1. Description

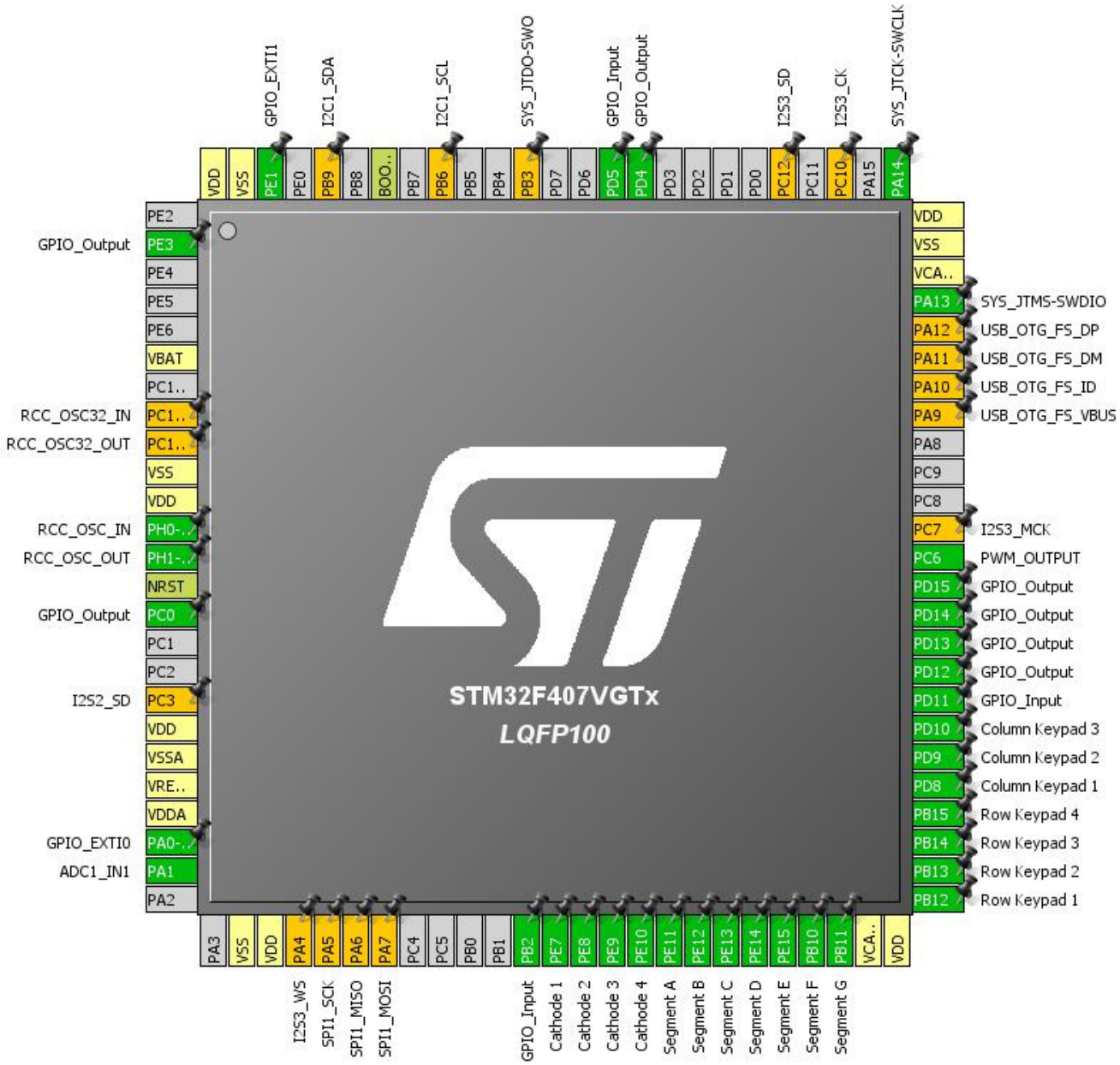
1.1. Project

Project Name	Lab3
Board Name	STM32F4DISCOVERY
Generated with:	STM32CubeMX 4.24.0
Date	02/25/2018

1.2. MCU

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

2. Pinout Configuration



3. Pins Configuration

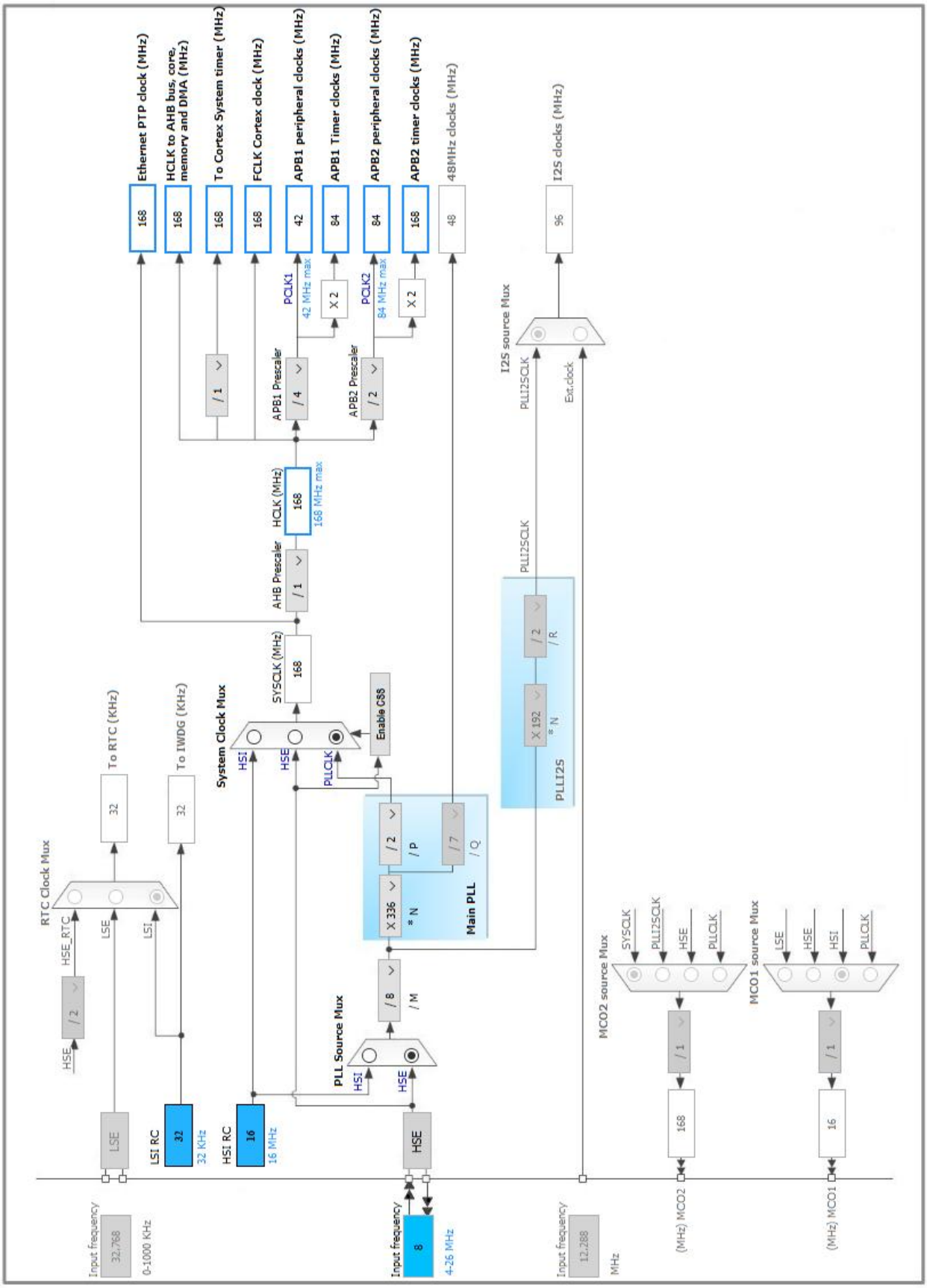
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Output	
6	VBAT	Power		
8	PC14-OSC32_IN **	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT **	I/O	RCC_OSC32_OUT	
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	
18	PC3 **	I/O	I2S2_SD	
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	GPIO_EXTI0	
24	PA1	I/O	ADC1_IN1	
27	VSS	Power		
28	VDD	Power		
29	PA4 **	I/O	I2S3_WS	
30	PA5 **	I/O	SPI1_SCK	
31	PA6 **	I/O	SPI1_MISO	
32	PA7 **	I/O	SPI1_MOSI	
37	PB2 *	I/O	GPIO_Input	
38	PE7 *	I/O	GPIO_Output	Cathode 1
39	PE8 *	I/O	GPIO_Output	Cathode 2
40	PE9 *	I/O	GPIO_Output	Cathode 3
41	PE10 *	I/O	GPIO_Output	Cathode 4
42	PE11 *	I/O	GPIO_Output	Segment A
43	PE12 *	I/O	GPIO_Output	Segment B
44	PE13 *	I/O	GPIO_Output	Segment C
45	PE14 *	I/O	GPIO_Output	Segment D
46	PE15 *	I/O	GPIO_Output	Segment E
47	PB10 *	I/O	GPIO_Output	Segment F
48	PB11 *	I/O	GPIO_Output	Segment G
49	VCAP_1	Power		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
50	VDD	Power		
51	PB12 *	I/O	GPIO_Input	Row Keypad 1
52	PB13 *	I/O	GPIO_Input	Row Keypad 2
53	PB14 *	I/O	GPIO_Input	Row Keypad 3
54	PB15 *	I/O	GPIO_Input	Row Keypad 4
55	PD8 *	I/O	GPIO_Input	Column Keypad 1
56	PD9 *	I/O	GPIO_Input	Column Keypad 2
57	PD10 *	I/O	GPIO_Input	Column Keypad 3
58	PD11 *	I/O	GPIO_Input	
59	PD12 *	I/O	GPIO_Output	
60	PD13 *	I/O	GPIO_Output	
61	PD14 *	I/O	GPIO_Output	
62	PD15 *	I/O	GPIO_Output	
63	PC6	I/O	TIM3_CH1	PWM_OUTPUT
64	PC7 **	I/O	I2S3_MCK	
68	PA9 **	I/O	USB_OTG_FS_VBUS	
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	
78	PC10 **	I/O	I2S3_CK	
80	PC12 **	I/O	I2S3_SD	
85	PD4 *	I/O	GPIO_Output	
86	PD5 *	I/O	GPIO_Input	
89	PB3 **	I/O	SYS_JTDO-SWO	
92	PB6 **	I/O	I2C1_SCL	
94	BOOT0	Boot		
96	PB9 **	I/O	I2C1_SDA	
98	PE1	I/O	GPIO_EXTI1	
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

** The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN1

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
Resolution	**8 bits (11 ADC Clock cycles) ***
Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	Disabled
End Of Conversion Selection	EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion	1
External Trigger Conversion Source	**Timer 3 Trigger Out event ***
External Trigger Conversion Edge	Trigger detection on the rising edge
Rank	1
Channel	Channel 1
Sampling Time	3 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. SYS

Debug: Serial Wire

Timebase Source: SysTick

5.4. TIM3

Slave Mode: External Clock Mode 1

Trigger Source: ITR0

Channel1: PWM Generation CH1

5.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
Slave Mode Controller	ETR mode 1

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	**Output Compare (OC1REF) ***

PWM Generation Channel 1:

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

*** 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	PA1	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	
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	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM3	PC6	TIM3_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM_OUTPUT
Single Mapped Signals	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PC3	I2S2_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA4	I2S3_WS	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	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 ***	
	PC7	I2S3_MCK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	
	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 ***	
	PC10	I2S3_CK	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PC12	I2S3_SD	Alternate Function Push Pull	No pull-up and no pull-down	Low	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PA0-WKUP	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PE7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Cathode 1
	PE8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Cathode 2
	PE9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Cathode 3
	PE10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Cathode 4
	PE11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment A
	PE12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment B
	PE13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment C
	PE14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment D
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment E
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment F
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Segment G
	PB12	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Row Keypad 1
	PB13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Row Keypad 2
	PB14	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Row Keypad 3
	PB15	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Row Keypad 4
	PD8	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Column Keypad 1
	PD9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Column Keypad 2
	PD10	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	Column Keypad 3
	PD11	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PD5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PE1	GPIO_EXTI1	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	

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
ADC1, ADC2 and ADC3 global interrupts	true	0	0
TIM3 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line0 interrupt	unused		
EXTI line1 interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev8

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	Lab3
Project Folder	C:\Users\micha\Documents\GitHub\ECSE426\Lab3
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.19.0

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	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