1. Description

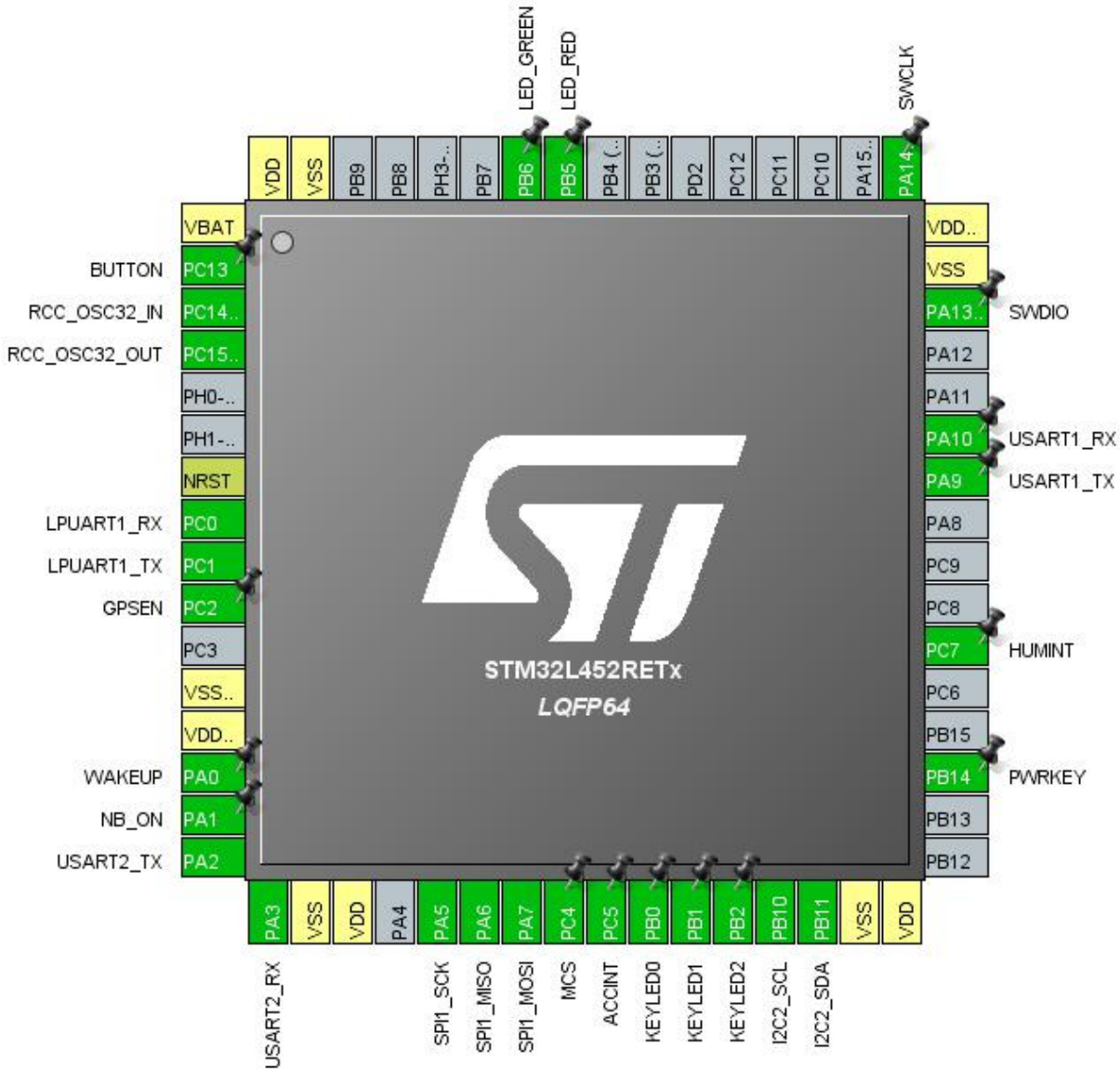
1.1. Project

Project Name	nbiotevk
Board Name	custom
Generated with:	STM32CubeMX 5.1.0
Date	06/22/2019

1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x2
MCU name	STM32L452RETx
MCU Package	LQFP64
MCU Pin number	64

2. Pinout Configuration



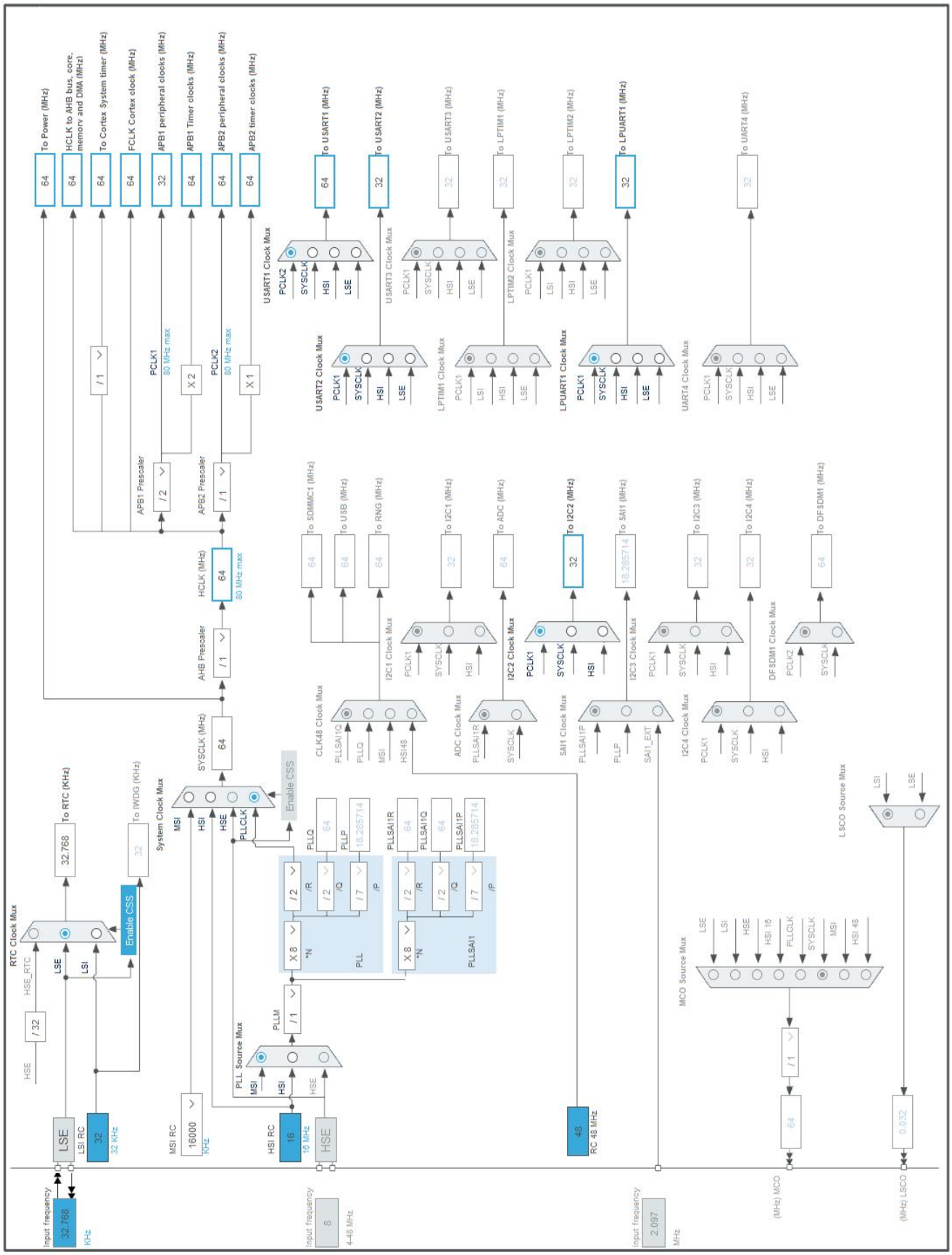
3. Pins Configuration

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13 *	I/O	GPIO_Input	BUTTON
3	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
4	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
7	NRST	Reset		
8	PC0	I/O	LPUART1_RX	
9	PC1	I/O	LPUART1_TX	
10	PC2 *	I/O	GPIO_Output	GPSEN
12	VSSA/VREF-	Power		
13	VDDA/VREF+	Power		
14	PA0	I/O	GPIO_EXTI0	WAKEUP
15	PA1 *	I/O	GPIO_Output	NB_ON
16	PA2	I/O	USART2_TX	
17	PA3	I/O	USART2_RX	
18	VSS	Power		
19	VDD	Power		
21	PA5	I/O	SPI1_SCK	
22	PA6	I/O	SPI1_MISO	
23	PA7	I/O	SPI1_MOSI	
24	PC4 *	I/O	GPIO_Output	MCS
25	PC5 *	I/O	GPIO_Input	ACCINT
26	PB0 *	I/O	GPIO_Input	KEYLED0
27	PB1 *	I/O	GPIO_Input	KEYLED1
28	PB2 *	I/O	GPIO_Input	KEYLED2
29	PB10	I/O	I2C2_SCL	
30	PB11	I/O	I2C2_SDA	
31	VSS	Power		
32	VDD	Power		
35	PB14 *	I/O	GPIO_Output	PWRKEY
38	PC7 *	I/O	GPIO_Input	HUMINT
42	PA9	I/O	USART1_TX	
43	PA10	I/O	USART1_RX	
46	PA13 (JTMS/SWDIO) *	I/O	GPIO_Input	SWDIO
47	VSS	Power		
48	VDDUSB	Power		
49	PA14 (JTCK/SWCLK) *	I/O	GPIO_Input	SWCLK

Pin Number LQFP64	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
57	PB5 *	I/O	GPIO_Output	LED_RED
58	PB6 *	I/O	GPIO_Output	LED_GREEN
63	VSS	Power		
64	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	nbiotevk
Project Folder	C:\proj\IoT\sw\nbiotevk
Toolchain / IDE	SW4STM32
Firmware Package Name and Version	STM32Cube FW_L4 V1.13.0

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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x2
MCU	STM32L452RETx
Datasheet	029968_Rev3

6.2. Parameter Selection

Temperature	25
Vdd	3.0

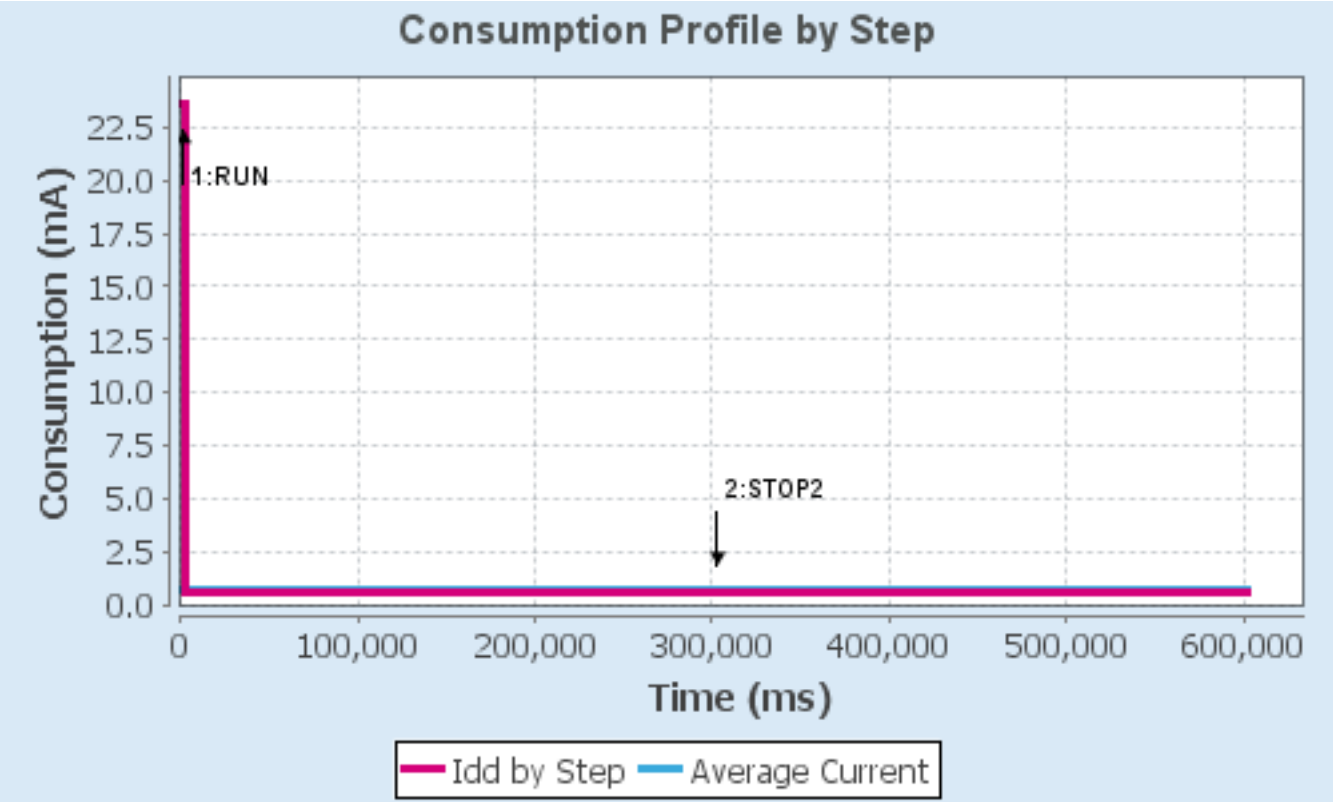
6.3. Sequence

Step	Step1	Step2
Mode	RUN	STOP2
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	FLASH	n/a
Clock Configuration	HSE BYP PLL	LSE BYP RTC
Clock Source Frequency	4 MHz	32.768 kHz
CPU Frequency	64 MHz	0 Hz
Peripherals	GPIOA GPIOB GPIOC I2C2 LPUART1 RTC SPI1 SYS-VREFBUF/COMP1:COMP_High_Speed-Square_VREFBUF_OFF USART1 USART2	
Additional Cons.	14 mA	590 µA
Average Current	23.65 mA	592.8 µA
Duration	3 s	600 s
DMIPS	0.0	0.0
Ta Max	101.74	104.92
Category	In DS Table	In DS Table

6.4. RESULTS

Sequence Time	603 s	Average Current	707.51 µA
Battery Life	0	Average DMIPS	80.0 DMIPS

6.5. Chart



7. IPs and Middleware Configuration

7.1. I2C2

I2C: I2C

7.1.1. Parameter Settings:

Timing configuration:

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

7.2. LPUART1

Mode: Asynchronous

7.2.1. Parameter Settings:

Basic Parameters:

Baud Rate	**9600 ***
Word Length	**8 Bits (including Parity) ***
Parity	None
Stop Bits	1

Advanced Parameters:

Data Direction	Receive and Transmit
Single Sample	Disable

Advanced Features:

Auto Baudrate Mode	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable

TX and RX pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

7.3. RCC

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	**3 ***
Instruction Cache	Enabled
Prefetch Buffer	**Enabled ***
Data Cache	Enabled
Flash Latency(WS)	3 WS (4 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Enabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
LSE Drive Capability	LSE oscillator low drive capability

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.4. RTC

mode: Activate Clock Source

7.4.1. Parameter Settings:

General:

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

7.5. SPI1

Mode: Full-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**8 ***
Baud Rate	**8.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	**Disabled ***
NSS Signal Type	Software

7.6. SYS

Timebase Source: SysTick

7.7. USART1

Mode: Asynchronous

7.7.1. 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
Single Sample	Disable

Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	Disable

RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

7.8. USART2

Mode: Asynchronous

7.8.1. 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
Single Sample	Disable

Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	Disable
RX Pin Active Level Inversion	Disable
Data Inversion	Disable
TX and RX Pins Swapping	Disable
Overrun	Enable
DMA on RX Error	Enable
MSB First	Disable

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	
	PB11	I2C2_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	
LPUART1	PC0	LPUART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PC1	LPUART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
RCC	PC14-OSC32_IN (PC14)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT (PC15)	RCC_OSC32_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA6	SPI1_MISO	Alternate Function Push Pull	**Pull-up ***	**Very High ***	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA3	USART2_RX	Alternate Function Push Pull	**Pull-up ***	**Very High ***	
GPIO	PC13	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	BUTTON
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPSEN
	PA0	GPIO_EXTI0	**External Interrupt Mode with Rising/Falling edge**	No pull-up and no pull-down	n/a	WAKEUP
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NB_ON

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Medium ***	MCS
	PC5	GPIO_Input	Input mode	No pull-up and no pull-down	**n/a**	ACCINT
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	**n/a**	KEYLED0
	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	**n/a**	KEYLED1
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	**n/a**	KEYLED2
	PB14	GPIO_Output	**Output Open Drain ***	No pull-up and no pull-down	Low	PWRKEY
	PC7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	HUMINT
	PA13 (JTMS/SWDIO)	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SWDIO
	PA14 (JTCK/SWCLK)	GPIO_Input	Input mode	**Pull-up ***	n/a	SWCLK
	PB5	GPIO_Output	Output Push Pull	**Pull-up ***	Low	LED_RED
	PB6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_GREEN

8.2. DMA configuration

DMA request	Stream	Direction	Priority
USART2_TX	DMA1_Channel7	Memory To Peripheral	Low
USART1_RX	DMA1_Channel5	Peripheral To Memory	Low
USART1_TX	DMA1_Channel4	Memory To Peripheral	Low
USART2_RX	DMA1_Channel6	Peripheral To Memory	Low
LPUART_RX	DMA2_Channel7	Peripheral To Memory	Low
LPUART_TX	DMA2_Channel6	Memory To Peripheral	Low

USART2_TX: DMA1_Channel7 DMA request Settings:

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

USART1_RX: DMA1_Channel5 DMA request Settings:

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

USART1_TX: DMA1_Channel4 DMA request Settings:

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

USART2_RX: DMA1_Channel6 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	Disable

Peripheral Data Width:	Byte
Memory Data Width:	Byte

LPUART_RX: DMA2_Channel7 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	Disable
Peripheral Data Width:	Byte
Memory Data Width:	Byte

LPUART_TX: DMA2_Channel6 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	0	0
System tick timer	true	1	1
RCC global interrupt	true	0	0
EXTI line0 interrupt	true	2	0
DMA1 channel4 global interrupt	true	0	0
DMA1 channel5 global interrupt	true	0	0
DMA1 channel6 global interrupt	true	0	0
DMA1 channel7 global interrupt	true	0	0
USART1 global interrupt	true	2	1
USART2 global interrupt	true	3	1
DMA2 channel6 global interrupt	true	0	0
DMA2 channel7 global interrupt	true	0	0
LPUART1 global interrupt	true	4	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
SPI1 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report