# *1. Description*

## 1.1. Project

| Project Name | l4-windsensor |
|---|---|
| Board Name | NUCLEO-L432KC |
| Generated with: | STM32CubeMX 4.20.1 |
| Date | 05/03/2017 |

## 1.2. MCU

| MCU Series | STM32L4 |
|---|---|
| MCU Line | STM32L4x2 |
| MCU name | STM32L432KCUx |
| MCU Package | UFQFPN32 |
| MCU Pin number | 32 |

# 2. Pinout Configuration



STM32L432KCUx
UFQFPN32
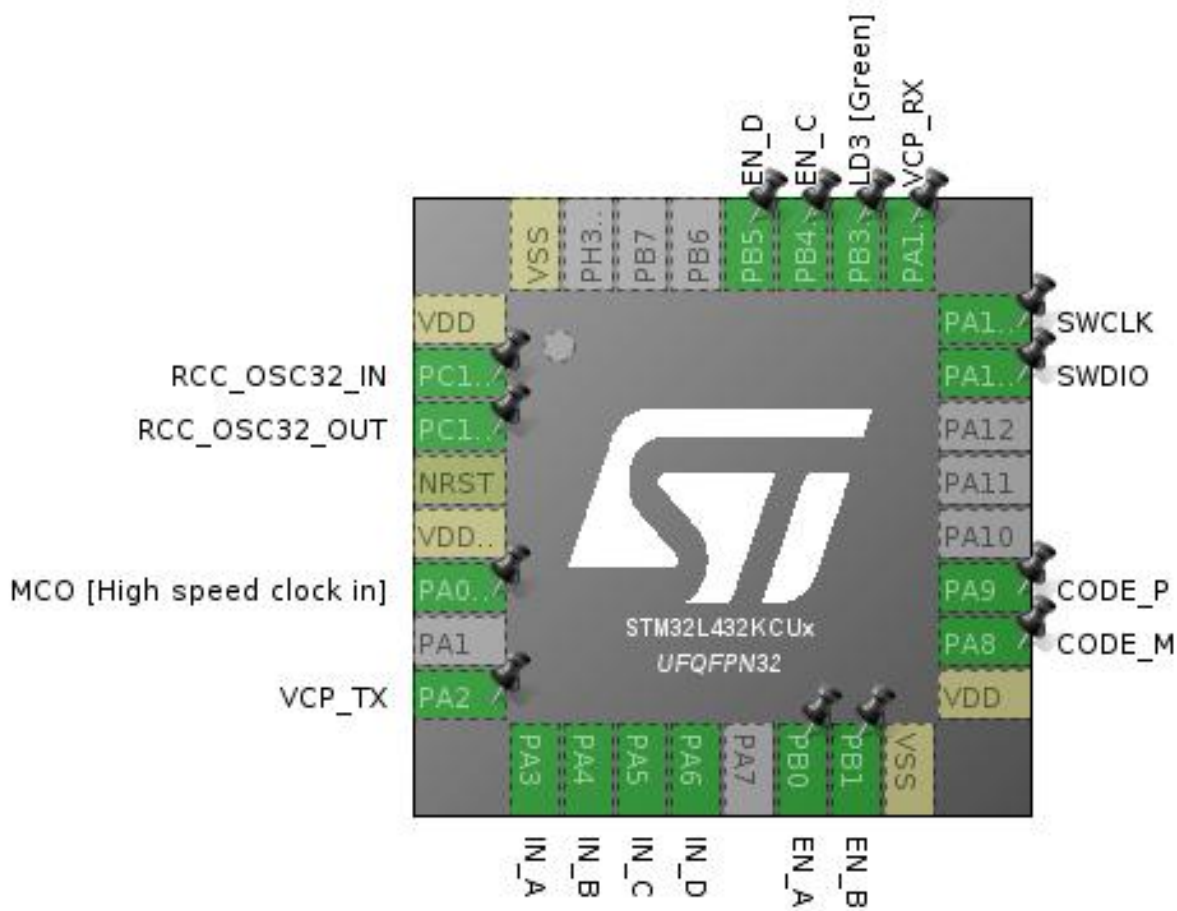
# *3. Pins Configuration*

| Pin Number UFQFPN32 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | VDD | Power | | |
| 2 | PC14-OSC32_IN (PC14) | I/O | RCC_OSC32_IN | |
| 3 | PC15-OSC32_OUT (PC15) | I/O | RCC_OSC32_OUT | |
| 4 | NRST | Reset | | |
| 5 | VDDA/VREF+ | Power | | |
| 6 | PA0-CK_IN | I/O | RCC_CK_IN | MCO [High speed clock in] |
| 8 | PA2 | I/O | USART2_TX | VCP_TX |
| 9 | PA3 | I/O | ADC1_IN8 | IN_A |
| 10 | PA4 | I/O | ADC1_IN9 | IN_B |
| 11 | PA5 | I/O | ADC1_IN10 | IN_C |
| 12 | PA6 | I/O | ADC1_IN11 | IN_D |
| 14 | PB0 * | I/O | GPIO_Output | EN_A |
| 15 | PB1 * | I/O | GPIO_Output | EN_B |
| 16 | VSS | Power | | |
| 17 | VDD | Power | | |
| 18 | PA8 * | I/O | GPIO_Output | CODE_M |
| 19 | PA9 * | I/O | GPIO_Output | CODE_P |
| 23 | PA13 (JTMS-SWDIO) | I/O | SYS_JTMS-SWDIO | SWDIO |
| 24 | PA14 (JTCK-SWCLK) | I/O | SYS_JTCK-SWCLK | SWCLK |
| 25 | PA15 (JTDI) | I/O | USART2_RX | VCP_RX |
| 26 | PB3 (JTDO-TRACESWO) * | I/O | GPIO_Output | LD3 [Green] |
| 27 | PB4 (NJTRST) * | I/O | GPIO_Output | EN_C |
| 28 | PB5 * | I/O | GPIO_Output | EN_D |
| 32 | VSS | Power | | |

* The pin is affected with an I/O function

# *4. Clock Tree Configuration*
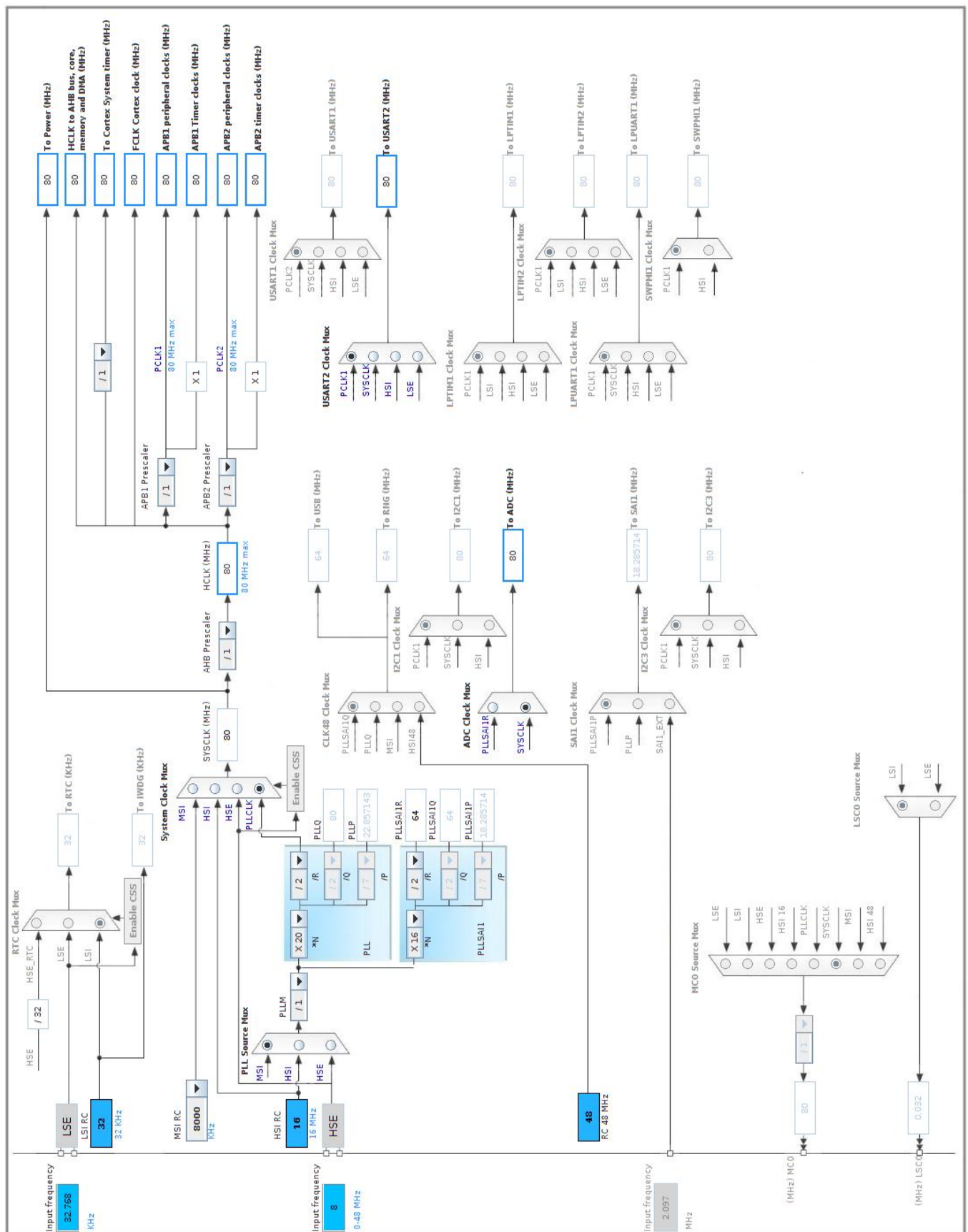
# 5. IPs and Middleware Configuration

## 5.1. ADC1

**IN8: IN8 Single-ended**
**IN9: IN9 Single-ended**
**IN10: IN10 Single-ended**
**IN11: IN11 Single-ended**

### 5.1.1. Parameter Settings:

**ADC_Settings:**

| | |
|---|---|
| Clock Prescaler | Asynchronous clock mode divided by 1 |
| Resolution | ADC 12-bit resolution |
| Data Alignment | Right alignment |
| Scan Conversion Mode | Disabled |
| 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 | Disable |
| Number Of Conversion | 1 |
| External Trigger Conversion Source | **Timer 1 Trigger Out event *** |
| External Trigger Conversion Edge | Trigger detection on the rising edge |
| Rank | 1 |
| Channel | **Channel 10 *** |
| Sampling Time | 2.5 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

## *5.2. RCC*

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

### 5.2.1. Parameter Settings:

**System Parameters:**

| | |
|---|---|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Enabled |
| Prefetch Buffer | Disabled |
| Data Cache | Enabled |
| Flash Latency(WS) | 4 WS (5 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 |

## *5.3. SYS*

**Debug: Serial Wire**
**Timebase Source: SysTick**

## *5.4. TIM1*

**Clock Source   : Internal Clock**

### 5.4.1. Parameter Settings:

**Counter Settings:**

| | |
|---|---|
| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |

| Counter Period (AutoReload Register - 16 bits value ) | **49 \*** |
| Internal Clock Division (CKD) | No Division |
| Repetition Counter (RCR - 8 bits value) | 0 |

**Trigger Output (TRGO) Parameters:**

| Master/Slave Mode | **Enable (sync between this TIM (Master) and its Slaves (through TRGO)) \*** |
| Trigger Event Selection TRGO | **Update Event \*** |
| Trigger Event Selection TRGO2 | Reset (UG bit from TIMx_EGR) |

## 5.5. TIM2

**Slave Mode: External Clock Mode 1**

**Trigger Source: ITR0**

### 5.5.1. Parameter Settings:

**Counter Settings:**

| Prescaler (PSC - 16 bits value) | 0 |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 32 bits value ) | **19 \*** |
| Internal Clock Division (CKD) | No Division |
| Slave Mode Controller | ETR mode 1 |

**Trigger Output (TRGO) Parameters:**

| Master/Slave Mode | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection TRGO | **Update Event \*** |

## 5.6. USART2

**Mode: Asynchronous**

### 5.6.1. 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**

# 6. System Configuration

## 6.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
| ADC1 | PA3 | ADC1_IN8 | Analog mode for ADC conversion | No pull-up and no pull-down | n/a | IN_A |
| | PA4 | ADC1_IN9 | Analog mode for ADC conversion | No pull-up and no pull-down | n/a | IN_B |
| | PA5 | ADC1_IN10 | Analog mode for ADC conversion | No pull-up and no pull-down | n/a | IN_C |
| | PA6 | ADC1_IN11 | Analog mode for ADC conversion | No pull-up and no pull-down | n/a | IN_D |
| 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 | |
| | PA0-CK_IN | RCC_CK_IN | n/a | n/a | n/a | MCO [High speed clock in] |
| SYS | PA13 (JTMS-SWDIO) | SYS_JTMS-SWDIO | n/a | n/a | n/a | SWDIO |
| | PA14 (JTCK-SWCLK) | SYS_JTCK-SWCLK | n/a | n/a | n/a | SWCLK |
| USART2 | PA2 | USART2_TX | Alternate Function Push Pull | Pull-up | **Very High** * | VCP_TX |
| | PA15 (JTDI) | USART2_RX | Alternate Function Push Pull | Pull-up | **Very High** * | VCP_RX |
| GPIO | PB0 | GPIO_Output | Output Push Pull | **Pull-down** * | Low | EN_A |
| | PB1 | GPIO_Output | Output Push Pull | **Pull-down** * | Low | EN_B |
| | PA8 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | **Very High** * | CODE_M |
| | PA9 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | **Very High** * | CODE_P |
| | PB3 (JTDO-TRACESWO) | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LD3 [Green] |
| | PB4 (NJTRST) | GPIO_Output | Output Push Pull | **Pull-down** * | Low | EN_C |
| | PB5 | GPIO_Output | Output Push Pull | | Low | EN_D |

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
|  |  |  |  | **Pull-down \*** |  |  |

## 6.2. DMA configuration

| DMA request | Stream | Direction | Priority |
|---|---|---|---|
| USART2_TX | DMA1_Channel7 | Memory To Peripheral | Low |
| ADC1 | DMA2_Channel3 | Peripheral To Memory | Low |
| TIM2_UP | DMA1_Channel2 | Peripheral To Memory | Low |

### USART2_TX: DMA1_Channel7 DMA request Settings:

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

### ADC1: DMA2_Channel3 DMA request Settings:

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

### TIM2_UP: DMA1_Channel2 DMA request Settings:

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

## 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 |
| 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 |
| DMA1 channel2 global interrupt | true | 0 | 0 |
| DMA1 channel7 global interrupt | true | 0 | 0 |
| DMA2 channel3 global interrupt | true | 0 | 0 |
| PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| ADC1 global interrupt | unused | | |
| TIM1 break interrupt and TIM15 global interrupt | unused | | |
| TIM1 update interrupt and TIM16 global interrupt | unused | | |
| TIM1 trigger and commutation interrupts | unused | | |
| TIM1 capture compare interrupt | unused | | |
| TIM2 global interrupt | unused | | |
| USART2 global interrupt | unused | | |
| FPU global interrupt | unused | | |

**\* User modified value**

# 7. Power Consumption Calculator report

7.1. Microcontroller Selection

| | |
|---|---|
| Series | STM32L4 |
| Line | STM32L4x2 |
| MCU | STM32L432KCUx |
| Datasheet | 028798_Rev1 |

7.2. Parameter Selection

| | |
|---|---|
| Temperature | 25 |
| Vdd | null |

# *8. Software Project*

## 8.1. Project Settings

| Name | Value |
|---|---|
| Project Name | l4-windsensor |
| Project Folder | /home/elmot/projects/l4-windsensor |
| Toolchain / IDE | SW4STM32 |
| Firmware Package Name and Version | STM32Cube FW_L4 V1.7.0 |

## 8.2. 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) | No |