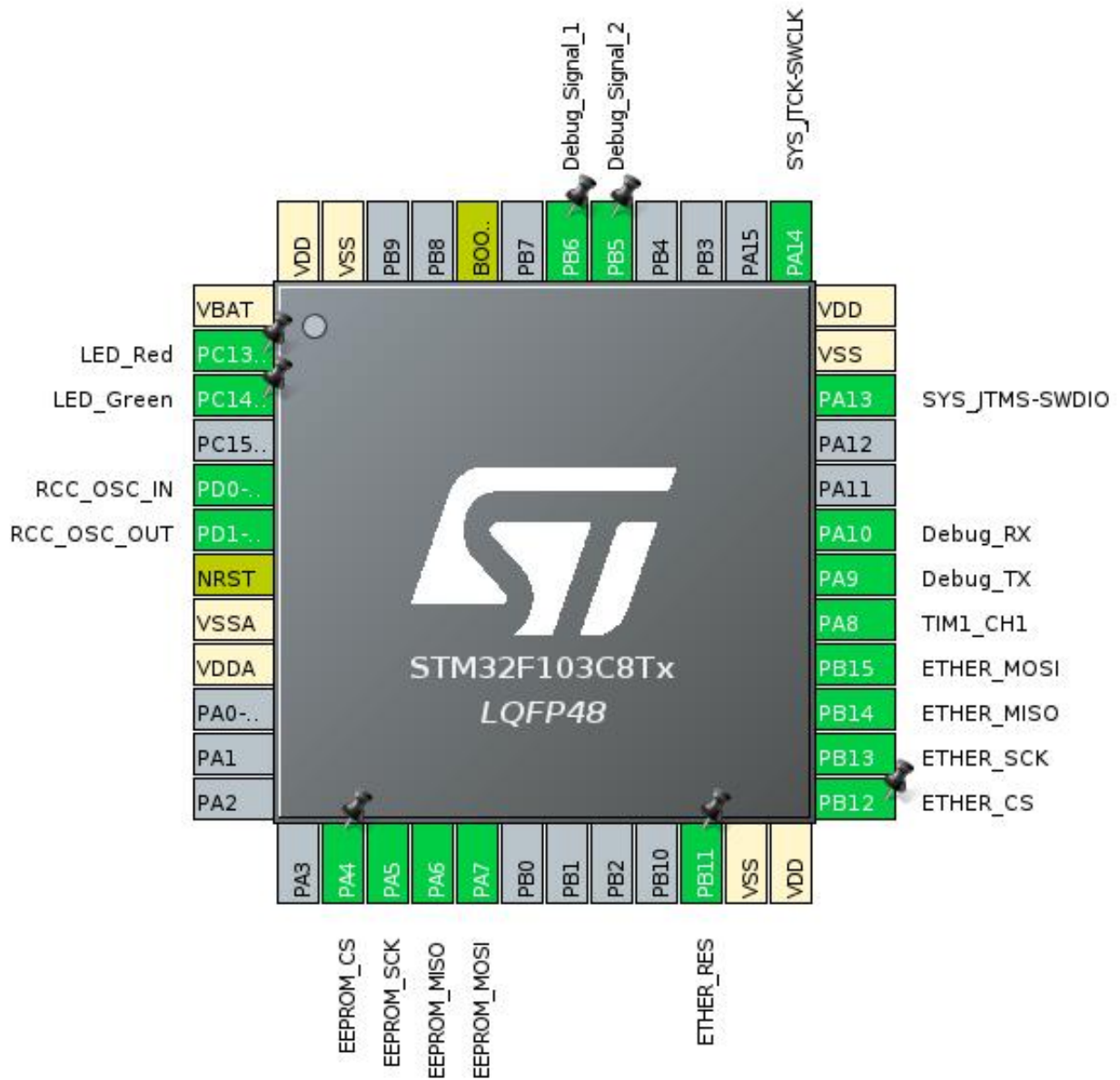
### 1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

### 1.3. Core(s) information

Core(s)	Arm Cortex-M3
---------	---------------

## 2. Pinout Configuration

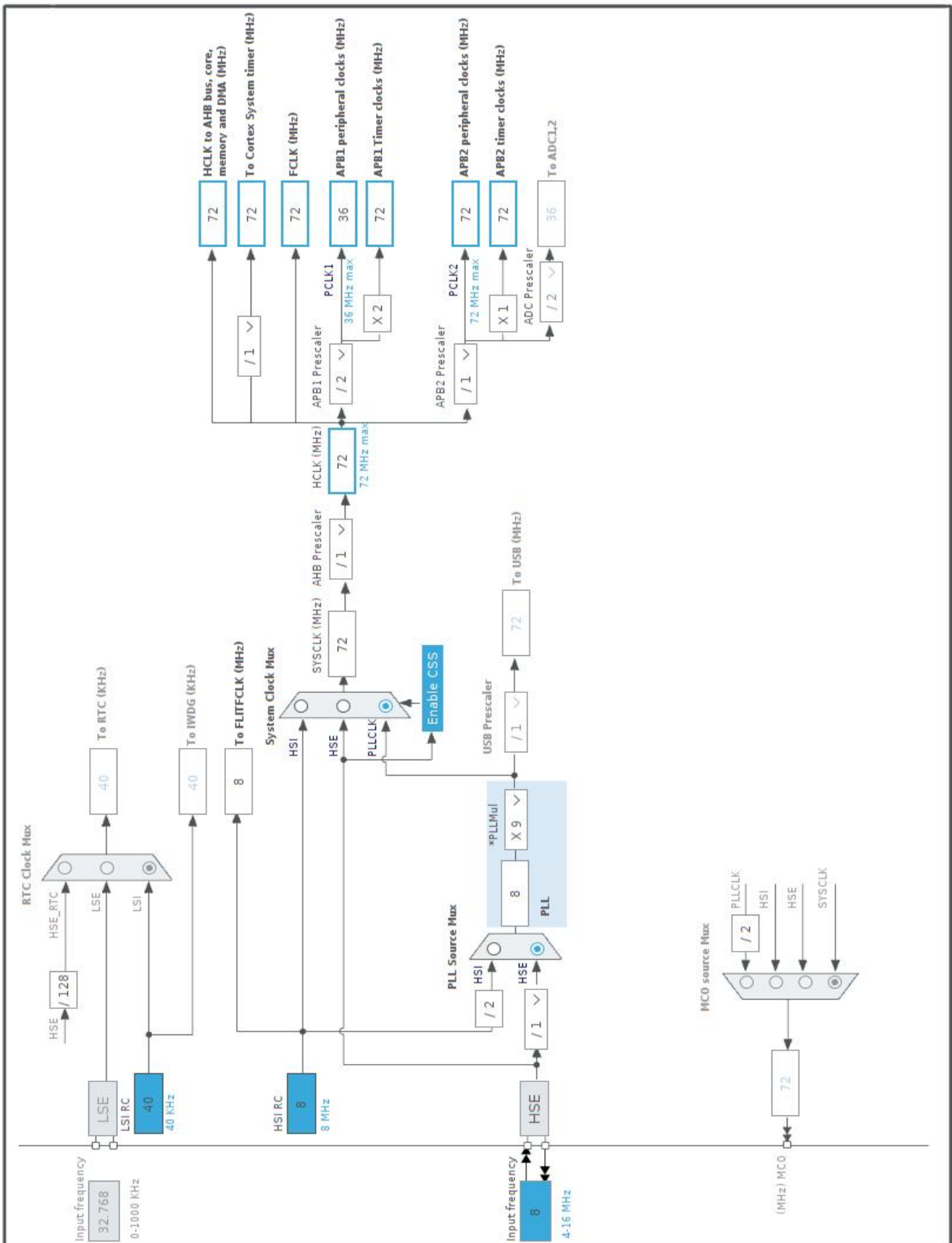


### 3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13-TAMPER-RTC *	I/O	GPIO_Output	LED_Red
3	PC14-OSC32_IN *	I/O	GPIO_Output	LED_Green
5	PD0-OSC_IN	I/O	RCC_OSC_IN	
6	PD1-OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
14	PA4 *	I/O	GPIO_Output	EEPROM_CS
15	PA5	I/O	SPI1_SCK	EEPROM_SCK
16	PA6	I/O	SPI1_MISO	EEPROM_MISO
17	PA7	I/O	SPI1_MOSI	EEPROM_MOSI
22	PB11 *	I/O	GPIO_Output	ETHER_RES
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	ETHER_CS
26	PB13	I/O	SPI2_SCK	ETHER_SCK
27	PB14	I/O	SPI2_MISO	ETHER_MISO
28	PB15	I/O	SPI2_MOSI	ETHER_MOSI
29	PA8	I/O	TIM1_CH1	
30	PA9	I/O	USART1_TX	Debug_TX
31	PA10	I/O	USART1_RX	Debug_RX
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
41	PB5 *	I/O	GPIO_Output	Debug_Signal_2
42	PB6 *	I/O	GPIO_Output	Debug_Signal_1
44	BOOT0	Boot		
47	VSS	Power		
48	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	cube
Project Folder	/home/wn/Workspaces/mains-frequency-counter-stm32/cube
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.3
Application Structure	Advanced
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

### 5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	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
Keep User Code 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
Enable Full Assert	No

### 5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	IP Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_SPI1_Init	SPI1
4	MX_SPI2_Init	SPI2
5	MX_TIM1_Init	TIM1
6	MX_USART1_UART_Init	USART1

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	DS5319_Rev17

### 6.2. Parameter Selection

Temperature	25
Vdd	3.3

### 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

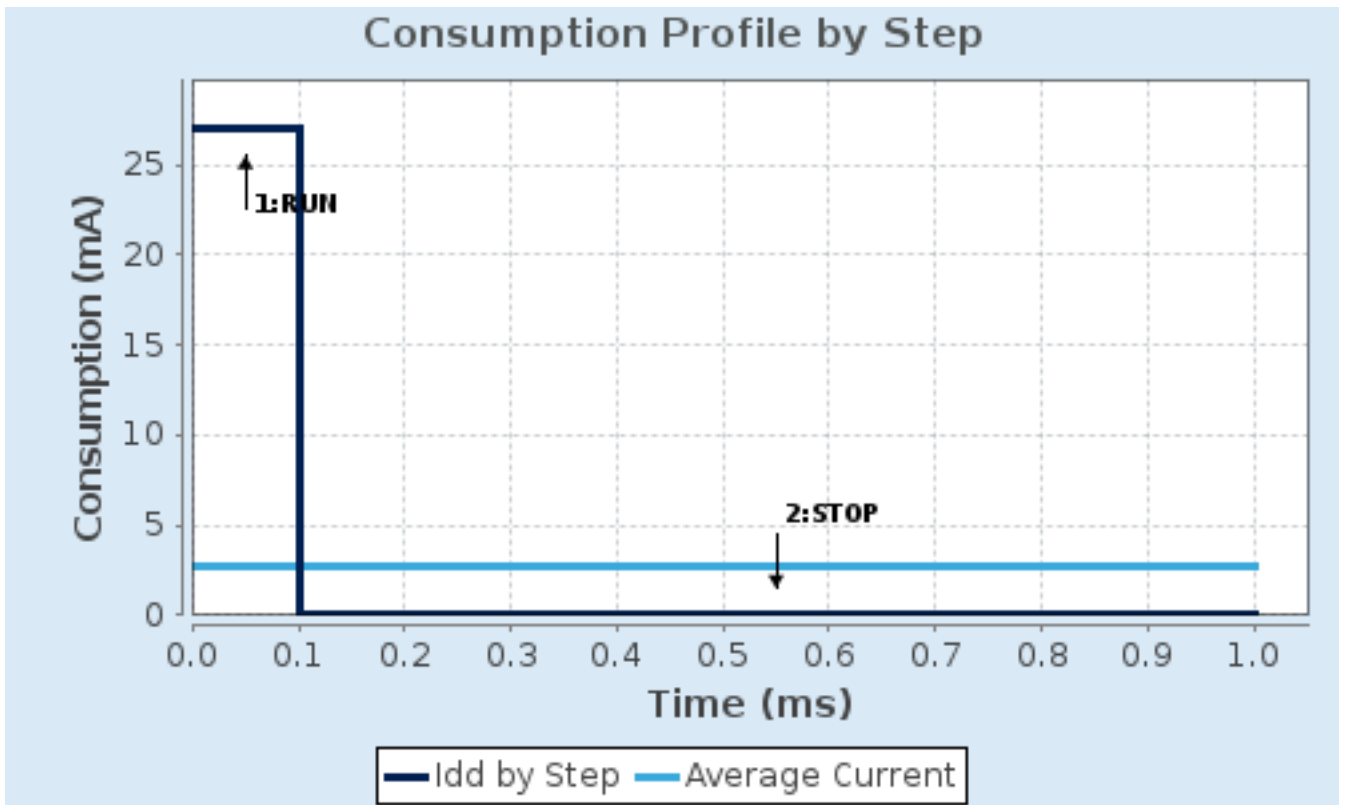
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP
<b>Vdd</b>	3.3	3.3
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	No Scale	No Scale
<b>Fetch Type</b>	FLASH	n/a
<b>CPU Frequency</b>	72 MHz	0 Hz
<b>Clock Configuration</b>	HSE PLL	Regulator LP
<b>Clock Source Frequency</b>	8 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	27 mA	14 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	90.0	0.0
<b>Ta Max</b>	100.1	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	2.71 mA
Battery Life	1 month, 21 days, 17 hours	Average DMIPS	61.0 DMIPS

#### 6.6. Chart





## 7. IPs and Middleware Configuration

### 7.1. GPIO

### 7.2. RCC

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

##### 7.2.1. Parameter Settings:

###### System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

###### RCC Parameters:

HSI Calibration Value	16
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

### 7.3. SPI1

#### Mode: Full-Duplex Master

##### 7.3.1. Parameter Settings:

###### Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

###### Clock Parameters:

Prescaler (for Baud Rate)	<b>8 *</b>
Baud Rate	<b>9.0 MBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

###### Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

### 7.4. SPI2

## Mode: Full-Duplex Master

### 7.4.1. Parameter Settings:

#### Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

#### Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	<b>18.0 MBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

#### Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

## 7.5. SYS

### Debug: Serial Wire

Timebase Source: SysTick

## 7.6. TIM1

Clock Source : Internal Clock

Channel1: Input Capture direct mode

### 7.6.1. Parameter Settings:

#### Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	65535
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)

#### Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct

Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

## 7.7. USART1

### Mode: Asynchronous

#### 7.7.1. 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

\* User modified value

## 8. System Configuration

### 8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
RCC	PD0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PD1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	n/a	High *	EEPROM_SCK
	PA6	SPI1_MISO	Input mode	No pull-up and no pull-down	n/a	EEPROM_MISO
	PA7	SPI1_MOSI	Alternate Function Push Pull	n/a	High *	EEPROM_MOSI
SPI2	PB13	SPI2_SCK	Alternate Function Push Pull	n/a	High *	ETHER_SCK
	PB14	SPI2_MISO	Input mode	No pull-up and no pull-down	n/a	ETHER_MISO
	PB15	SPI2_MOSI	Alternate Function Push Pull	n/a	High *	ETHER_MOSI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Input mode	No pull-up and no pull-down	n/a	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	High *	Debug_TX
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	n/a	Debug_RX
GPIO	PC13-TAMPER-RTC	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Red
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Green
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	EEPROM_CS
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ETHER_RES
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ETHER_CS
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Debug_Signal_2
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Debug_Signal_1

### 8.2. DMA configuration

nothing configured in DMA service

### 8.3. NVIC configuration

#### 8.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
Prefetch fault, memory access fault	true	0	0
Undefined instruction or illegal state	true	0	0
System service call via SWI instruction	true	0	0
Debug monitor	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
SPI1 global interrupt	true	0	0
USART1 global interrupt	true	0	0
PVD interrupt through EXTI line 16		unused	
Flash global interrupt		unused	
RCC global interrupt		unused	
TIM1 break interrupt		unused	
TIM1 update interrupt		unused	
TIM1 trigger and commutation interrupts		unused	
TIM1 capture compare interrupt		unused	
SPI2 global interrupt		unused	

#### 8.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	true	true	false
Hard fault interrupt	true	true	false
Memory management fault	true	true	false
Prefetch fault, memory access fault	true	true	false
Undefined instruction or illegal state	true	true	false
System service call via SWI instruction	true	true	false
Debug monitor	true	true	false
Pendable request for system service	true	true	false
System tick timer	true	true	true
SPI1 global interrupt	true	true	true
USART1 global interrupt	true	true	true

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

### Middleware

#### System Core

#### Analog

#### Timers

#### Connectivity

#### Computing

DMA

TIM1 

SPI1 

GPIO 

SPI2 

NVIC 

USART1 

RCC 

SYS 



## 10. Docs & Resources

Type	Link
Datasheet	<a href="http://www.st.com/resource/en/datasheet/CD00161566.pdf">http://www.st.com/resource/en/datasheet/CD00161566.pdf</a>
Reference manual	<a href="http://www.st.com/resource/en/reference_manual/CD00171190.pdf">http://www.st.com/resource/en/reference_manual/CD00171190.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/CD00228163.pdf">http://www.st.com/resource/en/programming_manual/CD00228163.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/CD00283419.pdf">http://www.st.com/resource/en/programming_manual/CD00283419.pdf</a>
Errata sheet	<a href="http://www.st.com/resource/en/errata_sheet/CD00190234.pdf">http://www.st.com/resource/en/errata_sheet/CD00190234.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00160362.pdf">http://www.st.com/resource/en/application_note/CD00160362.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00164185.pdf">http://www.st.com/resource/en/application_note/CD00164185.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00167326.pdf">http://www.st.com/resource/en/application_note/CD00167326.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00167594.pdf">http://www.st.com/resource/en/application_note/CD00167594.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00211314.pdf">http://www.st.com/resource/en/application_note/CD00211314.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00249778.pdf">http://www.st.com/resource/en/application_note/CD00249778.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00259245.pdf">http://www.st.com/resource/en/application_note/CD00259245.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264321.pdf">http://www.st.com/resource/en/application_note/CD00264321.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264342.pdf">http://www.st.com/resource/en/application_note/CD00264342.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264379.pdf">http://www.st.com/resource/en/application_note/CD00264379.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00024853.pdf">http://www.st.com/resource/en/application_note/DM00024853.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00032987.pdf">http://www.st.com/resource/en/application_note/DM00032987.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00033267.pdf">http://www.st.com/resource/en/application_note/DM00033267.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00033344.pdf">http://www.st.com/resource/en/application_note/DM00033344.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00042534.pdf">http://www.st.com/resource/en/application_note/DM00042534.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00052530.pdf">http://www.st.com/resource/en/application_note/DM00052530.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00073742.pdf">http://www.st.com/resource/en/application_note/DM00073742.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00080497.pdf">http://www.st.com/resource/en/application_note/DM00080497.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00129215.pdf">http://www.st.com/resource/en/application_note/DM00129215.pdf</a>

Application note [http://www.st.com/resource/en/application\\_note/DM00160482.pdf](http://www.st.com/resource/en/application_note/DM00160482.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00156964.pdf](http://www.st.com/resource/en/application_note/DM00156964.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00209695.pdf](http://www.st.com/resource/en/application_note/DM00209695.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00220769.pdf](http://www.st.com/resource/en/application_note/DM00220769.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00257177.pdf](http://www.st.com/resource/en/application_note/DM00257177.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00272912.pdf](http://www.st.com/resource/en/application_note/DM00272912.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00236305.pdf](http://www.st.com/resource/en/application_note/DM00236305.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00296349.pdf](http://www.st.com/resource/en/application_note/DM00296349.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00325582.pdf](http://www.st.com/resource/en/application_note/DM00325582.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00327191.pdf](http://www.st.com/resource/en/application_note/DM00327191.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00354244.pdf](http://www.st.com/resource/en/application_note/DM00354244.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00315319.pdf](http://www.st.com/resource/en/application_note/DM00315319.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00380469.pdf](http://www.st.com/resource/en/application_note/DM00380469.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00395696.pdf](http://www.st.com/resource/en/application_note/DM00395696.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00493651.pdf](http://www.st.com/resource/en/application_note/DM00493651.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00536349.pdf](http://www.st.com/resource/en/application_note/DM00536349.pdf)  
Application note [http://www.st.com/resource/en/application\\_note/DM00725181.pdf](http://www.st.com/resource/en/application_note/DM00725181.pdf)