1. Description

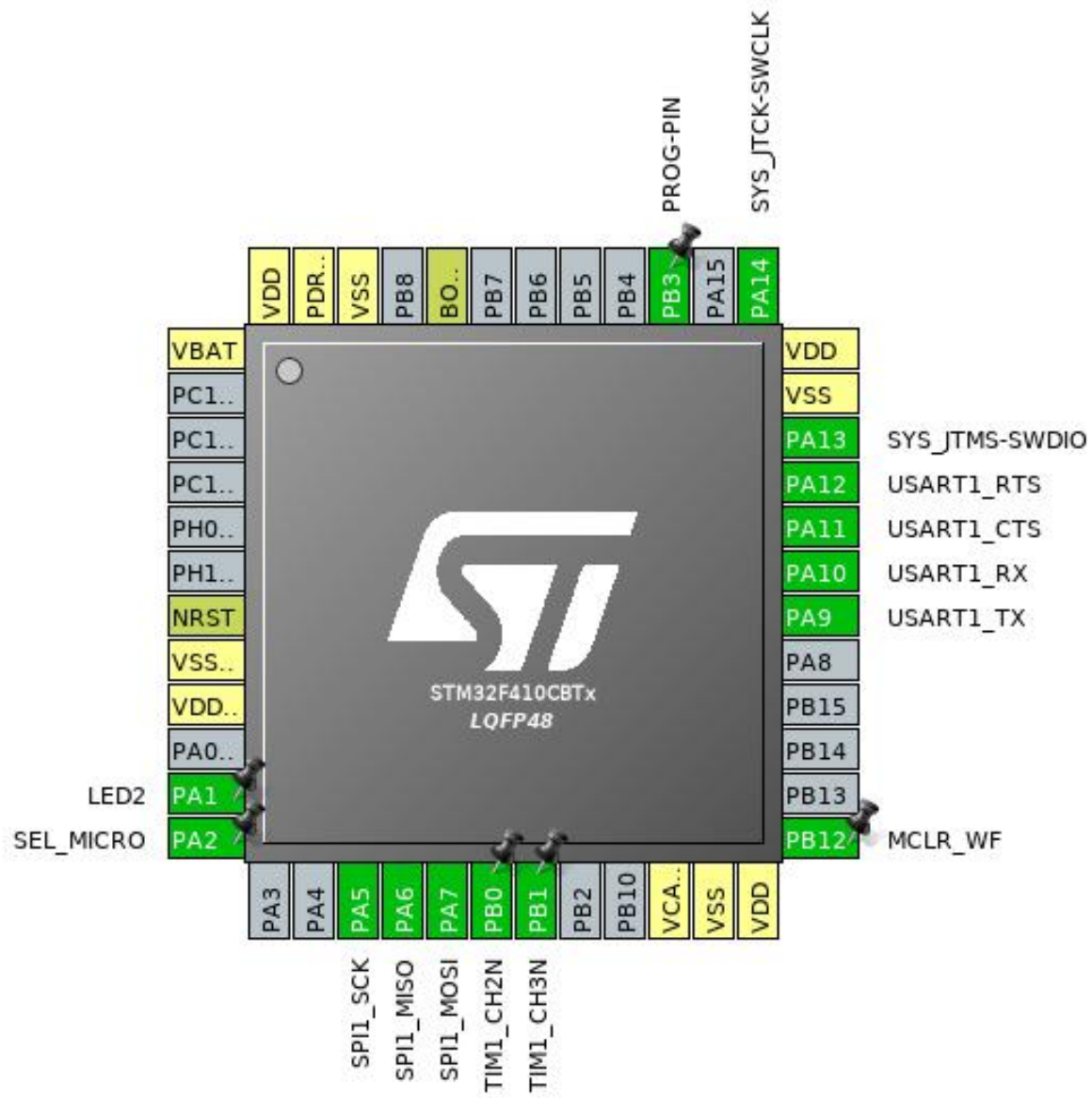
1.1. Project

Project Name	nilm-stm32f4-daq
Board Name	custom
Generated with:	STM32CubeMX 5.0.1
Date	08/17/2019

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F410
MCU name	STM32F410CBTx
MCU Package	LQFP48
MCU Pin number	48

2. Pinout Configuration

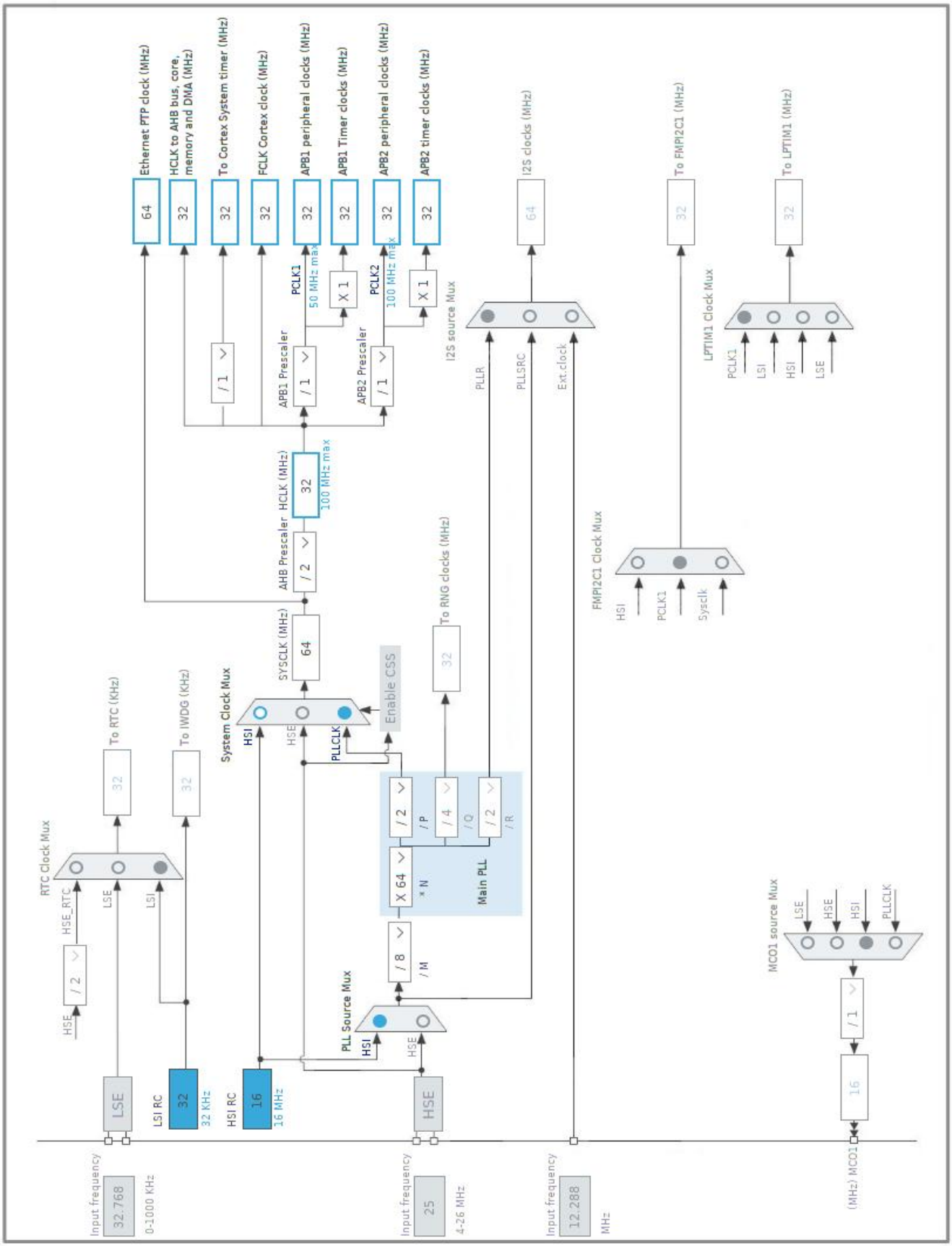


3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
7	NRST	Reset		
8	VSSA/VREF-	Power		
9	VDDA/VREF+	Power		
11	PA1 *	I/O	GPIO_Output	LED2
12	PA2 *	I/O	GPIO_Input	SEL_MICRO
15	PA5	I/O	SPI1_SCK	
16	PA6	I/O	SPI1_MISO	
17	PA7	I/O	SPI1_MOSI	
18	PB0	I/O	TIM1_CH2N	
19	PB1	I/O	TIM1_CH3N	
22	VCAP1	Power		
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	MCLR_WF
30	PA9	I/O	USART1_TX	
31	PA10	I/O	USART1_RX	
32	PA11	I/O	USART1_CTS	
33	PA12	I/O	USART1_RTS	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
39	PB3 *	I/O	GPIO_Output	PROG-PIN
44	BOOT0	Boot		
46	VSS	Power		
47	PDR_ON	Power		
48	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	nilm-stm32f4-daq
Project Folder	/home/burr/nilm-stm32f4-daq
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_F4 V1.23.0

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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F410
MCU	STM32F410CBTx
Datasheet	028094_Rev5

6.2. Parameter Selection

Temperature	25
Vdd	1.7

7. IPs and Middleware Configuration

7.1. SPI1

Mode: Full-Duplex Master

7.1.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**16.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	**2 Edge ***

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.2. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.3. TIM1

Clock Source : Internal Clock

Channel1: Output Compare No Output

Channel2: PWM Generation CH2N

Channel3: PWM Generation CH3N

7.3.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1618 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0

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

Output Compare No Output Channel 1:

Mode	Frozen (used for Timing base)
Pulse (16 bits value)	**1618-3-350 ***
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 2N:

Mode	**PWM mode 2 ***
Pulse (16 bits value)	**1618-4 ***
Fast Mode	**Enable ***
CHN Polarity	High
CHN Idle State	Reset

PWM Generation Channel 3N:

Mode	**PWM mode 2 ***
Pulse (16 bits value)	**1618-4 ***
Fast Mode	**Enable ***
CHN Polarity	High
CHN Idle State	Reset

7.4. USART1

Mode: Asynchronous

Hardware Flow Control (RS232): CTS/RTS

7.4.1. Parameter Settings:

Basic Parameters:

Baud Rate	**1000000 ***
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**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
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 ***	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM1	PB0	TIM1_CH2N	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB1	TIM1_CH3N	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 ***	
	PA11	USART1_CTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA12	USART1_RTS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
GPIO	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED2
	PA2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SEL_MICRO
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MCLR_WF
	PB3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PROG-PIN

8.2. DMA configuration

DMA request	Stream	Direction	Priority
USART1_RX	DMA2_Stream2	Peripheral To Memory	**Very High ***
USART1_TX	DMA2_Stream7	Memory To Peripheral	**Very High ***
SPI1_RX	DMA2_Stream0	Peripheral To Memory	**Very High ***
SPI1_TX	DMA2_Stream3	Memory To Peripheral	**Very High ***

USART1_RX: DMA2_Stream2 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	Disable
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

SPI1_RX: DMA2_Stream0 DMA request Settings:

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

SPI1_TX: DMA2_Stream3 DMA request Settings:

Mode:	Normal

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

8.3. 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
TIM1 capture compare interrupt	true	0	0
SPI1 global interrupt	true	1	0
USART1 global interrupt	true	4	0
DMA2 stream0 global interrupt	true	0	0
DMA2 stream2 global interrupt	true	0	0
DMA2 stream3 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		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM1 update interrupt	unused		
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report