1. Description

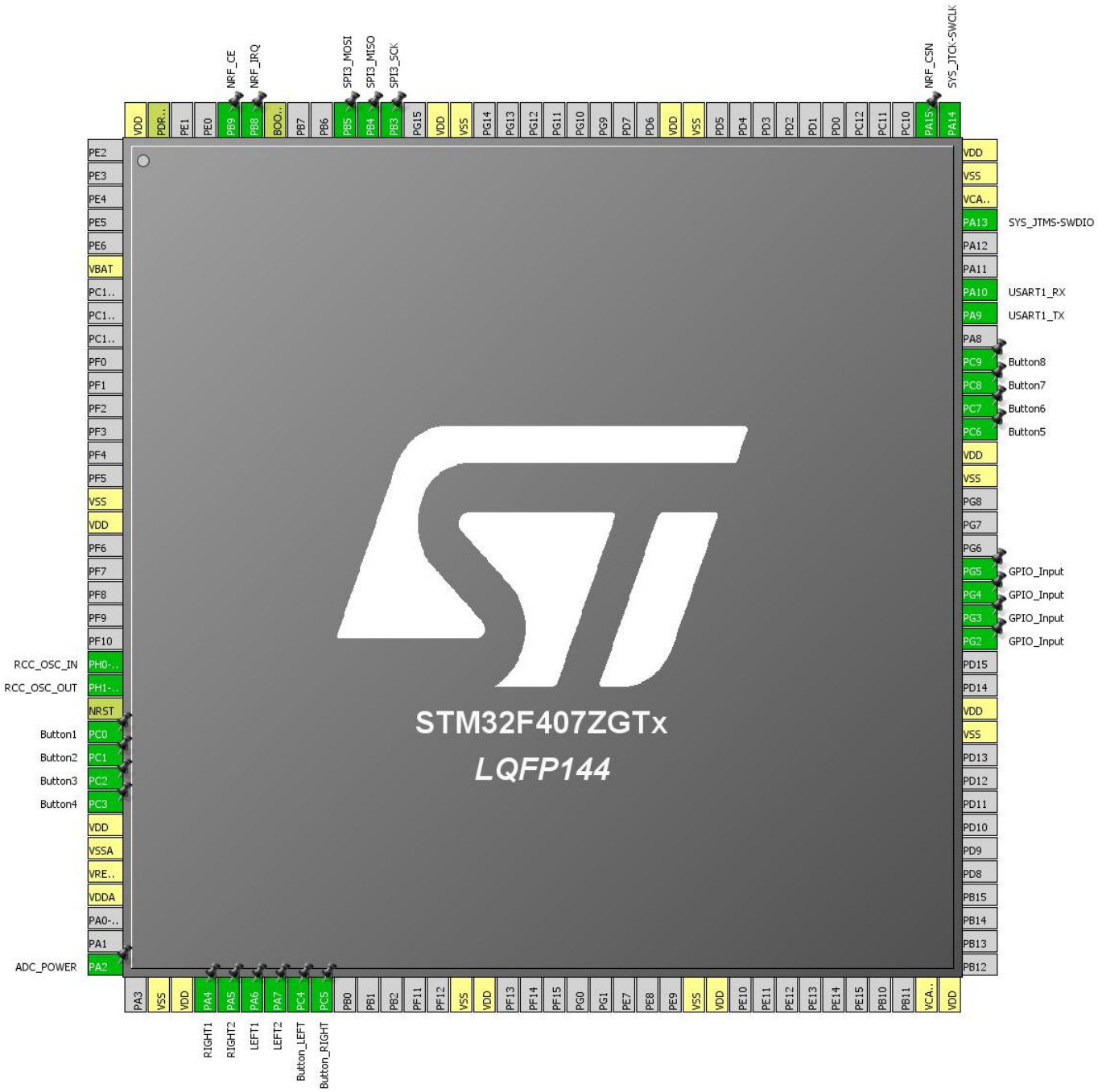
1.1. Project

Project Name	firmware
Board Name	custom
Generated with:	STM32CubeMX 4.27.0
Date	07/21/2019

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407ZGTx
MCU Package	LQFP144
MCU Pin number	144

2. Pinout Configuration



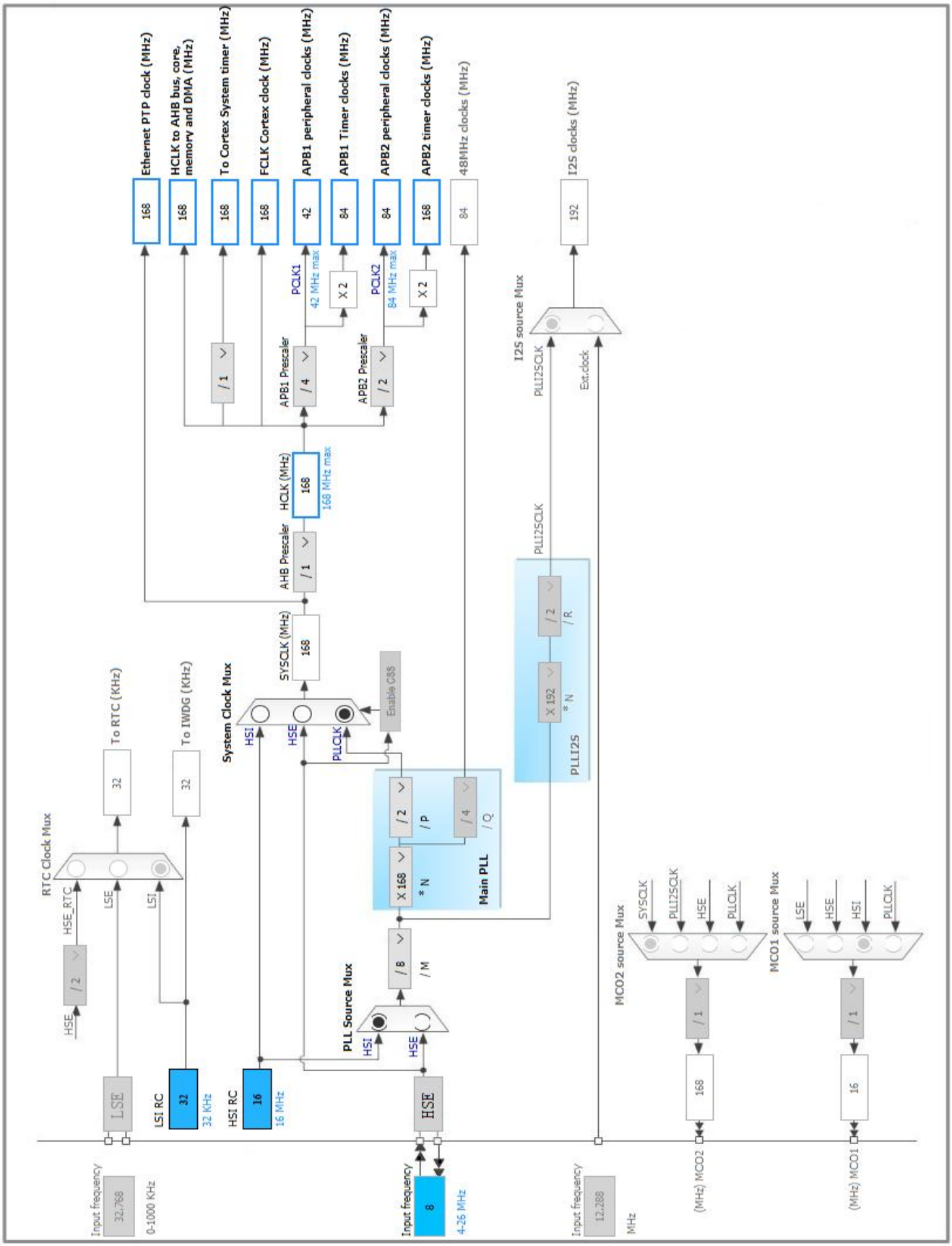
3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
16	VSS	Power		
17	VDD	Power		
23	PH0-OSC_IN	I/O	RCC_OSC_IN	
24	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
26	PC0	I/O	GPIO_EXTI0	Button1
27	PC1	I/O	GPIO_EXTI1	Button2
28	PC2	I/O	GPIO_EXTI2	Button3
29	PC3	I/O	GPIO_EXTI3	Button4
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
36	PA2	I/O	ADC1_IN2	ADC_POWER
38	VSS	Power		
39	VDD	Power		
40	PA4	I/O	ADC1_IN4	RIGHT1
41	PA5	I/O	ADC1_IN5	RIGHT2
42	PA6	I/O	ADC1_IN6	LEFT1
43	PA7	I/O	ADC1_IN7	LEFT2
44	PC4	I/O	GPIO_EXTI4	Button_LEFT
45	PC5	I/O	GPIO_EXTI5	Button_RIGHT
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
71	VCAP_1	Power		
72	VDD	Power		
83	VSS	Power		
84	VDD	Power		
87	PG2 *	I/O	GPIO_Input	
88	PG3 *	I/O	GPIO_Input	
89	PG4 *	I/O	GPIO_Input	
90	PG5 *	I/O	GPIO_Input	
94	VSS	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
95	VDD	Power		
96	PC6	I/O	GPIO_EXTI6	Button5
97	PC7	I/O	GPIO_EXTI7	Button6
98	PC8	I/O	GPIO_EXTI8	Button7
99	PC9	I/O	GPIO_EXTI9	Button8
101	PA9	I/O	USART1_TX	
102	PA10	I/O	USART1_RX	
105	PA13	I/O	SYS_JTMS-SWDIO	
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
109	PA14	I/O	SYS_JTCK-SWCLK	
110	PA15 *	I/O	GPIO_Output	NRF_CSN
120	VSS	Power		
121	VDD	Power		
130	VSS	Power		
131	VDD	Power		
133	PB3	I/O	SPI3_SCK	
134	PB4	I/O	SPI3_MISO	
135	PB5	I/O	SPI3_MOSI	
138	BOOT0	Boot		
139	PB8 *	I/O	GPIO_Output	NRF_IRQ
140	PB9 *	I/O	GPIO_Output	NRF_CE
143	PDR_ON	Reset		
144	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN2

mode: IN4

mode: IN5

mode: IN6

mode: IN7

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	**Enabled ***
End Of Conversion Selection	**EOC flag at the end of all conversions ***

ADC_Regular_ConversionMode:

Number Of Conversion	**5 ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	Channel 2
Sampling Time	**56 Cycles ***
Rank	**2 ***
Channel	**Channel 4 ***
Sampling Time	**56 Cycles ***
Rank	**3 ***
Channel	**Channel 5 ***
Sampling Time	**56 Cycles ***
Rank	**4 ***
Channel	**Channel 6 ***
Sampling Time	**56 Cycles ***
Rank	**5 ***

Channel	**Channel 7 ***
Sampling Time	**56 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

5.2. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.2.1. 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 Regulatror Voltage Scale	Power Regulator Voltage Scale 1

5.3. SPI3

Mode: Full-Duplex Master

5.3.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**21.0 MBits/s ***
Clock Polarity (CPOL)	Low

Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

5.4. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.5. USART1

Mode: Asynchronous

5.5.1. 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**

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PA2	ADC1_IN2	Analog mode	No pull-up and no pull-down	n/a	ADC_POWER
	PA4	ADC1_IN4	Analog mode	No pull-up and no pull-down	n/a	RIGHT1
	PA5	ADC1_IN5	Analog mode	No pull-up and no pull-down	n/a	RIGHT2
	PA6	ADC1_IN6	Analog mode	No pull-up and no pull-down	n/a	LEFT1
	PA7	ADC1_IN7	Analog mode	No pull-up and no pull-down	n/a	LEFT2
RCC	PH0-OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI3	PB3	SPI3_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB4	SPI3_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB5	SPI3_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	
USART1	PA9	USART1_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PA10	USART1_RX	Alternate Function Push Pull	Pull-up	**Very High ***	
GPIO	PC0	GPIO_EXTI0	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button1
	PC1	GPIO_EXTI1	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button2
	PC2	GPIO_EXTI2	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button3
	PC3	GPIO_EXTI3	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button4

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC4	GPIO_EXTI4	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button_LEFT
	PC5	GPIO_EXTI5	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button_RIGHT
	PG2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PG3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PG4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PG5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PC6	GPIO_EXTI6	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button5
	PC7	GPIO_EXTI7	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button6
	PC8	GPIO_EXTI8	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button7
	PC9	GPIO_EXTI9	**External Interrupt Mode with Falling edge trigger detection**	No pull-up and no pull-down	n/a	Button8
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRF_CSN
	PB8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRF_IRQ
	PB9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRF_CE

6.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA2_Stream0	Peripheral To Memory	**Medium ***
USART1_RX	DMA2_Stream2	Peripheral To Memory	**Medium ***
USART1_TX	DMA2_Stream7	Memory To Peripheral	**Medium ***

ADC1: DMA2_Stream0 DMA request Settings:

Mode:	**Circular ***
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

USART1_RX: DMA2_Stream2 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

USART1_TX: DMA2_Stream7 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

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
EXTI line0 interrupt	true	2	0
EXTI line1 interrupt	true	2	0
EXTI line2 interrupt	true	2	0
EXTI line3 interrupt	true	2	0
EXTI line4 interrupt	true	2	0
EXTI line[9:5] interrupts	true	2	0
DMA2 stream0 global interrupt	true	0	0
DMA2 stream2 global interrupt	true	0	0
DMA2 stream7 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1, ADC2 and ADC3 global interrupts	unused		
USART1 global interrupt	unused		
SPI3 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407ZGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	firmware
Project Folder	D:\OneDrive\\firmware
Toolchain / IDE	EWARM V8
Firmware Package Name and Version	STM32Cube FW_F4 V1.21.0

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	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)	No

9. Software Pack Report