1. Description

1.1. Project

Project Name	swotest
Board Name	custom
Generated with:	STM32CubeMX 6.9.1
Date	10/12/2023

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration
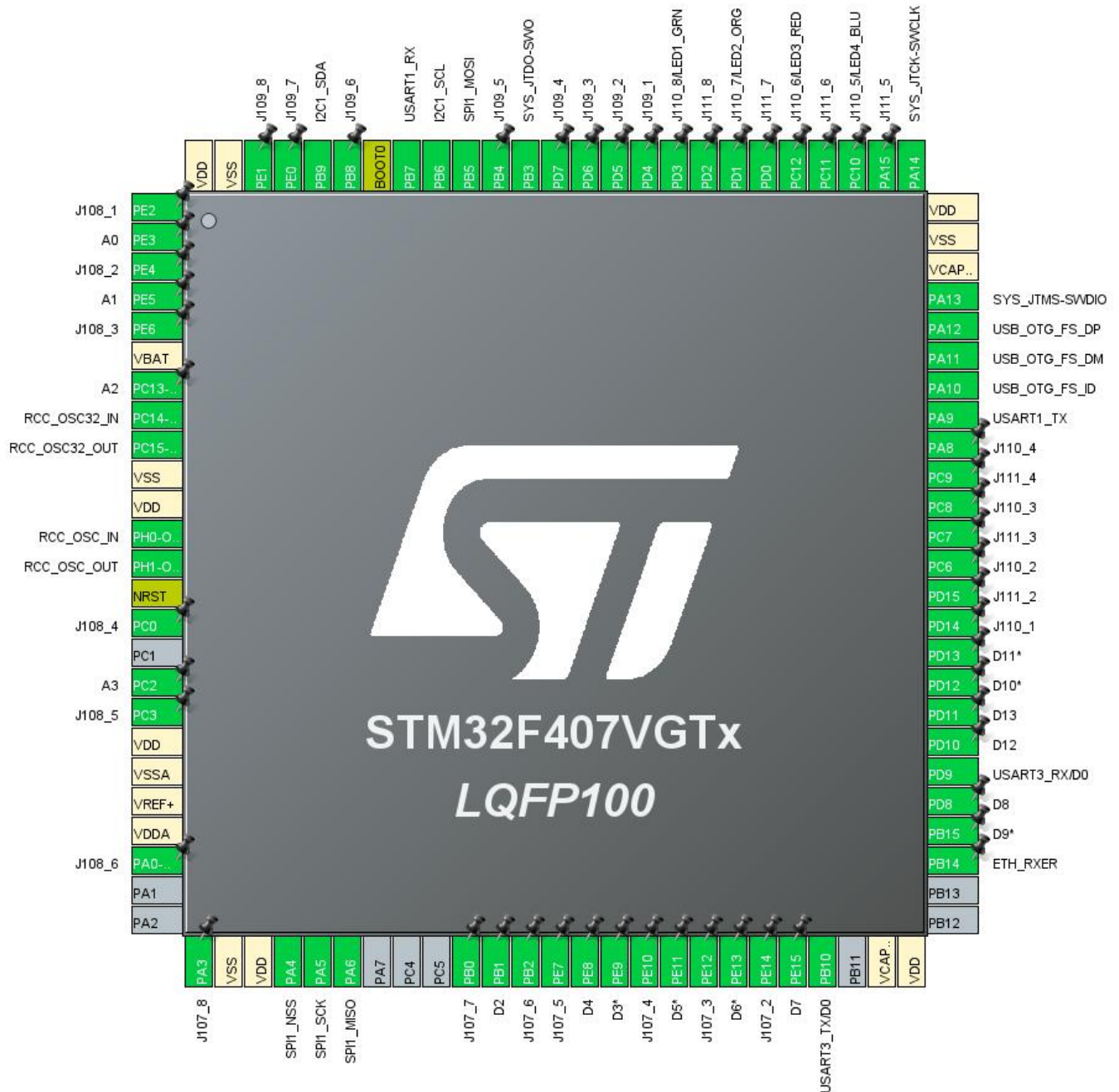
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Analog	J108_1
2	PE3 *	I/O	GPIO_Analog	A0
3	PE4 *	I/O	GPIO_Analog	J108_2
4	PE5 *	I/O	GPIO_Analog	A1
5	PE6 *	I/O	GPIO_Analog	J108_3
6	VBAT	Power		
7	PC13-ANTI_TAMP *	I/O	GPIO_Analog	A2
8	PC14-OSC32_IN	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT	I/O	RCC_OSC32_OUT	
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Analog	J108_4
17	PC2 *	I/O	GPIO_Analog	A3
18	PC3 *	I/O	GPIO_Analog	J108_5
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP *	I/O	GPIO_Analog	J108_6
26	PA3 *	I/O	GPIO_Output	J107_8
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	SPI1_NSS	
30	PA5	I/O	SPI1_SCK	
31	PA6	I/O	SPI1_MISO	
35	PB0 *	I/O	GPIO_Output	J107_7
36	PB1 *	I/O	GPIO_Output	D2
37	PB2 *	I/O	GPIO_Output	J107_6
38	PE7 *	I/O	GPIO_Output	J107_5
39	PE8 *	I/O	GPIO_Output	D4
40	PE9	I/O	TIM1_CH1	D3*
41	PE10 *	I/O	GPIO_Output	J107_4
42	PE11	I/O	TIM1_CH2	D5*

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
43	PE12 *	I/O	GPIO_Output	J107_3
44	PE13	I/O	TIM1_CH3	D6*
45	PE14 *	I/O	GPIO_Output	J107_2
46	PE15 *	I/O	GPIO_Output	D7
47	PB10	I/O	USART3_TX	USART3_TX/D0
49	VCAP_1	Power		
50	VDD	Power		
53	PB14 *	I/O	GPIO_Input	ETH_RXER
54	PB15	I/O	TIM12_CH2	D9*
55	PD8 *	I/O	GPIO_Output	D8
56	PD9	I/O	USART3_RX	USART3_RX/D0
57	PD10 *	I/O	GPIO_Output	D12
58	PD11 *	I/O	GPIO_Output	D13
59	PD12	I/O	TIM4_CH1	D10*
60	PD13	I/O	TIM4_CH2	D11*
61	PD14 *	I/O	GPIO_Analog	J110_1
62	PD15 *	I/O	GPIO_Analog	J111_2
63	PC6 *	I/O	GPIO_Analog	J110_2
64	PC7 *	I/O	GPIO_Analog	J111_3
65	PC8 *	I/O	GPIO_Analog	J110_3
66	PC9 *	I/O	GPIO_Analog	J111_4
67	PA8 *	I/O	GPIO_Analog	J110_4
68	PA9	I/O	USART1_TX	
69	PA10	I/O	USB_OTG_FS_ID	
70	PA11	I/O	USB_OTG_FS_DM	
71	PA12	I/O	USB_OTG_FS_DP	
72	PA13	I/O	SYS_JTMS-SWDIO	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14	I/O	SYS_JTCK-SWCLK	
77	PA15 *	I/O	GPIO_Analog	J111_5
78	PC10 *	I/O	GPIO_Output	J110_5/LED4_BLU
79	PC11 *	I/O	GPIO_Analog	J111_6
80	PC12 *	I/O	GPIO_Output	J110_6/LED3_RED
81	PD0 *	I/O	GPIO_Analog	J111_7
82	PD1 *	I/O	GPIO_Output	J110_7/LED2_ORG
83	PD2 *	I/O	GPIO_Analog	J111_8
84	PD3 *	I/O	GPIO_Output	J110_8/LED1_GRN

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
85	PD4 *	I/O	GPIO_Analog	J109_1
86	PD5 *	I/O	GPIO_Analog	J109_2
87	PD6 *	I/O	GPIO_Analog	J109_3
88	PD7 *	I/O	GPIO_Analog	J109_4
89	PB3	I/O	SYS_JTDO-SWO	
90	PB4 *	I/O	GPIO_Analog	J109_5
91	PB5	I/O	SPI1_MOSI	
92	PB6	I/O	I2C1_SCL	
93	PB7	I/O	USART1_RX	
94	BOOT0	Boot		
95	PB8 *	I/O	GPIO_Output	J109_6
96	PB9	I/O	I2C1_SDA	
97	PE0 *	I/O	GPIO_Analog	J109_7
98	PE1 *	I/O	GPIO_Analog	J109_8
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration
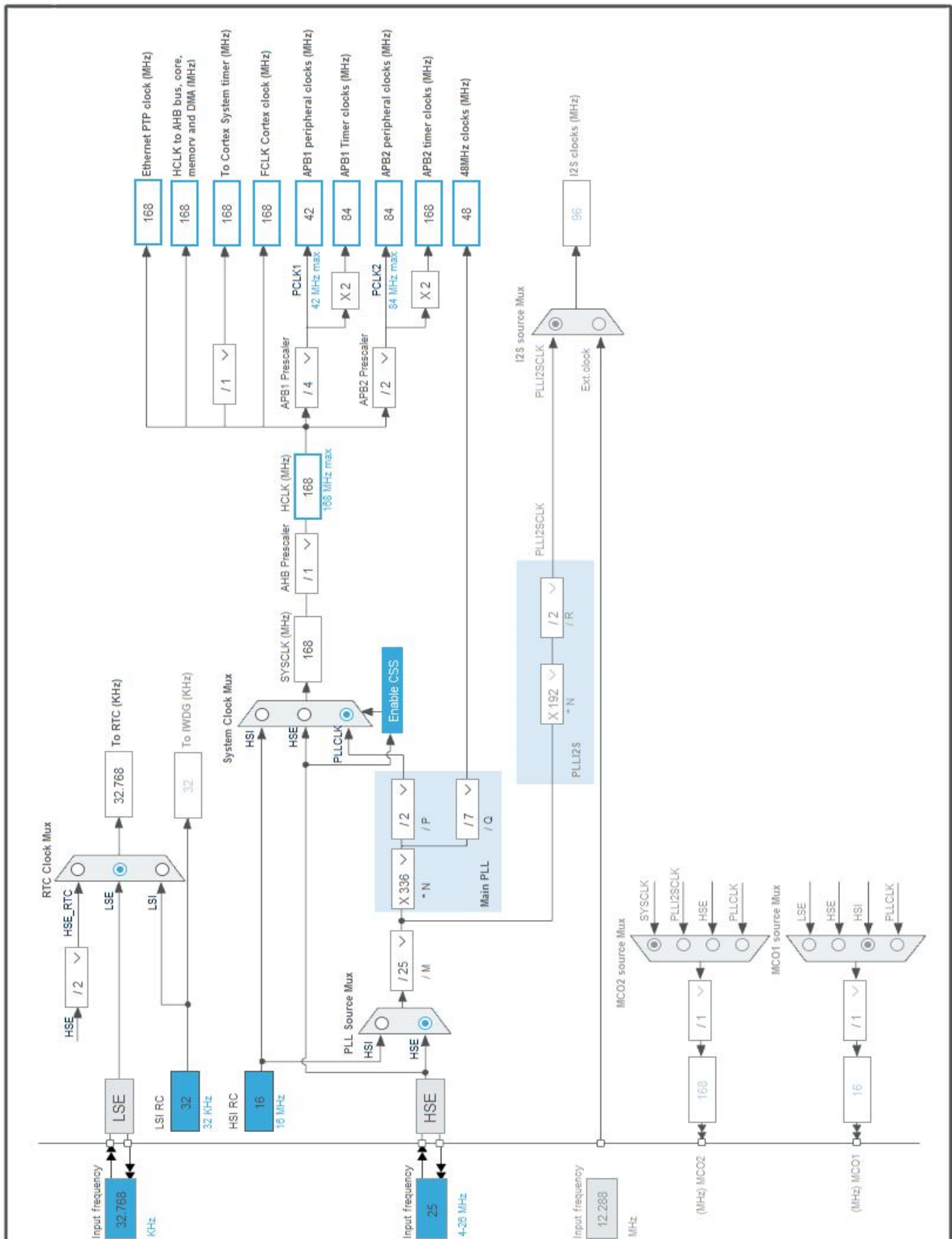
5. Software Project

5.1. Project Settings

Name	Value
Project Name	swotest
Project Folder	C:\websites\Elektronik\stm32f4_uno\software\swotest
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.27.1
Application Structure	Advanced
Generate Under Root	Yes
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	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	Yes
Enable Full Assert	Yes

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_RTC_Init	RTC
4	MX_SPI1_Init	SPI1
5	MX_USB_OTG_FS_USB_Init	USB_OTG_FS
6	MX_USART1_UART_Init	USART1
7	MX_I2C1_Init	I2C1
8	MX_TIM1_Init	TIM1
9	MX_TIM4_Init	TIM4
10	MX_TIM12_Init	TIM12
11	MX_USART3_UART_Init	USART3

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	DS8626_Rev8

1.2. Parameter Selection

Temperature	25
Vdd	3.3

1.3. 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

1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	168 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	46 mA	280 µA
Duration	0.1 ms	0.9 ms
DMIPS	210.0	0.0
Ta Max	98.47	104.96
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	4.85 mA
Battery Life	29 days, 4 hours	Average DMIPS	210.0 DMIPS

1.6. Chart

Consumption Profile by Step
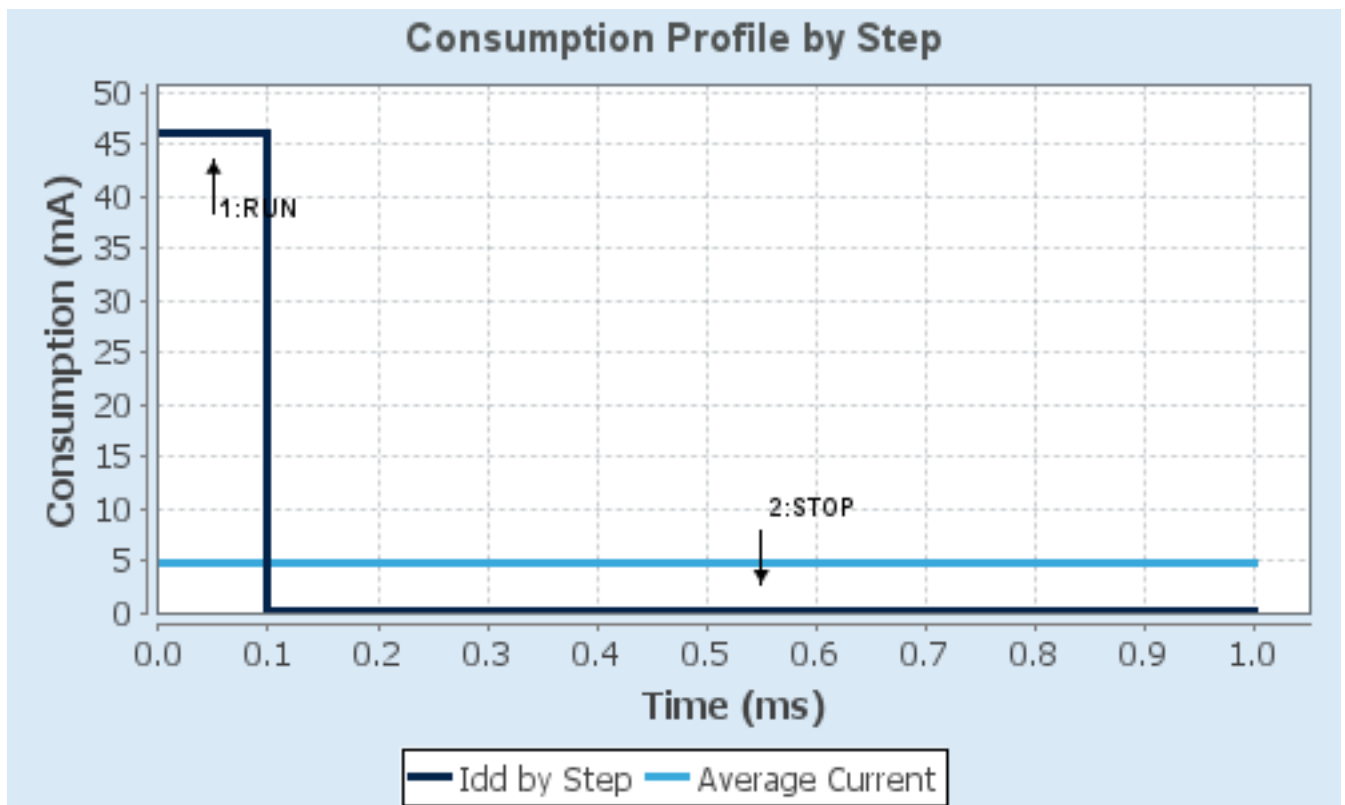
2. Peripherals and Middlewares Configuration

2.1. I2C1

I2C: I2C

2.1.1. 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

2.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

2.2.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	5 WS (6 CPU cycle)

RCC Parameters:

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

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

2.3. RTC

mode: Activate Clock Source

2.3.1. Parameter Settings:

General:

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

2.4. SPI1
Mode: Full-Duplex Master
Hardware NSS Signal: Hardware NSS Output Signal
2.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**42.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Output Hardware

2.5. SYS
Debug: Trace Asynchronous Sw
Timebase Source: SysTick

2.6. TIM1
Clock Source   : Internal Clock
Channel1: PWM Generation CH1
Channel2: PWM Generation CH2
Channel3: PWM Generation CH3
2.6.1. 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)

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

2.7. TIM4

Clock Source   : Internal Clock

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

2.7.1. 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
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)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

2.8. TIM12

Channel2: PWM Generation CH2

2.8.1. 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
auto-reload preload	Disable

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

2.9. USART1
Mode: Asynchronous
2.9.1. 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

2.10. USART3
Mode: Asynchronous
2.10.1. 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

2.11. USB_OTG_FS
Mode: OTG/Dual_Role_Device

* User modified value

3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	**Very High** *	
	PB9	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	**Very High** *	
RCC	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA4	SPI1_NSS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	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** *	
	PB5	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
TIM1	PE9	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	D3*
	PE11	TIM1_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	D5*
	PE13	TIM1_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	D6*
TIM4	PD12	TIM4_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	D10*
	PD13	TIM4_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	D11*
TIM12	PB15	TIM12_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	D9*
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PB7	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High**	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
USART3	PB10	USART3_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USART3_TX/D0
	PD9	USART3_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	USART3_RX/D0
USB_OTG_FS	PA10	USB_OTG_FS_ID	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	
GPIO	PE2	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_1
	PE3	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A0
	PE4	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_2
	PE5	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A1
	PE6	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_3
	PC13-ANTI_TAMP	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A2
	PC0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_4
	PC2	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	A3
	PC3	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_5
	PA0-WKUP	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J108_6
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_8
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_7
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D2
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_6
	PE7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_5
	PE8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D4
	PE10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_4
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_3
	PE14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J107_2
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D7
	PB14	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ETH_RXER
	PD8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D8
	PD10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D12
	PD11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	D13
	PD14	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J110_1
	PD15	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_2
	PC6	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J110_2

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC7	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_3
	PC8	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J110_3
	PC9	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_4
	PA8	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J110_4
	PA15	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_5
	PC10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J110_5/LED4_BLU
	PC11	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_6
	PC12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J110_6/LED3_RED
	PD0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_7
	PD1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J110_7/LED2_ORG
	PD2	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J111_8
	PD3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J110_8/LED1_GRN
	PD4	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_1
	PD5	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_2
	PD6	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_3
	PD7	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_4
	PB4	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_5
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	J109_6
	PE0	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_7
	PE1	GPIO_Analog	Analog mode	No pull-up and no pull-down	n/a	J109_8

3.2. DMA configuration

nothing configured in DMA service

3.3. NVIC configuration

3.3.1. 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
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	15	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM1 update interrupt and TIM10 global interrupt	unused		
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused		
TIM1 capture compare interrupt	unused		
TIM4 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
SPI1 global interrupt	unused		
USART1 global interrupt	unused		
USART3 global interrupt	unused		
TIM8 break interrupt and TIM12 global interrupt	unused		
FPU global interrupt	unused		

3.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Pendable request for system service	false	true	false
System tick timer	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Middleware

System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing
DMA		RTC ✓	I2C1 ✓			
GPIO ✓		TIM1 ✓	SPI1 ✓			
NVIC ✓		TIM4 ✓	USART1 ✓			
RCC ✓		TIM12 ✓	USART3 ✓			
SYS ✓			USB_FS ✓			

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f405-415_407-417_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f405-415_407-417_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f4_svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval-tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Brochures	https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
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