# 1. Description

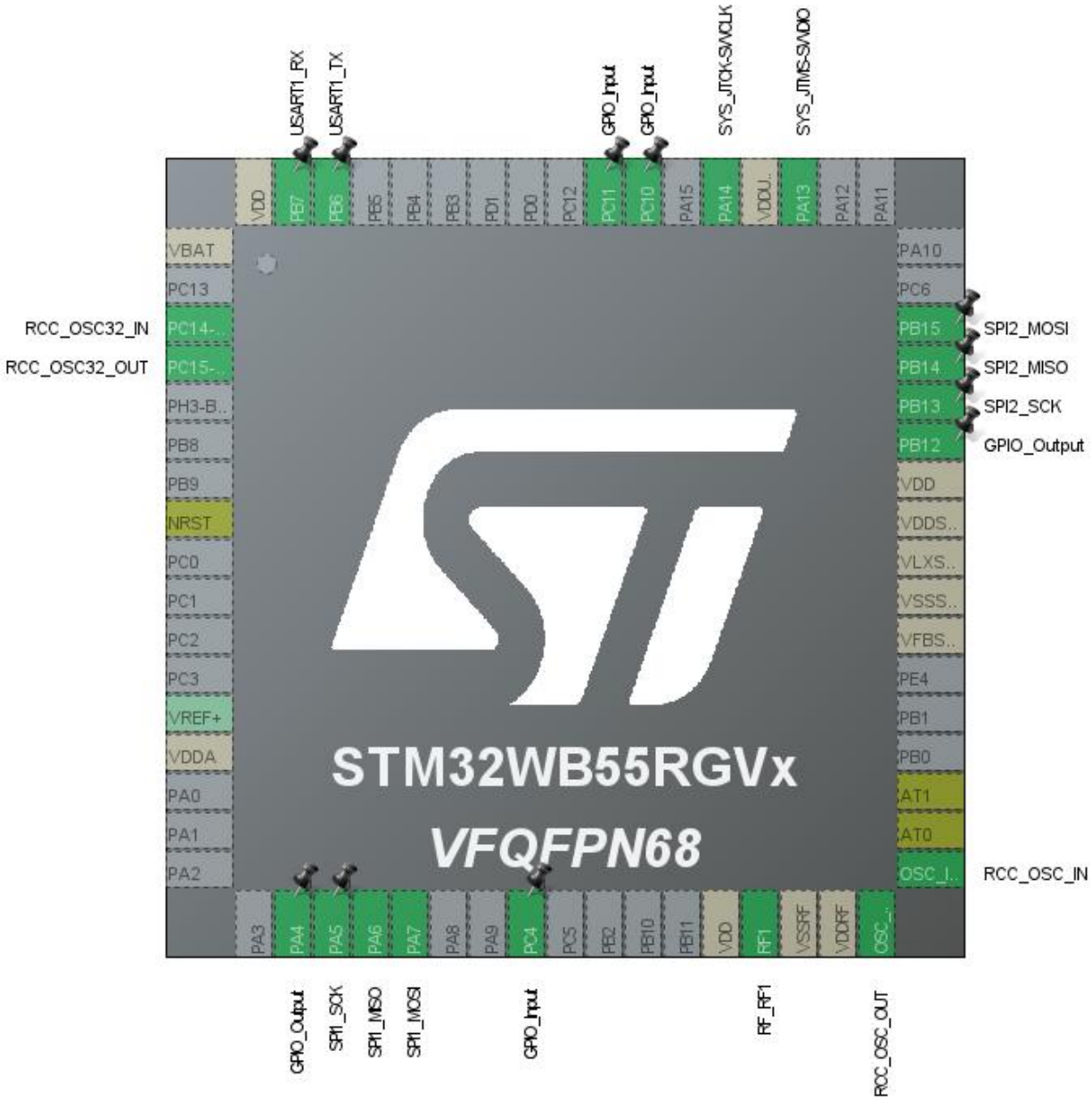
## 1.1. Project

| | |
|---|---|
| Project Name | MAX30001_BLE |
| Board Name | custom |
| Generated with: | STM32CubeMX 5.4.0 |
| Date | 04/13/2020 |

## 1.2. MCU

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

## 2. Pinout Configuration

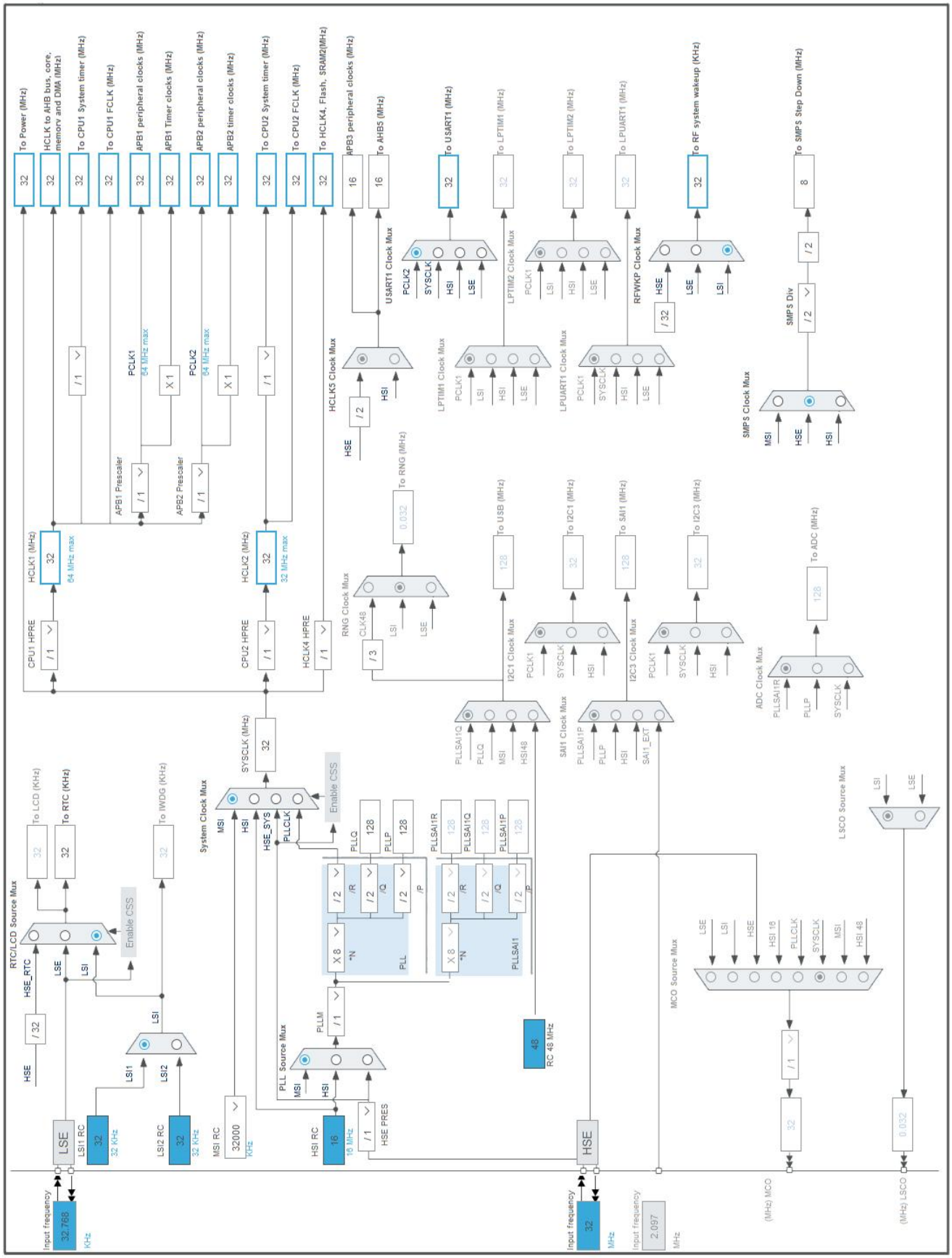


# 3. Pins Configuration

| Pin Number VFQFPN68 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | VBAT | Power | | |
| 3 | PC14-OSC32_IN | I/O | RCC_OSC32_IN | |
| 4 | PC15-OSC32_OUT | I/O | RCC_OSC32_OUT | |
| 8 | NRST | Reset | | |
| 14 | VDDA | Power | | |
| 19 | PA4 * | I/O | GPIO_Output | |
| 20 | PA5 | I/O | SPI1_SCK | |
| 21 | PA6 | I/O | SPI1_MISO | |
| 22 | PA7 | I/O | SPI1_MOSI | |
| 25 | PC4 * | I/O | GPIO_Input | |
| 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 | | |
| 41 | VFBSMPS | Power | | |
| 42 | VSSSMPS | Power | | |
| 43 | VLXSMPS | Power | | |
| 44 | VDDSMPS | Power | | |
| 45 | VDD | Power | | |
| 46 | PB12 * | I/O | GPIO_Output | |
| 47 | PB13 | I/O | SPI2_SCK | |
| 48 | PB14 | I/O | SPI2_MISO | |
| 49 | PB15 | I/O | SPI2_MOSI | |
| 54 | PA13 | I/O | SYS_JTMS-SWDIO | |
| 55 | VDDUSB | Power | | |
| 56 | PA14 | I/O | SYS_JTCK-SWCLK | |
| 58 | PC10 * | I/O | GPIO_Input | |
| 59 | PC11 * | I/O | GPIO_Input | |
| 66 | PB6 | I/O | USART1_TX | |
| 67 | PB7 | I/O | USART1_RX | |
| 68 | 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 | MAX30001_BLE |
| Project Folder | D:\FER_Diplomski\Diplomski rad\SW\MAX30001_BLE |
| Toolchain / IDE | STM32CubeIDE |
| 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. GPIO

## 7.2. HSEM

**mode: Activated**

## 7.3. RCC

**High Speed Clock (HSE): Crystal/Ceramic Resonator**

**Low Speed Clock (LSE) : Crystal/Ceramic Resonator**

### 7.3.1. Parameter Settings:

| | |
|---|---|
| **System Parameters:** | |
| VDD voltage (V) | **1.8 *** |
| 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 |

## 7.4. RF

**mode: Activate RF1**

## 7.5. RTC

**mode: Activate Clock Source**

### 7.5.1. Parameter Settings:

**General:**

| | |
|---|---|
| Hour Format | Hourformat 24 |
| Asynchronous Predivider value | CFG_RTC_ASYNCH_PRESCALER |
| Synchronous Predivider value | CFG_RTC_SYNCH_PRESCALER |

## *7.6. SEQUENCER*

**mode: Enabled**

## *7.7. SPI1*

**Mode: Full-Duplex Master**

### 7.7.1. 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) | 1 Edge |

**Advanced Parameters:**

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

## *7.8. SPI2*

**Mode: Full-Duplex Master**

### 7.8.1. 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) | 1 Edge |

**Advanced Parameters:**

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

## *7.9. SYS*

**Debug: Serial Wire**

**Timebase Source: SysTick**

## *7.10. TINY_LPM*

**mode: Enabled**

## *7.11. USART1*

**Mode: Asynchronous**

### 7.11.1. 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 |
| ClockPrescaler | clock /1 |
| Fifo Mode | Disable |
| Txfifo Threshold | 1 eighth full configuration |
| Rxfifo Threshold | 1 eighth full configuration |

**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 |

## *7.12. STM32_WPAN*

**mode: BLE**

### 7.12.1. BLE Applications and Services:

**BLE Application Type:**

| | |
|---|---|
| BLE Application Type | Server profile |

**Server Mode:**

| | |
|---|---|
| BT SIG Beacon | Disabled |
| BT SIG Blood Pressure Sensor | Disabled |
| BT SIG Health Thermometer Sensor | Disabled |
| BT SIG Heart Rate Sensor | Disabled |
| Custom P2P Server | Enabled |
| Custom Template | Disabled |

**BLE Services Configuration:**

| | |
|---|---|
| The device needs to support the Peripheral Role | 1 |
| The device needs to support the Central Role | 0 |
| BLE_CFG_SVC_MAX_NBR_CB | 7 |
| BLE_CFG_CLT_MAX_NBR_CB | 0 |

**P2P Service:**

| | |
|---|---|
| P2P_SERVER_NUMBER | P2P_SERVER1 |

**Local Name:**

| | |
|---|---|
| LOCAL_NAME | P2PSRV1 |

### 7.12.2. 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_DEBUGGER_SUPPORTED | Enabled |
| CFG_DEBUG_BLE_TRACE | Disabled |
| CFG_DEBUG_APP_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_CONSOLE_MENU | You need to activate either CFG_HW_UART1 or CFG_HW_LPUART1 |
| CFG_ADV_BD_ADDRESS | 0 |
| CFG_FAST_CONN_ADV_INTERVAL_MIN | 80 |
| CFG_FAST_CONN_ADV_INTERVAL_MAX | 100 |
| CFG_LP_CONN_ADV_INTERVAL_MIN | 1000 |
| CFG_LP_CONN_ADV_INTERVAL_MAX | 2500 |
| CFG_IO_CAPABILITY | Display Yes No |
| CFG_MITM_PROTECTION | MITM protection required |
| L2CAP_REQUEST_NEW_CONN_PARAM | 0 |
| CFG_RTCCLK_DIVIDER_CONF | 0 |

**Debug options:**

| | |
|---|---|
| BLE_DBG_APP_EN | Disabled |
| BLE_DBG_P2P_STM_EN | Disabled |

## 7.12.3. 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 |
|---|---|---|---|---|---|---|
| RCC | PC14-OSC32_IN | RCC_OSC32_IN | n/a | n/a | n/a | |
| | PC15-OSC32_OUT | RCC_OSC32_OUT | n/a | n/a | n/a | |
| | 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 | |
| SPI1 | PA5 | SPI1_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA6 | SPI1_MISO | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PA7 | SPI1_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| SPI2 | PB13 | SPI2_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB14 | SPI2_MISO | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| | PB15 | SPI2_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Low | |
| SYS | PA13 | SYS_JTMS-SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_JTCK-SWCLK | n/a | n/a | n/a | |
| USART1 | PB6 | USART1_TX | Alternate Function Push Pull | No pull-up and no pull-down | **Very High *** | |
| | PB7 | USART1_RX | Alternate Function Push Pull | **Pull-down *** | **Very High *** | |
| GPIO | PA4 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |
| | PC4 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PB12 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | |
| | PC10 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |
| | PC11 | GPIO_Input | Input mode | No pull-up and no pull-down | n/a | |

## 8.2. DMA configuration

nothing configured in DMA service

## 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 | 0 | 0 |
| USART1 global interrupt | true | 0 | 0 |
| PVD/PVM0/PVM2 interrupts through EXTI lines 16/31/33 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| CPU2 SEV interrupt through EXTI line 40 and PWR CPU2 HOLD wake-up interrupt | unused | | |
| SPI1 global interrupt | unused | | |
| SPI2 global interrupt | unused | | |
| PWR switching on the fly, end of BLE activity, end of 802.15.4 activity, end of critical radio phase interrupt | unused | | |
| HSEM global interrupt | unused | | |
| FPU global interrupt | unused | | |

*** User modified value**

# 9. Software Pack Report