

## 1. Description

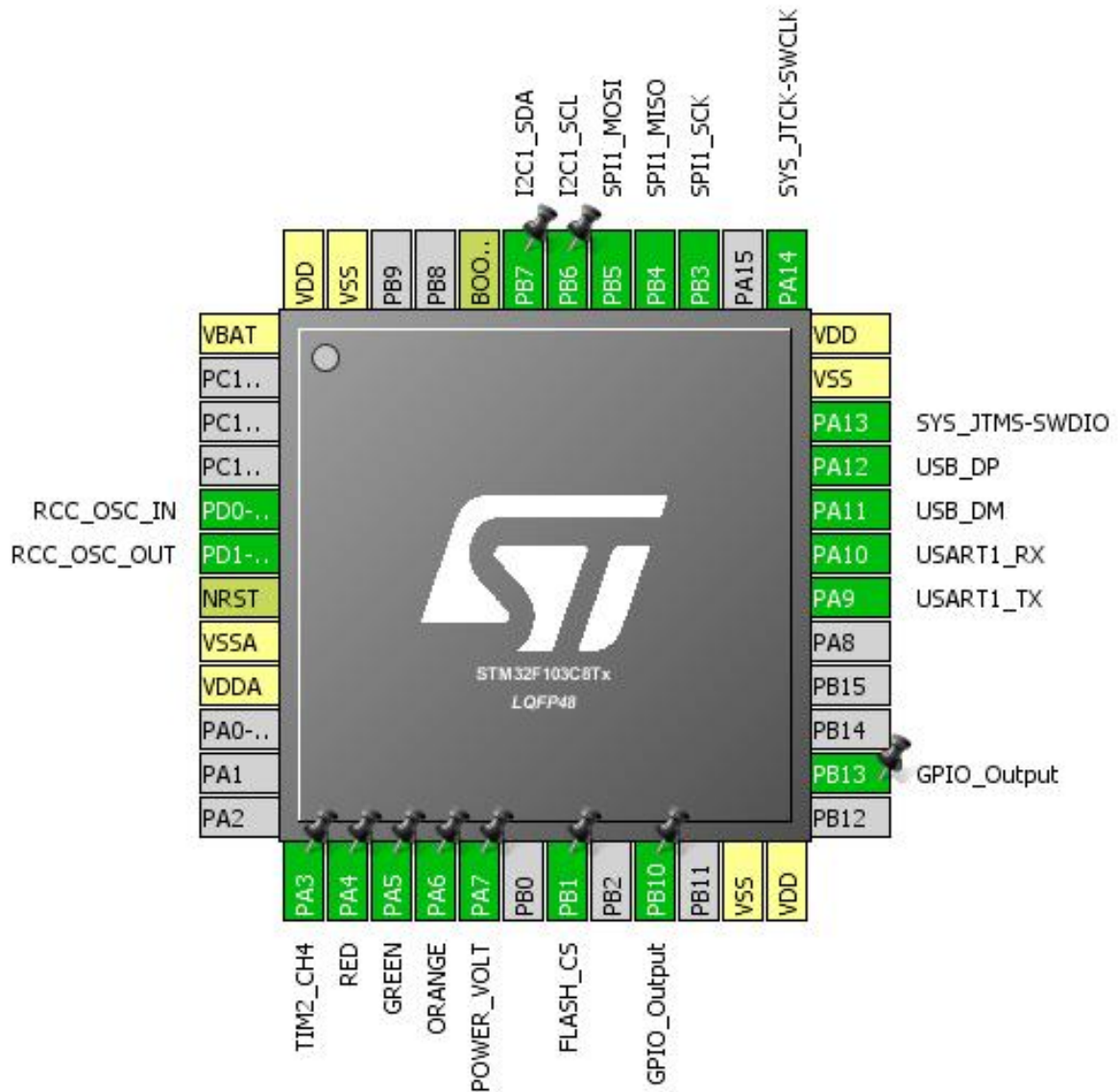
### 1.1. Project

Project Name	Modbus_Air_STM32
Board Name	custom
Generated with:	STM32CubeMX 4.27.0
Date	12/10/2019

### 1.2. MCU

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

## 2. Pinout Configuration

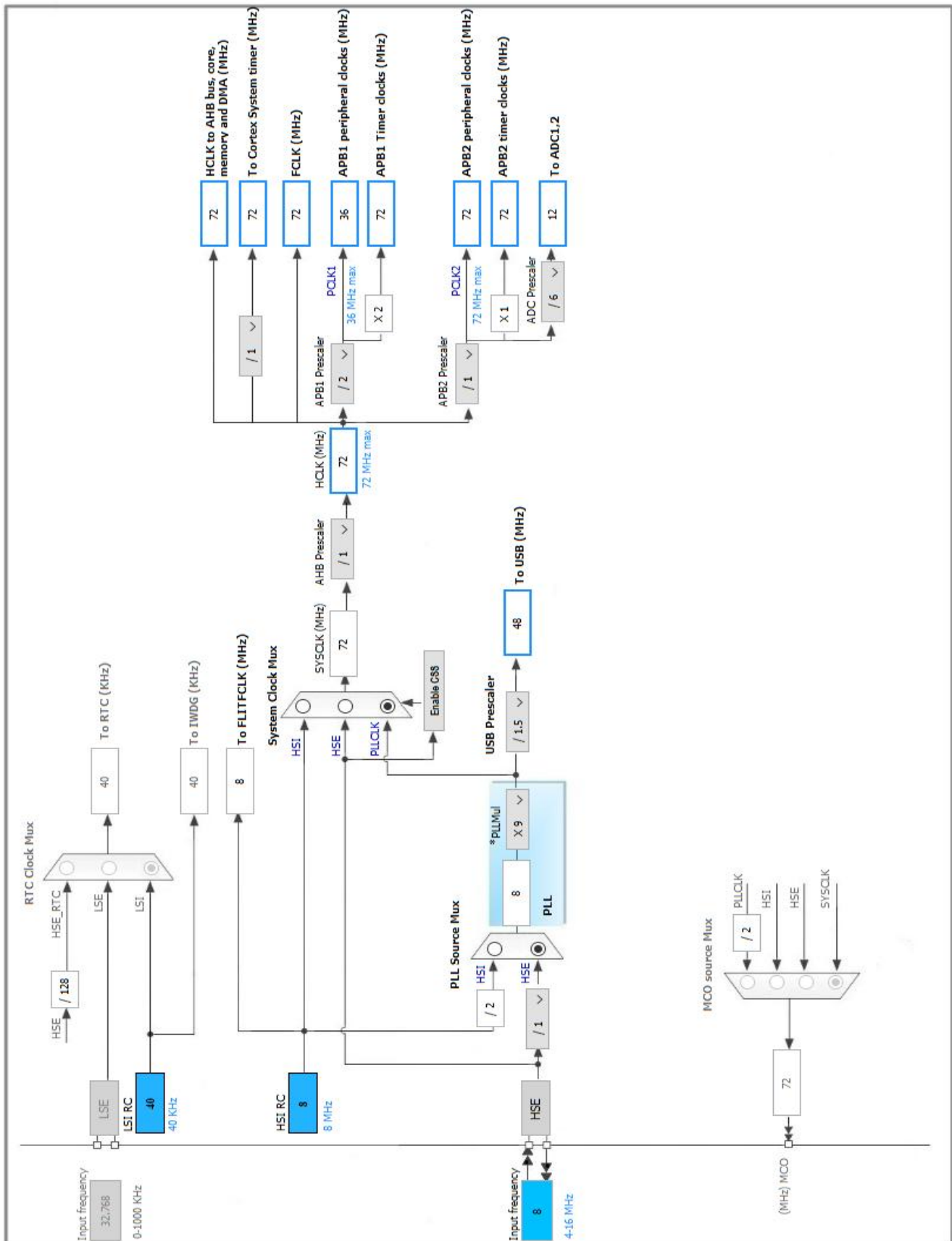


### 3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
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		
13	PA3	I/O	TIM2_CH4	
14	PA4 *	I/O	GPIO_Input	RED
15	PA5 *	I/O	GPIO_Input	GREEN
16	PA6 *	I/O	GPIO_Input	ORANGE
17	PA7	I/O	ADC1_IN7	POWER_VOLT
19	PB1 *	I/O	GPIO_Output	FLASH_CS
21	PB10 *	I/O	GPIO_Output	
23	VSS	Power		
24	VDD	Power		
26	PB13 *	I/O	GPIO_Output	
30	PA9	I/O	USART1_TX	
31	PA10	I/O	USART1_RX	
32	PA11	I/O	USB_DM	
33	PA12	I/O	USB_DP	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
39	PB3	I/O	SPI1_SCK	
40	PB4	I/O	SPI1_MISO	
41	PB5	I/O	SPI1_MOSI	
42	PB6	I/O	I2C1_SCL	
43	PB7	I/O	I2C1_SDA	
44	BOOT0	Boot		
47	VSS	Power		
48	VDD	Power		

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

## 4. Clock Tree Configuration



## 5. IPs and Middleware Configuration

### 5.1. ADC1

mode: IN7

#### 5.1.1. Parameter Settings:

##### ADCs\_Common\_Settings:

Mode Independent mode

##### ADC\_Settings:

Data Alignment Right alignment

Scan Conversion Mode Disabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

##### ADC\_Regular\_ConversionMode:

Enable Regular Conversions Enable

Number Of Conversion 1

External Trigger Conversion Source Regular Conversion launched by software

Rank 1

Channel Channel 7

Sampling Time **28.5 Cycles \***

##### ADC\_Injected\_ConversionMode:

Number Of Conversions 0

##### WatchDog:

Enable Analog WatchDog Mode false

### 5.2. I2C1

I2C: I2C

#### 5.2.1. Parameter Settings:

##### Master Features:

I2C Speed Mode Standard Mode

I2C Clock Speed (Hz) 100000

##### Slave Features:

Clock No Stretch Mode Disabled

Primary Address Length selection 7-bit

Dual Address Acknowledged Disabled

Primary slave address 0

General Call address detection Disabled

### 5.3. RCC

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

##### 5.3.1. 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

### 5.4. SPI1

#### Mode: Full-Duplex Master

##### 5.4.1. 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

### 5.5. SYS

#### Debug: Serial Wire

**Timebase Source: SysTick**

## **5.6. TIM2**

**Clock Source : Internal Clock**

**Channel4: PWM Generation CH4**

### **5.6.1. Parameter Settings:**

#### **Counter Settings:**

Prescaler (PSC - 16 bits value)	<b>72 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>500 *</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 4:**

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	<b>Low *</b>

## **5.7. TIM4**

**mode: Clock Source**

### **5.7.1. Parameter Settings:**

#### **Counter Settings:**

Prescaler (PSC - 16 bits value)	<b>72 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>49 *</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)

## 5.8. USART1

**Mode: Asynchronous**

### 5.8.1. 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

## 5.9. USB

**mode: Device (FS)**

### 5.9.1. Parameter Settings:

#### Basic Parameters:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	8 Bytes

#### Power Parameters:

Low Power	Disabled
Link Power Management	Disabled
Battery Charging	Disabled

## 5.10. USB\_DEVICE

**Class For FS IP: Communication Device Class (Virtual Port Com)**

### 5.10.1. Parameter Settings:

#### Basic Parameters:

USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces)	1
USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration)	1
USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors)	512
USBD_SUPPORT_USER_STRING (Enable user string descriptor)	Disabled
USBD_SELF_POWERED (Enabled self power)	Enabled



USBD_DEBUG_LEVEL (USBD Debug Level)	0: No debug message
<b>Class Parameters:</b>	
USB CDC Rx Buffer Size	1000
USB CDC Tx Buffer Size	1000

5.10.2. Device Descriptor:

<b>Device Descriptor:</b>	
VID (Vendor Identifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	<b>LightningBolt *</b>
<b>Device Descriptor FS:</b>	
PID (Product Identifier)	22336
PRODUCT_STRING (Product Identifier)	<b>Obit-Tesla *</b>
SERIALNUMBER_STRING (Serial number)	<b>27112019 *</b>
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

\* User modified value

## 6. System Configuration

### 6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA7	ADC1_IN7	Analog mode	n/a	n/a	POWER_VOLT
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	n/a	High *	
	PB7	I2C1_SDA	Alternate Function Open Drain	n/a	High *	
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	PB3	SPI1_SCK	Alternate Function Push Pull	n/a	High *	
	PB4	SPI1_MISO	Input mode	No pull-up and no pull-down	n/a	
	PB5	SPI1_MOSI	Alternate Function Push Pull	n/a	High *	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM2	PA3	TIM2_CH4	Alternate Function Push Pull	n/a	Low	
USART1	PA9	USART1_TX	Alternate Function Push Pull	n/a	High *	
	PA10	USART1_RX	Input mode	No pull-up and no pull-down	n/a	
USB	PA11	USB_DM	n/a	n/a	n/a	
	PA12	USB_DP	n/a	n/a	n/a	
GPIO	PA4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	RED
	PA5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GREEN
	PA6	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ORANGE
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	FLASH_CS
	PB10	GPIO_Output	Output Push Pull	Pull-up *	Low	
	PB13	GPIO_Output	Output Push Pull	Pull-up *	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
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
USB low priority or CAN RX0 interrupts	true	0	0
TIM4 global interrupt	true	0	0
SPI1 global interrupt	true	1	0
USART1 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
USB high priority or CAN TX interrupts	unused		
TIM2 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		

\* User modified value

## ***7. Power Consumption Calculator report***

### 7.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	13587_Rev17

### 7.2. Parameter Selection

Temperature	25
Vdd	3.3

## 8. Software Project

### 8.1. Project Settings

Name	Value
Project Name	Modbus_Air_STM32
Project Folder	H:\Project_For_Me\Start\PCB_NodeSTM32\Modbus_Air_STM32
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F1 V1.6.1

### 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

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