1. Description

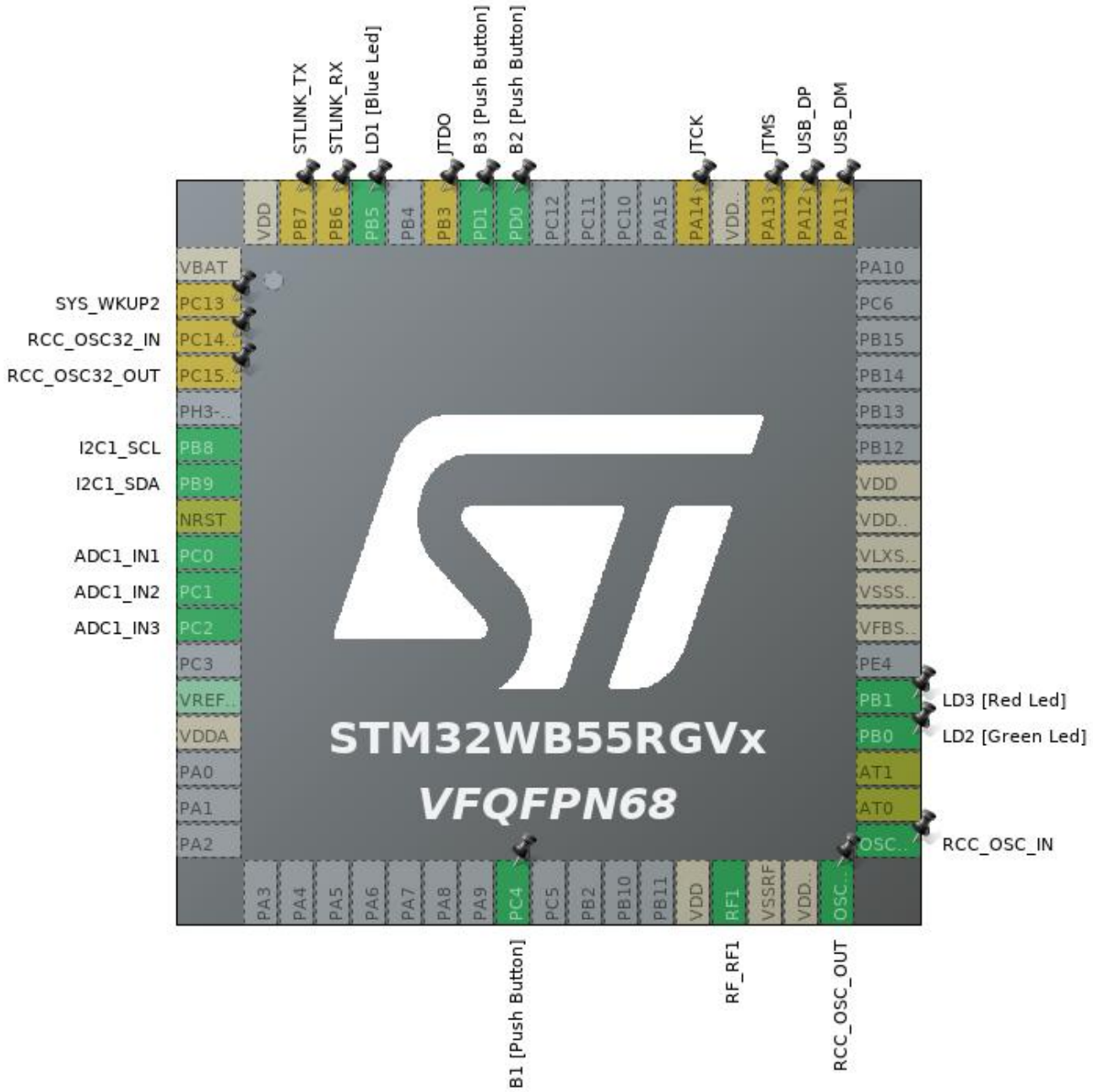
1.1. Project

Project Name	ceaa-nutrient-solution
Board Name	P-NUCLEO-WB55-Nucleo
Generated with:	STM32CubeMX 5.4.0
Date	10/23/2019

1.2. MCU

MCU Series	STM32WB
MCU Line	STM32WBx5
MCU name	STM32WB55RGVx
MCU Package	VFQFPN68
MCU Pin number	68

2. Pinout Configuration



3. Pins Configuration

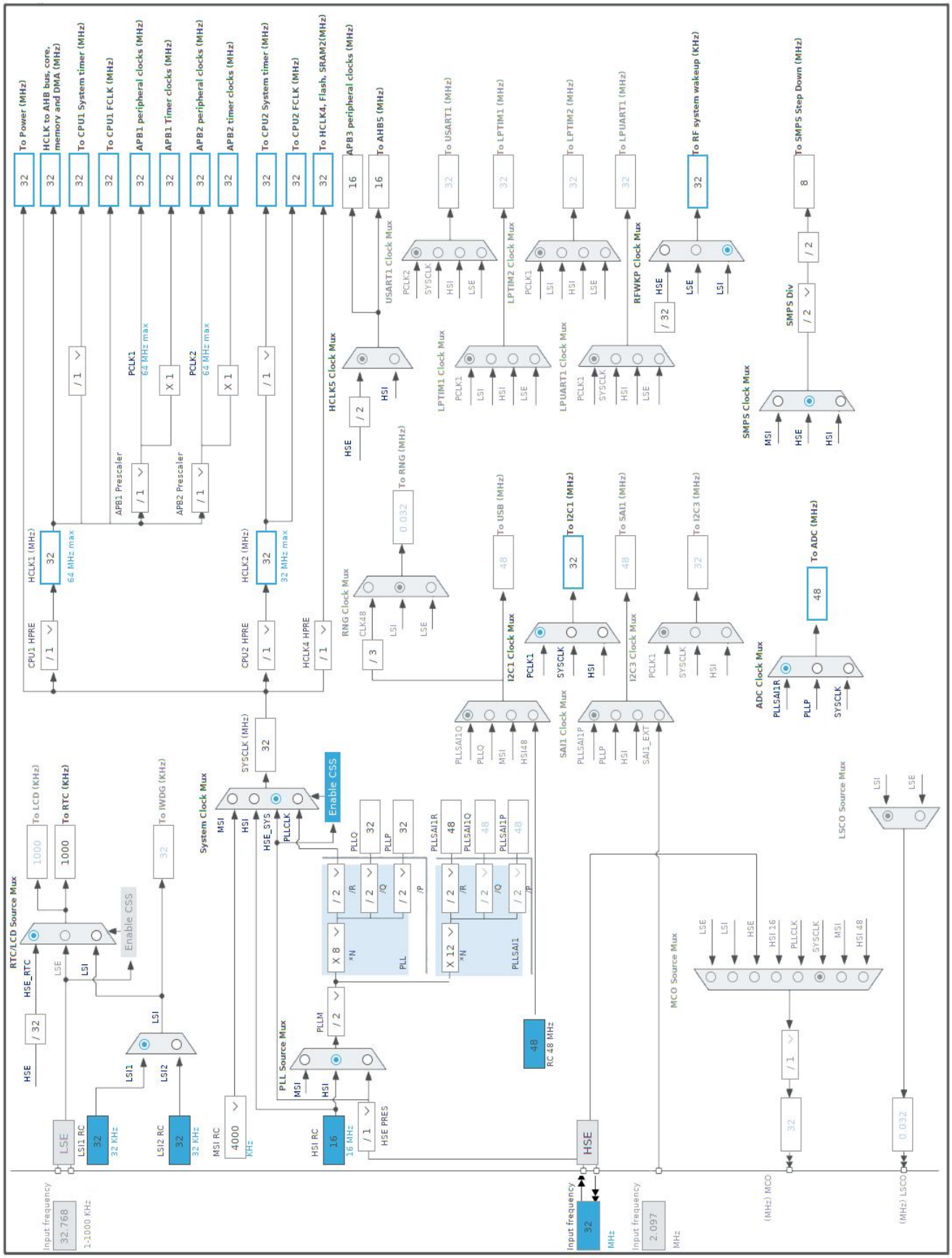
Pin Number VFQFPN68	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13 *	I/O	SYS_WKUP2	
3	PC14-OSC32_IN *	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT *	I/O	RCC_OSC32_OUT	
6	PB8	I/O	I2C1_SCL	
7	PB9	I/O	I2C1_SDA	
8	NRST	Reset		
9	PC0	I/O	ADC1_IN1	
10	PC1	I/O	ADC1_IN2	
11	PC2	I/O	ADC1_IN3	
14	VDDA	Power		
25	PC4	I/O	GPIO_EXTI4	B1 [Push Button]
30	VDD	Power		
31	RF1	MonoIO	RF_RF1	
32	VSSRF	Power		
33	VDDRF	Power		
34	OSC_OUT	MonoIO	RCC_OSC_OUT	
35	OSC_IN	MonoIO	RCC_OSC_IN	
36	AT0	NC		
37	AT1	NC		
38	PB0 **	I/O	GPIO_Output	LD2 [Green Led]
39	PB1 **	I/O	GPIO_Output	LD3 [Red Led]
41	VFBSMPS	Power		
42	VSSSMPS	Power		
43	VLXSMPS	Power		
44	VDDSMPS	Power		
45	VDD	Power		
52	PA11 *	I/O	USB_DM	
53	PA12 *	I/O	USB_DP	
54	PA13 *	I/O	SYS_JTMS-SWDIO	JTMS
55	VDDUSB	Power		
56	PA14 *	I/O	SYS_JTCK-SWCLK	JTCK
61	PD0	I/O	GPIO_EXTI0	B2 [Push Button]
62	PD1	I/O	GPIO_EXTI1	B3 [Push Button]
63	PB3 *	I/O	SYS_JTDO-SWO	JTDO
65	PB5 **	I/O	GPIO_Output	LD1 [Blue Led]

Pin Number VFQFPN68	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
66	PB6 *	I/O	USART1_TX	STLINK_RX
67	PB7 *	I/O	USART1_RX	STLINK_TX
68	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. Software Project

5.1. Project Settings

Name	Value
Project Name	ceaa-nutrient-solution
Project Folder	/home/fedor/STM32-projects/ceaa-nutrient-solution
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_WB V1.3.0

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	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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32WB
Line	STM32WBx5
MCU	STM32WB55RGVx
Datasheet	DS11929_Rev3

6.2. Parameter Selection

Temperature	25
Vdd	3.0

7. IPs and Middleware Configuration

7.1. ADC1

IN1: IN1 Single-ended

IN2: IN2 Single-ended

IN3: IN3 Single-ended

mode: Vrefint Channel

7.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	**Asynchronous clock mode divided by 64 ***
Resolution	ADC 12-bit resolution
Data Alignment	Right alignment
Scan Conversion Mode	Enabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
DMA Continuous Requests	**Enabled ***
End Of Conversion Selection	End of single conversion
Overrun behaviour	Overrun data preserved
Low Power Auto Wait	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Enable Regular Oversampling	**Enable ***
Oversampling Right Shift	**4 bit shift for oversampling ***
Oversampling Ratio	**Oversampling ratio 256x ***
Regular Oversampling Mode	**Oversampling Resumed Mode ***
Triggered Regular Oversampling	Single trigger for all oversampled conversions
Number Of Conversion	**4 ***
External Trigger Conversion Source	Regular Conversion launched by software
External Trigger Conversion Edge	None
Rank	1
Channel	**Channel Vrefint ***
Sampling Time	**47.5 Cycles ***
Offset Number	No offset
Rank	**2 ***
Channel	Channel 1
Sampling Time	**640.5 Cycles ***
Offset Number	No offset
Rank	**3 ***

Channel	**Channel 2 ***
Sampling Time	**640.5 Cycles ***
Offset Number	No offset
Rank	**4 ***
Channel	**Channel 3 ***
Sampling Time	**640.5 Cycles ***
Offset Number	No offset

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable

Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false

Analog Watchdog 2:

Enable Analog WatchDog2 Mode	false

Analog Watchdog 3:

Enable Analog WatchDog3 Mode	false

7.2. GPIO

7.3. HSEM

mode: Activated

7.4. I2C1

I2C: I2C

7.4.1. Parameter Settings:

Timing configuration:

Custom Timing	Disabled
I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x00707CBB ***

Slave Features:

Clock No Stretch Mode	Disabled
General Call Address Detection	Disabled

Primary Address Length selection	7-bit
Dual Address Acknowledged	Disabled
Primary slave address	0

7.5. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.5.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Disabled
Data Cache	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Disabled
MSI State	Enabled
HSI State	Enabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

Peripherals Clock Configuration:

Generate the peripherals clock configuration	TRUE

7.6. RF

mode: Activate RF1

7.7. RTC

mode: Activate Clock Source

7.7.1. Parameter Settings:

General:

Hour Format	Hourformat 24

Asynchronous Predivider value	CFG_RTC_ASYNCH_PRESCALER
Synchronous Predivider value	CFG_RTC_SYNCH_PRESCALER

7.8. SYS

Timebase Source: TIM17

7.9. TINY_LPM

mode: Enabled

7.10. FREERTOS

Interface: CMSIS_V2

7.10.1. Config parameters:

API:

FreeRTOS API	CMSIS v2

Versions:

FreeRTOS version	10.0.1
CMSIS-RTOS version	2.00

Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	1000
MAX_PRIORITIES	56
MINIMAL_STACK_SIZE	128
MAX_TASK_NAME_LEN	**20 ***
USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Enabled
USE_COUNTING_SEMAPHORES	Enabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	Disabled
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Disabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled
RECORD_STACK_HIGH_ADDRESS	Disabled
OVERRIDE_DEFAULT_TICK_CONFIGURATION	Disabled

Memory management settings:

Memory Allocation	Dynamic / Static
TOTAL_HEAP_SIZE	3072
Memory Management scheme	heap_4

Hook function related definitions:

USE_IDLE_HOOK	Disabled
USE_TICK_HOOK	Disabled
USE_MALLOC_FAILED_HOOK	Disabled
USE_DAEMON_TASK_STARTUP_HOOK	Disabled
CHECK_FOR_STACK_OVERFLOW	Disabled

Run time and task stats gathering related definitions:

GENERATE_RUN_TIME_STATS	Disabled
USE_TRACE_FACILITY	Enabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

Co-routine related definitions:

USE_CO_ROUTINES	Disabled
MAX_CO_ROUTINE_PRIORITIES	2

Software timer definitions:

USE_TIMERS	Enabled
TIMER_TASK_PRIORITY	2
TIMER_QUEUE_LENGTH	10
TIMER_TASK_STACK_DEPTH	256

Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

7.10.2. Include parameters:

Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	Disabled
vTaskSuspend	Enabled
vTaskDelayUntil	Enabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Enabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled

uxTaskGetStackHighWaterMark	Enabled
xTaskGetCurrentTaskHandle	**Enabled ***
eTaskGetState	Enabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Enabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled

7.11. STM32_WPAN

mode: THREAD

7.11.1. THREAD Applications and Services:

THREAD application type:

Thread Application	**Full Thread Device with network configuration ***

Parameters:

PANID	**1812 ***
CHANNEL	**14 ***

7.11.2. Configuration:

HW Timer Server:

CFG_HW_TS_MAX_NBR_CONCURRENT_TIMER	6
CFG_HW_TS_NVIC_RTC_WAKEUP_IT_PREEMPTPRIO	3
CFG_HW_TS_NVIC_RTC_WAKEUP_IT_SUBPRIO	0
CFG_HW_TS_USE_PRIMASK_AS_CRITICAL_SECTION	1
CFG_HW_TS_RTC_HANDLER_MAX_DELAY	(10 * (LSI_VALUE/1000))
CFG_HW_TS_RTC_WAKEUP_HANDLER_ID	RTC_WKUP_IRQn

HW UART:

CFG_HW_LPUART1_ENABLED	Disabled
CFG_HW_LPUART1_DMA_TX_SUPPORTED	Disabled
CFG_HW_USART1_ENABLED	Disabled
CFG_HW_USART1_DMA_TX_SUPPORTED	Disabled

Generic parameters:

CFG_HW_RESET_BY_FW	Enabled
CFG_LPM_SUPPORTED	Disabled
CFG_FULL_LOW_POWER	Disabled
CFG_DEBUGGER_SUPPORTED	**Disabled ***

CFG_DEBUG_TRACE	Disabled
CFG_DEBUG_TRACE_LIGHT	Disabled
CFG_DEBUG_TRACE_FULL	Disabled

Application parameters:

CFG_DEBUG_TRACE_UART	You need to activate either CFG_HW_UART1 or CFG_HW_LPUART1
CFG_CLI_UART	You need to activate either CFG_HW_UART1 or CFG_HW_LPUART1
APPLI_CONFIG_LOG_LEVEL	LOG_LEVEL_INFO
APPLI_PRINT_FILE_FUNC_LINEs	0
CFG_TL_EVT_QUEUE_LENGTH	5
CFG_TL_MOST_EVENT_PAYLOAD_SIZE	27

7.11.3. Parameter Settings:

No CTS for USART1

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PC0	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	
	PC1	ADC1_IN2	Analog mode	No pull-up and no pull-down	n/a	
	PC2	ADC1_IN3	Analog mode	No pull-up and no pull-down	n/a	
I2C1	PB8	I2C1_SCL	Alternate Function Open Drain	Pull-up	Low	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	Low	
RCC	OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
	OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
RF	RF1	RF_RF1	n/a	n/a	n/a	
Single Mapped Signals	PC13	SYS_WKUP2	n/a	n/a	n/a	
	PC14-OSC32_IN	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT	RCC_OSC32_OUT	n/a	n/a	n/a	
	PA11	USB_DM	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA12	USB_DP	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	JTMS
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	JTCK
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	JTDO
	PB6	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Low	STLINK_RX
	PB7	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Low	STLINK_TX
GPIO	PC4	GPIO_EXTI4	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	B1 [Push Button]
	PB0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD2 [Green Led]
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Red Led]
	PD0	GPIO_EXTI0	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	B2 [Push Button]
	PD1	GPIO_EXTI1	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	B3 [Push Button]

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD1 [Blue Led]

8.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA1_Channel1	Peripheral To Memory	**Medium ***
I2C1_RX	DMA1_Channel2	Peripheral To Memory	**High ***
I2C1_TX	DMA1_Channel3	Memory To Peripheral	Low

ADC1: DMA1_Channel1 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

I2C1_RX: DMA1_Channel2 DMA request Settings:

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

I2C1_TX: DMA1_Channel3 DMA request Settings:

Mode:	Normal
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
Prefetch 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	15	0
System tick timer	true	15	0
PVD/PVM0/PVM2 interrupts through EXTI lines 16/31/33	true	5	0
Flash global interrupt	true	5	0
EXTI line0 interrupt	true	5	0
EXTI line1 interrupt	true	5	0
EXTI line4 interrupt	true	5	0
DMA1 channel1 global interrupt	true	5	0
DMA1 channel2 global interrupt	true	5	0
DMA1 channel3 global interrupt	true	5	0
CPU2 SEV interrupt through EXTI line 40 and PWR CPU2 HOLD wake-up interrupt	true	5	0
TIM1 trigger and commutation interrupts and TIM17 global interrupt	true	0	0
I2C1 event interrupt	true	5	0
PWR switching on the fly, end of BLE activity, end of 802.15.4 activity, end of critical radio phase interrupt	true	5	0
HSEM global interrupt	true	5	0
RCC global interrupt	unused		
ADC1 global interrupt	unused		
I2C1 error interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report