

## 1. Description

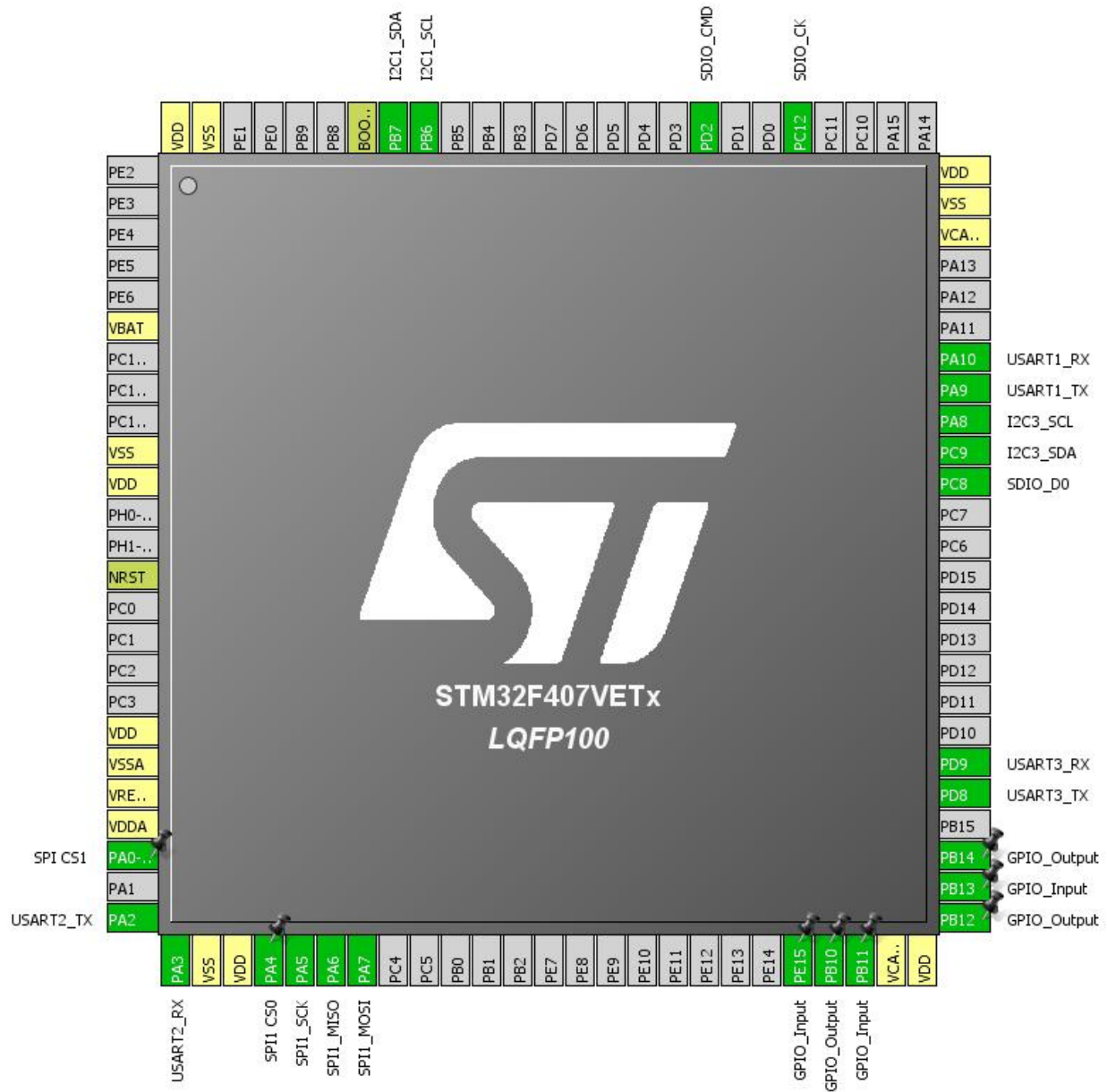
### 1.1. Project

Project Name	umweltspaeher_stm32f407VET_V6
Board Name	umweltspaeher_stm32f407VET_V6
Generated with:	STM32CubeMX 4.23.0
Date	12/04/2019

### 1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VETx
MCU Package	LQFP100
MCU Pin number	100

## 2. Pinout Configuration



### 3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
14	NRST	Reset		
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP *	I/O	GPIO_Output	SPI CS1
25	PA2	I/O	USART2_TX	
26	PA3	I/O	USART2_RX	
27	VSS	Power		
28	VDD	Power		
29	PA4 *	I/O	GPIO_Output	SPI1 CS0
30	PA5	I/O	SPI1_SCK	
31	PA6	I/O	SPI1_MISO	
32	PA7	I/O	SPI1_MOSI	
46	PE15 *	I/O	GPIO_Input	
47	PB10 *	I/O	GPIO_Output	
48	PB11 *	I/O	GPIO_Input	
49	VCAP_1	Power		
50	VDD	Power		
51	PB12 *	I/O	GPIO_Output	
52	PB13 *	I/O	GPIO_Input	
53	PB14 *	I/O	GPIO_Output	
55	PD8	I/O	USART3_TX	
56	PD9	I/O	USART3_RX	
65	PC8	I/O	SDIO_D0	
66	PC9	I/O	I2C3_SDA	
67	PA8	I/O	I2C3_SCL	
68	PA9	I/O	USART1_TX	
69	PA10	I/O	USART1_RX	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
80	PC12	I/O	SDIO_CK	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
83	PD2	I/O	SDIO_CMD	
92	PB6	I/O	I2C1_SCL	
93	PB7	I/O	I2C1_SDA	
94	BOOT0	Boot		
99	VSS	Power		
100	VDD	Power		

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



## 5. IPs and Middleware Configuration

### 5.1. I2C1

#### I2C: I2C

##### 5.1.1. 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

### 5.2. I2C3

#### 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. RTC

**mode: Activate Clock Source**

**mode: Activate Calendar**

**Alarm A: Internal Alarm**

**WakeUp: Internal WakeUp**

### 5.3.1. Parameter Settings:

#### General:

Hour Format	Hourformat 24
Asynchronous Predivider value	127
Synchronous Predivider value	255

#### Calendar Time:

Data Format	BCD data format
Hours	0
Minutes	0
Seconds	0
Day Light Saving: value of hour adjustment	Daylightsaving None
Store Operation	Storeoperation Reset

#### Calendar Date:

Week Day	Monday
Month	January
Date	1
Year	0

#### Alarm A:

Hours	0
Minutes	0
Seconds	0
Sub Seconds	0
Alarm Mask Date Week day	Disable
Alarm Mask Hours	Disable
Alarm Mask Minutes	Disable
Alarm Mask Seconds	Disable
Alarm Sub Second Mask	All Alarm SS fields are masked.
Alarm Date Week Day Sel	Date
Alarm Date	1

#### Wake UP:

Wake Up Clock	RTCCLK / 16
Wake Up Counter	0

## 5.4. SDIO

Mode: SD 1 bit

### 5.4.1. Parameter Settings:

#### SDIO parameters:

Clock transition on which the bit capture is made	Rising transition
SDIO Clock divider bypass	Disable
SDIO Clock output enable when the bus is idle	Disable the power save for the clock
SDIO hardware flow control	The hardware control flow is disabled
SDIOCLK clock divide factor	0

## 5.5. SPI1

Mode: Full-Duplex Master

### 5.5.1. 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>42.0 MBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

#### Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

## 5.6. SYS

Timebase Source: SysTick



## 5.7. USART1

Mode: Asynchronous

### 5.7.1. 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

## 5.8. USART2

Mode: Asynchronous

### 5.8.1. 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

## 5.9. USART3

Mode: Asynchronous

### 5.9.1. Parameter Settings:

#### Basic Parameters:

Baud Rate	115200
Word Length	8 Bits (including Parity)

Parity	None
Stop Bits	1
<b>Advanced Parameters:</b>	
Data Direction	Receive and Transmit
Over Sampling	16 Samples

## 5.10. FATFS

mode: SD Card

### 5.10.1. Set Defines:

#### Version:

FATFS version	R0.12c
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#### Function Parameters:

FS_READONLY (Read-only mode)	Disabled
FS_MINIMIZE (Minimization level)	Disabled
USE_STRFUNC (String functions)	Enabled with LF -> CRLF conversion
USE_FIND (Find functions)	Disabled
USE_MKFS (Make filesystem function)	Enabled
USE_FASTSEEK (Fast seek function)	Enabled
USE_EXPAND (Use f_expand function)	Disabled
USE_CHMOD (Change attributes function)	Disabled
USE_LABEL (Volume label functions)	Disabled
USE_FORWARD (Forward function)	Disabled

#### Locale and Namespace Parameters:

CODE_PAGE (Code page on target)	Latin 1
USE_LFN (Use Long Filename)	Disabled
MAX_LFN (Max Long Filename)	255
LFN_UNICODE (Enable Unicode)	ANSI/OEM
STRF_ENCODE (Character encoding)	UTF-8
FS_RPATH (Relative Path)	Disabled

#### Physical Drive Parameters:

VOLUMES (Logical drives)	1
MAX_SS (Maximum Sector Size)	512
MIN_SS (Minimum Sector Size)	512
MULTI_PARTITION (Volume partitions feature)	Disabled
USE_TRIM (Erase feature)	Disabled
FS_NOFSINFO (Force full FAT scan)	0

#### System Parameters:

FS_TINY (Tiny mode)	Disabled
FS_EXFAT (Support of exFAT file system)	Disabled
FS_NORTC (Timestamp feature)	Dynamic timestamp
NORTC_YEAR (Year for timestamp)	2015
NORTC_MON (Month for timestamp)	6
NORTC_MDAY (Day for timestamp)	4
FS_REENTRANT (Re-Entrancy)	Disabled
FS_TIMEOUT (Timeout ticks)	1000
SYNC_t (O/S sync object)	osSemaphoreId
FS_LOCK (Number of files opened simultaneously)	2

### 5.10.2. IPs instances:

#### SDIO/SDMMC:

SDIO instance	SDIO
Use dma template	Enabled

\* User modified value

## 6. System Configuration

### 6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	Very High *	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	Very High *	
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	Pull-up	Very High *	
	PA8	I2C3_SCL	Alternate Function Open Drain	Pull-up	Very High *	
SDIO	PC8	SDIO_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC12	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
USART1	PA9	USART1_TX	Alternate Function Push Pull	Pull-up	Very High *	
	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	Very High *	
USART2	PA2	USART2_TX	Alternate Function Push Pull	Pull-up	Very High *	
	PA3	USART2_RX	Alternate Function Push Pull	Pull-up	Very High *	
USART3	PD8	USART3_TX	Alternate Function Push Pull	Pull-up	Very High *	
	PD9	USART3_RX	Alternate Function Push Pull	Pull-up	Very High *	
GPIO	PA0-WKUP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI CS1
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1 CS0

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PE15	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PB11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PB13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	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
Pre-fetch 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
PVD interrupt through EXTI line 16	unused		
RTC wake-up interrupt through EXTI line 22	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
USART1 global interrupt	unused		
USART2 global interrupt	unused		
USART3 global interrupt	unused		
RTC alarms A and B interrupt through EXTI line 17	unused		
SDIO global interrupt	unused		
I2C3 event interrupt	unused		
I2C3 error interrupt	unused		
FPU global interrupt	unused		

\* User modified value

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

### 7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VETx
Datasheet	022152_Rev8

### 7.2. Parameter Selection

Temperature	25
Vdd	3.3

## 8. Software Project

### 8.1. Project Settings

Name	Value
Project Name	umweltspaeher_stm32f407VET_V6
Project Folder	C:\Users\Julian\Desktop\Programming\Repos\Master_Thesis\working\Master_Th
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.16.0

### 8.2. 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	No
Backup previously generated files when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No